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## **COVID-19 Global Pandemic, Financial Development and Financial Inclusion**

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**COVID-19 Global Pandemic, Financial Development and Financial Inclusion**

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**Abstract**

This chapter examines how the Covid-19 pandemic has affected financial development and financial inclusion in African countries. The study provides both broad perspectives and country-specific frameworks based on selected country cases studies. Some emphasis is placed on the achievement of sustainable development goals (SDGs) that are related to financial inclusion. The study aims to understand what immediate challenges the COVID-19 pandemic has represented to the economies and societies on the one hand and on the other, the effect of the COVID-19 on the interconnected financial systems in terms of consequences of the pandemic. The relevance of the study builds on the importance of these insights in helping both scholars and policy makers understand how the effect of the pandemic on the financial system and by extension, the global economy can be mitigated for more financial inclusion.

*Keywords:* Covid-19 pandemic; financial development; Financial inclusion; Africa

## 1. Introduction

The purpose of financial inclusion is to enhance use of and access to formal financial services by individuals in order to improve economic security and opportunity to impoverished and excluded fractions of the population (Demirgüç-Kunt et al. 2017; Yamada et al., 2020). The concern has been of particular relevance to developing countries especially in the light of Sustainable Development Goals (SDGs) which are centered on, *inter alia*, consolidating the capability of financial institutions at the domestic level to expand and encourage access to financial, insurance and banking services to everyone. Yamada et al. (2020) however maintain that prospects for financial services are not quite encouraging though between 2011 and 2017, those who held accounts with a mobile money provider or financial institution increased from 51% to 69%. According to the narrative, as of 2017, about 1.7 billion adults were unbanked in the world and compared to high income countries, a greater proportion of the unbanked are in middle- and low-income countries.

Consistent with the attendant literature (Karlan et al., 2016; Demirgüç-Kunt et al., 2017; Yamada et al., 2020), the concept of financial inclusion can be understood as a phenomenon that enhances the availability of a plethora of financial services such as saving accounts, loans, insurances and loans for individuals and by extension, these individuals also benefit in terms of financial risk management, productive investment and the smoothing of consumption. Hence, the population can substantially benefit from financial inclusion if payment facilities for daily transactions as well as pensions and wages are switched to digital payments from cash.

Since the proclamation of SDGs, much literature has been covered on financial inclusion (Tchamyou, 2019; Tchamyou et al., 2019). However, the recent outbreak of the COVID-19 pandemic has represented a serious challenge to inclusive development, especially in the light of the targeted SDGs (Diop and Asongu, 2021; Asongu et al., 2020; Diop et al.,

2021; Ezeaku et al., 2021). This chapter contributes to the extant literature on the consequences of the COVID-19 pandemic by assessing the impact and consequences of the recent pandemic on financial development and financial inclusion. This is in response to both scholarly and policy concerns that across the world, financial institutions are dealing with and monitoring the impacts of the COVID-19 pandemic. Hence, this study aims to understand what immediate challenges the COVID-19 pandemic has represented to the economies and societies on the one hand and on the other, the effect of the COVID-19 on the interconnected financial systems in terms of consequences of the pandemic. The relevance of the study builds on the importance of these insights in helping both scholars and policy makers understand how the effect of the pandemic on the financial system and by extension, the global economy can be mitigated for more financial inclusion.

The rest of the chapter is organized as follows. Section 2 provides insights into the impact of the COVID-19 pandemic on the financial sector with particular emphasis on digital payments, emerging risks in the financial sector and post-pandemic financial sector services. Section 3 focuses on the implications of the COVID-19 pandemic on the financial sector which insights into consequences for asset management, banking and capital markets. Section 4 concludes with implications for SDGs and future research directions.

## **2. The impact of Covid-19 on the financial sector**

The COVID-19 pandemic brought uncertainties and disruptions in various sectors, including financial markets and institutions. Following the outbreak of the pandemic, there was a fall in the stock price of financials, including banking, insurance, and diversified financial firms (Wójcik and Ioannou, 2020). Financial institutions experienced an increase in nonperforming loans and a drop in demand for loans (Park and Shin, 2021; Gourinchas et al., 2020; Li et al., 2021). Microfinance institutions (MFIs) and nonbank financial institutions were disbursing

just over three quarters of pre-crisis loan volumes (IFC, 2020). Also, high nonperforming loan ratios are not good for the financial sector and the entire economy, as they are positively associated with corporate debt overhangs, which affect investment and delay economic recovery (Aiyar et al., 2015; Kalemli-Özcan et al., 2018). However, there is a silver lining as the disruptions caused by the pandemic also created opportunities, especially in the digital payments space.

