# 4 Lending during the recovery and beyond

*The ongoing impact of the COVID-19 crisis on business performance and household incomes could inhibit new lending because of increased credit risk. Risk can be mitigated by better visibility into borrower viability and improved recourse in the event of default. Reassessing credit models to take into account the "new normal," as well as innovations in digital finance that leverage alternative data and tailor loans to the borrower and the lending environment, can help keep credit flowing. Regulatory frameworks that enable innovation can support credit in the recovery while ensuring consumer and market protections.*

## Policy Priorities

Mitigating the environment of uncertainty and the lack of transparency that are making the traditional approaches to measuring risk less effective calls for the following measures:

- **Creating an enabling environment to leverage alternative data.** Lenders should look to adapt underwriting approaches, with support from supervisory model validation and regulatory frameworks that open access to data while ensuring privacy and consumer protection.

- **Embracing innovations in product design and embedded finance** that tailor loans to customer and market conditions or link credit to underlying business transactions to increase visibility and improve recourse.

- **Providing well-tuned guarantee programs** where needed to bridge the gap between lenders' risk aversion and the role of credit as a driver of an equitable recovery.

- **Advancing the regulatory framework and financial infrastructure** to support innovation; adjust the regulatory perimeter; provide clear, effective, and enforceable consumer and market protections; and facilitate digital payments, information exchange, and asset registration.

# Introduction

Previous chapters focused on the actions countries can take to reduce damage to the financial sector if long-term, widespread income losses stemming from the COVID-19 (coronavirus) pandemic force borrowers to default on their debt. For the economy, however, the risks associated with past loans are not the only concern. A separate challenge is the ability of financial service providers to continue extending credit to fuel the recovery. As countries embark on the road to recovery and policy makers wind down the exceptional fiscal and other policy support measures put in place to help the economy through the pandemic, it is paramount that businesses and households have adequate access to credit to withstand economic uncertainty, invest in opportunities, and take part in the recovery.

The onset of the pandemic extensively disrupted economies worldwide. Lockdowns, business interruptions and closures, and job losses in the real sector (the activities associated with goods and services) were reflected almost immediately in the financial sector by a tightening of lending conditions. Bank supervisors and lenders worried that the crisis would rapidly translate into loan losses and cash withdrawals by the public.

As discussed in chapter 1, unprecedented government intervention and regulatory forbearance to mitigate the impacts of the crisis have so far helped banks maintain capital levels and liquidity. Yet the ongoing impacts of the crisis on business performance and household incomes, as well as the expected rise in nonperforming loans (NPLs) and tightening of monetary policies, will create challenges for new lending. Continued economic disruptions and uncertainty will increase credit risk, reduce visibility into borrower viability, and diminish the realizable value of traditional sources of recourse in the event of default. Reporting practices around loan moratoria and debt restructuring further cloud visibility into the actual credit performance of certain customers.

In this environment of heightened risk and continued uncertainty, finance providers need to adapt credit models and product offerings if they are to continue lending. Ways of doing this include making changes in product design—the terms and lengths (tenors) of loans—as well as integrating new types of data into credit models. These adaptations will benefit from the continuing adoption of new technologies and digital channels supporting payments, credit information, and secured transactions. A silver lining of the pandemic is that it accelerated digital adoption in the economy as a whole, as well as among finance providers and borrowers, thereby laying the foundation for better credit analysis and monitoring, greater product diversity, and a broader range of credit providers.

Financial service providers, infrastructure providers, governments, and the regulatory community can all help advance the adoption of solutions to facilitate access to credit during the recovery. This chapter describes approaches available to finance providers for adjusting their operations and products to continue lending. It also describes the role of governments, regulators, and financial infrastructure in helping the credit market adapt to the new environment—such as by integrating new data and business models—and in countering market tendencies to limit credit to larger firms and better-off borrowers. As credit conditions improve, markets that have been able to roll out these solutions and restrain a "flight to quality" will be in a better position to tackle long-standing credit gaps and foster financial inclusion.

Examples in this chapter illustrate how financial service providers have delivered credit to underserved customers and entrepreneurs during the pandemic by mitigating risk through product design, or by integrating new technologies or improved data models for credit underwriting and servicing. Innovations in channels, products, and processes have enabled the expansion of lending to riskier and previously underserved segments. Although these innovations will be pivotal to achieving additional visibility and recourse in the pandemic context, even for previously well-served segments, the rollout

of certain products, business models, and data may not be feasible in all markets. Their adoption will require thoughtful consideration of systemic and institutional factors as well as consumer protection.