## **2.1 Increase of digital payments**

The pandemic has accelerated the use of digital technology to conduct financial transactions. Digital finance innovations enable marginalized communities, especially in the global South, to access financial resources (Puschmann, 2017; Gomber et al., 2018; Bharadwaj et al., 2019). Financial technology (FinTech) offers the financial industry, and consumers, innovations that render their transactions less expensive, more convenient, and more secure (Chen et al., 2019; Puschmann, 2017). Between 2010 and 2019, over \$165.5 billion was invested into FinTech firms (Imerman and Fabozzi, 2020). Financial institutions and technology firms are increasingly investing in FinTech technologies, which attracted global investments of \$40 billion in 2019 (KPMG, 2019). Fintech innovations are contributing to reducing the cost of providing financial services, rendering it possible to reach more people, and reducing the need for face-to-face interactions, essential for keeping up economic activity during the pandemic. The rise in smartphone penetration and the disruption caused by COVID-19 has contributed to a significant rise of one of the largest Fintech products—that is, digital payments. Digital payments account for about 25% of the fintech market (Blaney, 2020). Digital payments, as used in this chapter, refer to the transfer of value from one payment account to another using a digital device such as a mobile phone or computer. According to the 2021 Digital Payments Market Report, the transaction value for the global digital payments market was \$5.44 trillion in 2020, and based on projections, will be worth \$11.29trillion by 2026. Key players in the

digital payments market are Alipay, Apple Pay, Amazon Pay, Tencent, First Data, Google Pay, Paypal, Fiserv, MasterCard, and Visa Inc. In 2020, 90% of users made payments with their smartphones (Blaney, 2020).

Various factors account for the rise in digital payment in the pandemic era. First, they are regarded as playing an important role in addressing pandemic related challenges (Remolina (2020)). Digital payments enabled people to pay for goods and services while adhering to social distancing (Ziegler et al., 2020). In the city of Kigali in Rwanda, taxis were directed by the regulator to acquire meters that will enable a passenger to pay for his/her ride digitally, which prevents the exchange of cash, hence contributes to the fight against COVID-19 (Ashimwe, 2020). Second, customers were attracted to digital payments due to ease and speed of transactions. In the city of Kigali, Rwanda, taxi passengers can get tickets online via the Tap&Go app or web as well as pay for tickets using cashless payment platforms (Bizimungu, 2021). Digital payment technologies are also improving the ability to provide financial assistance to vulnerable segments of the population following the outbreak of the pandemic (Agur et al., 2020). Additionally, digital payment technologies enabled people to perform remittance transfers in a few minutes (Dubey et al., 2020). The disruptions caused by the pandemic also required innovative and more convenient way to send money to loved ones. Digital technology enabled people to carry out remittance transfers from the comfort of their homes without the need for physical queuing, as is the case when they use conventional remittance channels. Remittances also have a role to play in achieving the SDGs. It is precisely for this reason that one of the recommendations of the SDG is the reduction of money transfer fees (Nurse, 2018).

In Africa, the rapid penetration of mobile phones has helped the rise of mobile payments. By mobile payments, we are referring to all purchases using mobile phones (Karsen et al., 2019). PayU South Africa recorded a 35% increase in e-commerce in 2020, with most

transactions completed on mobile devices (PayU, 2021). In Rwanda, the volume of mobile payment increased by 51% in the first half of 2020 following the onset of the pandemic (Bizimungu, 2021). In Kenya, use of digital payments for business transactions increased from 18% at the end of 2019 to 62% by March 2021, and there was a 58% surge in clients paying digitally during the lockdown in April – July 2020 (FSD, 2021).

The increase in digital payments is significant due to its relationship to financial inclusion, and this has implications with respect to income inequality. Studies have highlighted the role of digital financial inclusion in reducing income inequality (Asongu, 2015; Asongu & Le Roux, 2017; Tchamyou, 2020, 2021).

The importance of digital payments to financial inclusion, especially during the pandemic era explains why governments in various African countries have provided incentives to encourage the use of digital payment platforms to pay for goods and services. For instance, the government of Uganda reduced mobile money transfer fees, while the governments of Ghana, Cameroon, the Democratic Republic of Congo, Mozambique, Kenya, Rwanda, Zambia, and Senegal have cut mobile money transfer fees and raised transaction size limits (Agur et al., 2020).

That said, the increase in digitalization of the economy in general and the financial sector in particular, generates risks, which must be addressed. This is the focus of the next subsection.

## **2.2. COVID-19 and emerging risks in the financial sector**

The COVID-19 pandemic has increased the risks by faced financial institutions. The risks relate particularly to fraud and data security. The pandemic environment is providing conducive ground for criminals and fraudsters who are seeking to exploit the crisis. A recent survey conducted by the Association of Certified Fraud Examiners noted that 77% of fraud professionals had experienced an increase in fraud in 2020 (ACFE, 2020).



The digitalization of financial services makes financial institutions more vulnerable to cybercrime. In fact, the financial sector has been attacked by hackers relatively more than other sectors during the COVID-19 pandemic (Aldasoro et al., 2021). A survey conducted among financial institutions by the Financial Services Information Sharing and Analysis Center (FS-ISAC) – an industry consortium of nearly 7,000-member financial institutions – found that COVID-19-related attacks increased with the spread of the pandemic, from less than 5,000 per week in February 2020 to over 200,000 per week towards the end of April 2020 (FS-ISAC, 2020).

Financial institutions in Africa have equally faced cyber-attacks. In October 2020, about 4000 customers of BetterSure, a South African home insurance company, experienced a phishing attack (CEIP, 2021). Still in South Africa, in August 2020, Experian South Africa, a major credit bureau, experienced a data breach that exposed personal information of millions of its South African clients (CEIP, 2021). In October 2020, the heads of MTN, Airtel, and Stanbic Bank in Uganda issued a joined statement acknowledging that hackers targeted Pegasus Technologies, a firm that processes mobile money transactions for the two telecom firms, and funds were stolen (CEIP, 2021; Signé and Signé, 2021).

Misleading information is an emerging risk which the financial sector must deal with. Social media financial bots diffuse misleading information and equally engage in speculative campaigns promoting certain stocks (Tardelli et al., 2020). A recent study on the effects of fake news in financial markets found that it increases price volatility by about 40% and increases abnormal trading activity by over 50% (Kogan et al., 2020). Clarke et al. (2020) note that fake news generates significantly more attention with respect to stock price reaction than legitimate news.

Arguably, misleading information generates negative effects because it influences sentiment. Studies have noted that sentiment is a vital driver of investment decisions in the

stock market (Huang et al., 2015; Deng et al., 2018), and mass media plays an important role in the diffusion of sentiment (Tetlock, 2015; Ahern and Sosyura, 2014). Scholars have shown that mass media sentiment influences stock market performance (Tetlock, 2014).

In addition to addressing the emerging risks mentioned earlier, financial institutions also need to develop key priority areas in the post-COVID-19 period. We shed light on this issue in the next sub-section.

### **2.3. Financial services priorities in post-Covid-19**

The disruptions caused by COVID-19 also calls on the need for financial services providers to think about major priority areas in the post-COVID-19 era.

The pandemic has brought to the fore the importance of digital payments. There is a huge untapped market for digital payments in Africa, and financial services providers need to engage in digital transformation. In Africa, consumer payments are expected to top \$2.1 trillion by 2025 and only about 5% of these transactions are currently digitized (UNCDF, 2021). Digital payments have the potential of improving access to other financial services, like credit, which is usually the topmost requirement of small merchants. Financial service providers in Africa need to build innovative solutions to capture this huge opportunity, especially as it affects their profit margin. For example, a study conducted in Cameroon found that SMEs using mobile payment services had higher profitability, as it provides funding opportunities (Talom and Tengeh, 2020).

To remain competitive, financial services providers would have to establish partnerships with non-traditional actors such as fintech firms. For instance, collaboration between traditional financial institutions and FinTech firms could address payment and settlement bottlenecks (Drasch et al., 2018). Such collaboration will help clients of financial service providers to access diverse financial services as well as carryout transactions remotely (Coffie

et al., 2021). Doing so fosters financial inclusion, as it removes some of the barriers that people often face when accessing financial services (Alfred et al., 2017; Coffie et al., 2020). Additionally, the delivery of FinTech-enabled services through mobile phones overcomes the infrastructural deficiencies hindering the delivery of financial services especially to rural areas (Demirgüç-Kunt et al., 2020). Fintech services also offer cost-effective platforms when compared with conventional financial services and strengthen users' experience using easy and convenient functions (Lim et al., 2019), and contribute to a reduction of transaction costs and improvement of service quality (Aslam et al., 2021; Wamba et al., 2020). These issues have to be taken seriously if financial institutions expect to thrive in the post-COVID-19 era.

To meet customers' needs, financial services providers need to ensure the interoperability of digital platforms as well as deploy application programming interfaces to permit the utilization of embedded-payment systems (EIU, 2021). APIs work by establishing a mechanism for remote services to request something of the platform, loosely described as either data to be provided by the platform, or an operation to be performed by the platform (Bock 2015). Small merchants would have to build their transaction systems to work with various payment providers (Riley, 2020).

In the post-COVID era in Africa, there will be need for services related to the fostering of digital financial literacy. Such services will be needed due to the gradual expansion of the digitalization of financial services in the continent. These services will be particularly valuable among segments of the population with low levels of formal education. Such services are needed due to the impact of FinTech developments on financial planning and financial wellbeing (Frame et al., 2019). Researchers have noted Fintech developments may enhance financial capability, just as they may negatively affect financial wellbeing by setting off impulsive consumer behavior (Panos and Wilson, 2020). Also, digital financial literacy raises awareness of digital financial risks. There is a need for users to understand the

additional risks that they may encounter when using digital financial services (Morgan et al., 2019). By promoting digital financial literacy, financial services providers are contributing to building inclusive and financially resilient communities.

Providing digital finance education may be one way for financial services providers to engage with the customers as well as attract potential customers by making them aware of the existence of unconventional financial products and services provided digitally on the internet and mobile phones (Morgan et al. 2019). Knowledge of products, including how they work, increases the likelihood of their usage, as customers see the value of money. Customers tend to engage with businesses that can optimize their resources and outcomes (Karpen and Conduit, 2020).

Customer engagement also entails dealing with customer complaints. Financial services providers will need to develop innovative tools aimed at dealing with customer complaints post-COVID. For instance, the use of artificial intelligence in addressing customers' complaints related to financial services. Artificial intelligence can handle large volumes of data, including unstructured inputs such as speech or images (Kietzmann et al., 2018), which makes it extremely relevant to financial services providers. The use of artificial intelligence systems to address customer complaints in the financial services space is gaining ground in Africa. In March 2021, The African Development Bank (AfDB) approved a grant of \$1.024 million for artificial intelligence enabled systems to process customer complaints on behalf of the national banks of Ghana and Rwanda and the Competition and Consumer Protection Commission of Zambia (AfDB, 2021). The long-term goal of the project is to improve the tracking of client complaints made to financial services providers and strengthen the support for marginalized groups, which will build confidence in the use of financial services (AfDB, 2021). Consumer confidence is key to building an inclusive financial system, and the latter is

linked to the SDGs. For example, the UN 2030 agenda for sustainable development acknowledges the essential role of financial inclusion in successfully implementing the SDGs.

### **3. Implications of the Covid-19 pandemic to the financial sector**

#### **3.1 Implications for asset, real estate and private equity management**

Consistent with the attendant literature (Giese and Haldane, 2020; KPMG, 2021), the COVID-19 pandemic also has implications for the financial sector, especially as it pertains to consequences on asset, real estate and private equity management. These are discussed in the same chronology as highlighted.

First, from the premise of asset management, *inter alia*: (i) asset management agility is needed especially given the significant disruptions posed by the COVID-19 pandemic in the asset management industry; (ii) a perspective of asset management in the light of environmental sustainability also needs to be taken on board because environmental, social and governance issues are immense challenges for SDGs and (iii) new tax dynamics should be considered given that the contemporary tax and investment landscape are changed in the light of those witnessed after the global financial crisis (KPMG, 2021; Fabeil, 2020).

Second, in terms of real estate management, three main insights are worthwhile, notably: (i) the capacity to effectively value real estate in the light of uncertainty in order to provide a fair assessment amid apparent volatilities; (ii) rent concessions which are expedient for COVID-19 oriented economic operations; (iii) the real estate investment trust (REIT) industry especially as the novel coronavirus is bringing uncertainty and modifying the business environment and (iii) leveraging on best practices that ensure the continuity of business confidence from clients amid the crisis (KPMG, 2021; Fabeil, 2020).

Third, from the perspective of private equity, due diligence is essential and six main techniques can be used by private equity investors in order to arrive at informed decisions. These include: (i) proactive portfolio management and future planning; (ii) understanding

concerns surrounding private equity valuation during the COVID-19 pandemic; (iii) adopting robust strategies in trying times especially those that are resilient, innovative and adapted to ongoing crises and (iv) understanding private equity when times are turbulent especially with insights from rapid capital stress testing (Giese and Haldane, 2020).

### **3.2 Implication for banking and capital markets**

The COVID-19 pandemic also has implications for the banking and capital markets, especially in view of the fact that banks are currently in need of resources with which to confront the current challenges and better prepare for potential challenges in the future (KPMG, 2021; Berger and Demirgüç-Kunt, 2021). It is worthwhile to articulate that with disruptions from the COVID-19 pandemic, banks of all types (e.g. small and medium-sized banks, regional banks, large universal banks, challenger bank, fintech banks and central banks) are being confronted with unprecedented risks and challenges (Giese & Haldane, 2020). In this context, a plethora of measures are being taken by financial institutions in order to provide the much needed support to customers and employees in view of bolstering the financial system (Berger and Demirgüç-Kunt, 2021).

In the light of the above, for financial institutions to better prepare for future pandemics, their resilience in operational efficiency in order to ensure business continuity is essential. Consistent with the relevant policy and scholarly literature (KPMG, 2021; Giese and Haldane, 2020), some relevant insights that can be considered by banks around the world in responding to the present COVID-19 challenges as well as preparing against the unfavorable consequences of future pandemic include: (i) forging payment deals ahead in spite of the COVID-19 pandemic especially in view of the fact that with the global pandemic, ecosystems of payment are changing and the digital economy is growingly gaining grounds; (ii) understanding that the COVID-19 pandemic is a major catalyst in the contemporary

transformation of payment operations in banks; (iii) aligning the bank strategies with SDGs and (iv) fundamental cyber risks related to banks when banking operations are more constrained by challenges surrounding global pandemics and crises (Aldasoro et al., 2021).

#### **4. Concluding implications and future research directions**

This chapter examines how the Covid-19 pandemic has affected financial development and financial inclusion in African countries. The study provides both broad perspectives and country-specific frameworks based on selected country cases studies. Some emphasis is placed on how the pandemic would influence the achievement of sustainable development goals (SDGs) that are related to financial inclusion. The study aims to understand what immediate challenges the COVID-19 pandemic has represented to the economies and societies on the one hand and on the other, the effect of the COVID-19 on the interconnected financial systems in terms of consequences of the pandemic. The relevance of the study builds on the importance of these insights in helping both scholars and policy makers understand how the effect of the pandemic on the financial system and by extension, the global economy can be mitigated for more financial inclusion.

More specifically, the study has provided insights into the impact of the COVID-19 pandemic on the financial sector with particular emphasis on digital payments, emerging risks in the financial sector and post-pandemic financial sector services. The study has also focused on the implications of the COVID-19 pandemic on the financial sector with insights into consequences for asset management, banking and capital markets.

The insights provided in this chapter are relevant not least, because financial inclusion is part and parcel of economic inclusion. In addition, inclusive economic development and growth cannot be worthwhile without putting emphasis on financial inclusion. Accordingly, as recently articulated by Kasradze (2020), it is difficult to achieve most of the 17 SDGs

without financial inclusion. These goals include: no poverty (Goal 1), zero hunger (Goal 2), good health and well-being (Goal 3), quality education (Goal 4), gender equality (Goal 5), economic growth and decent work (Goal 8) and reduced inequality (Goal 10).

Understanding the concern of financial inclusion in view of the insights provided in this chapter is important because during the COVID-19 pandemic, a substantial part of the global population has been out of work and hence, there is an urgent need for governments as well as for financial institutions to provide enhanced access to financial services for poor households and individuals (Kasradze, 2020). The narratives in this chapter on the causes and consequences of the global pandemic with specific emphasis on the financial sector and financial inclusion can be leveraged by policy makers to make sure more individuals and households have access to financial services which as documented in the attendant literature, are essential in supporting and ensuring their livelihoods (Ozili, 2020; Eldomiaty et al., 2020).

The chapter obviously leaves for future research especially as it relates to empirically examining the impact of the COVID-19 crisis on financial inclusion in order to assess whether the established findings in this study withstand empirical scrutiny. In addition, more robust literature reviews as more data become available will also go long way to improving what is currently known about the causes and consequences of this major global pandemic.



## References

African Development Bank [AfDB]. (2021). African Development Bank provides \$1 million for AI-based national customer management systems in Ghana, Rwanda and Zambia. AfDB: Abidjan, press release, 10 March 2021.

Aldasoro, I, Frost, J., Gambacorta, L., & Whyte, D., (2021): "Covid-19 and cyber risk in the financial sector", *BIS Bulletin*, no 37, January.  
<https://www.bis.org/publ/bisbull37.pdf> (Accessed: 31/10/2021).

Agur, I., Peria, S. M., & Rochon, C. (2020). Digital Financial Services and the Pandemic: Opportunities and Risks for Emerging and Developing Economies. In International Monetary Fund Special Issue on COVID-19.

Ahern, K. R., & Sosyura, D. (2014). Who writes the news? Corporate press releases during merger negotiations. *Journal of Finance*, 69(1), 241–291.

Aiyar, S., Bergthaler, W., Garrido, J., Ilyina, A., Jobst, A., Kang, K., Kovtun, D., Liu, Y., Monaghan, D., & Moretti, M., (2015). "A strategy for resolving Europe's problem loans." IMF Staff Discussion Note No. 15/19. Washington, DC.

Aldasoro I., Frost I., Gambacorta L. & Whyte D. (2021). Covid-19 and cyber risk in the financial sector. *BIS Bulletin #37*. URL: <https://www.bis.org/publ/bisbull37.htm>.

Alfred, S., Maureen, T., & Were, M. (2017). Mobile financial services and financial inclusion: Is it a boon for savings mobilization? *Review of Development Finance*, 7(1), 29–35.

Ashimwe, E. (2020). Kigali based taxi-motos to use cashless payments from Mid-August, *The New Times*, <https://www.newtimes.co.rw/news/kigali-based-taxi-motos-use-cashless-payments-mid-august>(accessed on 6 October 2021)

Aslam, J.; Saleem, A.; Khan, N.T.& Kim, Y.B. (2021). Factors influencing blockchain adoption in supply chain management practices: A study based on the oil industry. *Journal of Innovation & Knowledge*, 6(2), 124–134.

Asongu, S. A. (2015). The Impact of Mobile Phone Penetration on African inequality, AGDI Working Paper, No. WP/13/021, African Governance and Development Institute (AGDI), Yaoundé.

Asongu, S. A., & Diop, S., & Nnanna, J., (2020). The geography of the effectiveness and consequences of Covid-19 measures: Global evidence. *Journal of Public Affairs*. DOI: 10.1002/pa.2483.

Asongu, S. A., & Le Roux, S. (2017). Enhancing ICT for Inclusive Human Development in Sub-Saharan Africa, *Technological Forecasting and Social Change*, 118, 44-54.

Association of Certified Fraud Examiners [ACFE]. (2020). Fraud in the wake of COVID-19: Benchmarking report. ACFE: Austin.

- Berger, A. N., & Demirgüç-Kunt, A. (2021). Banking research in the time of COVID-19. *Journal of Financial Stability*, 57(December), 100939.
- Bharadwaj, P.; Jack, W. & Suri, T. (2019). *Fintech and Household Resilience to Shocks: Evidence from Digital Loans in Kenya*; National Bureau of Economic Research: Cambridge, MA, USA.
- Bizimungu, J. (2021). How Covid-19 pandemic triggered surge in cashless payments. *The New Times*, <https://www.newtimes.co.rw/news/how-covid-19-pandemic-triggered-surge-cashless-payments> (accessed on 6 October 2021)
- Blaney, B., (2020). Chart-topping fintech stats for 2020. [https://tipalti.com/](https://tipalti.com/fintech-stats-for-2020/)
- Bock, M. (2015). “WTF is an API? How the Internet Works Behind the Scenes”. Hackernoon, January 20. <https://hackernoon.com/apis-how-the-internet-works-behind-the-scenes-690288634c32>.
- Carnegie Endowment for International Peace [CEIP]. (2021). Timeline of Cyber Incidents Involving Financial Institutions. <https://carnegieendowment.org/specialprojects/protectingfinancialstability/timeline> (accessed 8 October 2021)
- Chen, M.A.; Wu, Q. & Yang, B. (2019). How valuable is Fintech innovation? *Rev. Financ. Stud.*, 32, 2062–2106.
- Clarke, J., Chen, H., Du, D., & Hu, Y. (2020). Fake news, investor attention, and market reaction *Information Systems Research*, 32 (1) (2020), pp. 35-52
- Coffie, C., Hongjiang, Z., Mensah, I., Kiconco, R & Simon, A. (2021). Determinants of FinTech payment services diffusion by SMEs in Sub-Saharan Africa: evidence from Ghana, *Information Technology for Development*, 27(3), 539-560.
- Coffie, C. P. K., Zhao, H., & Mensah, I.A. (2020). Panel econometric analysis on mobile payment transactions and traditional banks effort toward financial accessibility in Sub-Saharan Africa. *Sustainability*, 12(3), 895.
- Demirgüç-Kunt, A., Klapper, L. & Singer, D., (2017). *Financial inclusion and inclusive growth: a review of recent empirical evidence*, Policy Research Working Paper 8040. Washington, DC: World Bank
- Demirgüç-Kunt, A., Klapper, L., Singer, D., Ansar, S., & Hess, J. (2020). The global Findex Database 2017: Measuring financial inclusion and opportunities to expand access to and use of financial services. *The World Bank Economic Review*, <https://doi.org/10.1093/wber/lhz013>
- Deng, S., Huang, Z. (. J.), Sinha, A. P., & Zhao, H. (2018). The interaction between microblog sentiment and stock returns: An empirical examination. *MIS Quarterly*, 42(3), 895–918.

Diop, S., & Asongu, S. A., (2021). The Covid-19 Pandemic and the New Poor in Africa: The Straw That Broke the Camel's Back. *Forum for Social Economics*, DOI: 10.1080/07360932.2021.1884583

Diop, S., Asongu, S. A., & Nnanna, J., (2021). COVID-19 economic vulnerability and resilience indexes: Global evidence. *International Social Science Journal*. DOI: 10.1111/issj.12276.

Drasch, B. J., Schweizer, A., & Urbach, N. (2018). Integrating the 'troublemakers': A taxonomy for cooperation between banks and fintechs. *Journal of Economics and Business*, (March), 1–17.

Dubey, V., Sonar, R. and Mohanty, A. (2020), "FinTech, RegTech and contactless payments through the lens of COVID 19 times", *Money*, Vol. 29 No. 6, pp. 3727-3734.

Economist Intelligence Unit [EIU]. (2021). Going digital: Payments in the post-Covid world. EIU: London.

Eldomiaty, T., Hammam, R., & El Bakry, R. (2020). Institutional determinants of financial inclusion: Evidence from world economies. *International Journal of Development Issues*, 19(2), 217-228.

Ezeaku, H., Asongu, S. A., & Nnanna, J., (2021). Volatility of international commodity prices in times of COVID-19: Effects of oil supply and global demand shocks. *The Extractive Industries and Society*, 8(1), 257-270.

Fabeil, N.F., Pazim, K.H. & Langgat, J. (2020). The impact of covid-19 pandemic crisis on MicroEnterprises: entrepreneurs' perspective on business continuity and recovery strategy. *Journal of Economics and Business*, 3(2) (2020)  
[https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=3612830](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3612830) (Accessed: 31/10/2021).

Financial Sector Deepening [FSD]. (2021). AnnualReport2020, <https://www.fsdkenya.org/wp-content/uploads/2021/06/FSDK-Annual-Report-2020-Web.pdf> (accessed 6 October 2021)

Financial Services Information Sharing and Analysis Center [FS-ISAC]. (2020). COVID-19 effects on cybersecurity survey, July.

Frame, W. S., Wall, L. & White, L. J. (2019). "Technological Change and Financial Innovation in Banking: Some Implications for FinTech." In *Oxford Handbook of Banking*, 3rd ed., edited by A. Berger, P. Molyneux, and J. O. S. Wilson, 262–284. Oxford: Oxford University Press.

Giese, J. & Haldane, A. (2020). COVID-19 and the financial system: a tale of two crises. *Oxford Review of Economic Policy*, 36(S1), S200 – S214.

Gomber, P.; Kauffman, R.J.; Parker, C & Weber, B.W. (2018). On the Fintech revolution: Interpreting the forces of innovation, disruption, and transformation in financial services. *J. Manag. Inf. Syst.* 2018, 35, 220–265.

- Gourinchas, P. O., Kalemli-Özcan, S., Penciakova, V & Sander, N. (2020). Covid-19 and SME failures. NBER Working Paper Series. doi:10.3386/w27877
- Huang, D., Jiang, F., Tu, J., & Zhou, G. (2015). Investor sentiment aligned: A powerful predictor of stock returns. *Review of Financial Studies*, 28(3), 791–837.
- IFC. (2020). The early impact of COVID-19 on financial institutions, IFC: Washington, D.C.
- Imerman, M. B & Fabozzi, F. J. (2020). Cashing in on Innovation: A Taxonomy of FinTech. *Journal of Asset Management* 21:167–77.
- Kalemli-Özcan, S., Laeven, L. & Moreno, D. (2020). Debt overhang, rollover risk, and corporate investment: Evidence from the European crisis. NBER Working Paper Series. doi: 10.3386/w24555.
- Karlan, D., Kendall, J. Mann, R., Pande, R., Suri, T. & Zinman, J., (2016). Research and impacts of digital financial services, NBER Working Paper No. 22633, Cambridge.
- Karsen, M., Chandra, Y. U., & Juwitasary, H. (2019). Technological factors of mobile payment: A systematic literature review. *Procedia Computer Science*, 157, 489–498.
- Kasradze, T., (2020). Challenges Facing Financial Inclusion Due to the COVID-19 Pandemic. *European Journal of Marketing and Economics*, 3(2), 50-63.
- Kietzmann, J.H., J. Paschen, J & Treen, E. (2018). Artificial intelligence in advertising: How marketers can leverage artificial intelligence along the consumer journey. *Journal of Advertising Research*, 58 (3) (2018), pp. 263-267.
- Kogan, S., Moskowitz, T.J., & Niessner, M. (2020). Fake news: Evidence from financial markets.  
Available at [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=3237763](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3237763)
- KPMG. (2019). The Pulse of Fintech 2019—Biannual Global Analysis of Investment in Fintech; KPMG: Zurich, Switzerland.
- KPMG (2021). Implications of COVID-19 for Asset Management. *KPMG International entities*  
<https://home.kpmg/xx/en/home/insights/2020/04/covid-19-impact-and-implications-to-asset-management.html> (Accessed: 31/10/2021).
- Li, X., Feng, H., Zhao, S., & Carter, D. (2021). The effect of revenue diversification on bank profitability and risk during the COVID-19 pandemic, *Finance Research Letters*, 101957
- Lim, S.H.; Kim, D.J.; Hur, Y. & Park, K. (2019). An Empirical Study of the Impacts of Perceived Security and Knowledge on Continuous Intention to Use Mobile Fintech Payment Services. *International Journal of Human–Computer Interaction*, 35(10), 886–898.

- Morgan, P.J., Huang, B & Trinh, L.Q. (2019). The need to promote digital financial literacy for the digital age Realizing Education for all: In the Digital Age, JICA and ADBI, Tokyo, Japan (2019), pp. 40-46.
- Nurse, K. (2018). Migration, Diasporas, Remittances and the Sustainable Development Goals in Least Developed Countries. *Journal of Globalization and Development*, 9(2): 1-13.
- Ozili, P. K. (2020). Financial Inclusion and Fintech during COVID-19 Crisis: Policy Solutions. *SSRN Electronic Journal*. doi:10.2139/ssrn.3585662
- Panos, G& Wilson, J. O. S., (2020). Financial literacy and responsible finance in the FinTech era: capabilities and challenges, *The European Journal of Finance*, 26:4-5, 297-301.
- Park, C-Y & Shin, K. (2021). COVID-19, nonperforming loans, and cross-border bank lending, *Journal of Banking & Finance*, 106233.
- PayU, (2021). The Next Frontier: the most promising markets for emerging e-commerce leaders in 2021 and beyond. PayU
- Puschmann, T. *Fintech. Bus. Inf. Syst. Eng.* 2017, 59, 69–76.
- Remolina, N. (2020), “Towards a data-driven financial system: the impact of COVID-19”, SMU Centre for AI & Data Governance, Research Paper, (08).
- Riley, C. (2020) Unpacking interoperability in competition, *Journal of Cyber Policy*, 5:1, 94-106.
- Signé, L and Signé, K. 2021. How African states can improve their cybersecurity. March 16, 2021, Brookings, <https://www.brookings.edu/techstream/how-african-states-can-improve-their-cybersecurity/> (accessed 8 October 2021)
- Talom, F. S. G., & Tengeh, R. K. (2020). The impact of mobile money on the financial performance of the SMEs in Douala, Cameroon. *Sustainability*, 12(1), 183.
- Tardelli, S., Avvenuti, M., Tesconi, M & Cresci, S. (2020). “Characterizing social bots spreading financial disinformation” In Meiselwitz, G (Ed.), *Social computing and social media: Design, ethics, user behavior, and social network analysis lecture notes in computer science*, Springer, Cham, Switzerland, pp. 376-392.
- Tchamyou, V. S., (2019). The Role of Information Sharing in Modulating the Effect of Financial access on Inequality. *Journal of African Business*, 20(3), 317-338.
- Tchamyou, V. S. (2020). Education, lifelong learning, inequality and financial access: Evidence from African countries. *Contemporary Social Science*, 15(1), 7-25.
- Tchamyou, V. S. (2021). Financial access, governance and the persistence of inequality in Africa: Mechanisms and policy instruments. *Public Affairs*, 21(2), e2201.

Tchamyou, V.S., Erreygers, G., & Cassimon, D., (2019). Inequality, ICT and Financial Access in Africa. *Technological Forecasting and Social Change*, 139(February), 169-184.

Tetlock, P. C. (2015). The role of media in finance. In *Handbook of media economics* (Vol. 1, pp. 701–721). Elsevier.

Tetlock, P. C. (2014). Information transmission in finance. *Annual Review of Financial Economics*, 6(1), 365–384.

UNCDF. (2021). *Research on Small and Micro Merchants Payments Digitization in Africa*. UNCDF: Brussel

Wamba, F., S.; Kamdjoug, K., Bawack, E., & Keogh, J.G. (2020). Bitcoin, Blockchain and Fintech: A systematic review and case studies in the supply chain. *Production Planning & Control*, 31(2-3), 115–142.

Wójcik, D & Ioannou, S. (2020). COVID-19 and Finance: Market developments so far and potential impacts on the financial sector and centre. *Tijdschrift voor Economische en Sociale Geografie* 111(3): 387–400.

Yamada, E., Shimizutani, S., & Murakami, E., (2020). “The COVID-19 pandemic, remittances and financial inclusion in the Philippines”, *The Philippine Review of Economics*, 57(1), 18-41.

Ziegler T, Zhang BZ, Carvajal A, Barton ME, Smit H, Wenzlaff K, Natarajan H, et al. (2020). *Global COVID-19 FinTech market rapid assessment study - CCAF publications*. University of Cambridge Alternative Finance Center. <https://www.jbs.cam.ac.uk/faculty-research/centres/alternative-finance/publications/2020-global-covid-19-fintech-market-rapid-assessment-study/>