The borrowers referred to in this chapter include the small and medium businesses that make up the majority of enterprises providing jobs in most emerging economies,[1] as well as households and microentrepreneurs. These groups find it challenging to access formal credit even when the economy is sound and growing, and all have been significantly affected by the pandemic. Nonetheless, the credit needs of small businesses differ from those of microentrepreneurs, for example, and they are often served by different financial services providers, offering different solutions.

## Solving the COVID-19 risk puzzle: Risk visibility and recourse

Beyond its profound impacts on the credit risk of households and businesses, the pandemic significantly impaired the visibility that lenders have into a borrower's capacity and willingness to repay a loan, and it limited lenders' options for recourse in the increasingly likely event of a default. Policy responses to help alleviate the impacts of the pandemic reduced near-term risks, but further reduced visibility into and certainty about the underlying viability of borrowers. The protracted effects of the pandemic on the economy and the financial sector may over time affect the liquidity and capital of finance providers, diminishing even more their willingness and ability to take on risk.

A lender's decision to extend credit and the associated terms reflect the amount of risk the lender is willing to take based on estimates of both the borrower's probability of default and the anticipated loss in the event of a default. The ability to assess the likelihood of repayment depends on the available information about the borrower and the context of the loan (visibility), whereas estimates of loss in case of default are based on the market for collateral or the enforceability of guarantees (recourse).

As noted in earlier chapters, the pandemic and associated lockdowns had a profound impact on economic activity, affecting borrowers (businesses and households) directly and increasing credit risk. For some sectors and businesses, the impact was transitory and it diminished as lockdowns were lifted. For others, the effects will last longer. For example, in Rwanda business sectors that rely on in-person work (such as construction and accommodation and food) were more affected by the lockdowns than sectors that could transition some of their activities to remote working. Once lockdowns were lifted, however, construction quickly recovered well above precrisis levels, but for the accommodation and food sector, where face-to-face interactions with customers are necessary, the crisis dragged on.[2] When lenders confront uncertain conditions, they typically respond by tightening credit standards and reducing credit supply, shifting to safer assets. If lenders lack solid information with which to assess risks, they reduce credit not only to insolvent businesses and households, but also to everyone else because they are not able to distinguish between the two groups.

Although uncertainty has always been part of lender business models, before the pandemic finance providers were better able to determine a borrower's ability and willingness to repay and the probability of default by taking into account credit and payment histories, income, or assets; nonfinancial information (such as home address, relevant sector of the borrower's business, and length of banking relationship) that can act as a proxy for income; the purpose of the loan (home loans or loans for business equipment have a different risk profile than loans for consumption or working capital); and the time horizon for the loan (visibility tends to be higher over shorter time horizons). For business loans, lenders would rely on heuristics and models to take into account sector or demographic norms (such as typical inventory turns or balance sheet ratios for a given industry).

The significant structural break caused by the crisis diminished, however, the value of past data and heuristics. Traditional credit data sources are largely backward-looking. But with so many sectors,

businesses, and individual incomes disrupted, past performance is no longer as strong an indicator of future performance. Typical reporting delays by lenders and infrequent updates of credit registries and credit bureau data are a challenge in the rapidly evolving pandemic. Even for sectors that might be expected to recover, lenders might not have the timely relevant information needed to accurately determine whether an existing or prospective borrower would still have the income and ability to navigate the new economic environment.

Even the more qualitative relationship-based methods that lenders typically use to smooth lending over an economic cycle were compromised. Loan officer visits were limited or delayed by lockdowns and social distancing.[3] Lenders had difficulty meeting new clients, verifying customer identity, and evaluating a borrower's business operations on site, and they curtailed the in-person collections and group meetings central to many microfinance business models. These and other operational challenges were particularly acute earlier in the crisis. Many of these challenges have since been overcome through the use of digital tools, but operational constraints continue to be a factor in many markets.

The unprecedented level of policy interventions—including government transfers, debt moratoria, loan reschedulings, and suspension of NPL classifications—further clouded lender visibility by reducing the usefulness of financial data and credit information as predictors of a borrower's ability to repay. Lenders must be able to distinguish whether a borrower's business is sustainably recovering due to sound fundamentals or is dependent on government support of the business or its customers. Even relatively recent data can be misleading.[4] Positive cash flows or increases in account balances resulting from government support programs do not indicate longer-term viability. Eventual winding down of that support could later affect ability to repay.

Thus policy interventions that stabilized markets may have, paradoxically, made it more difficult in some cases for lenders to extend the credit needed to resume growth. Along with these challenges around visibility, the pandemic has also affected the traditional forms of recourse that limit lenders' losses in the event of default. Having recourse also dissuades borrowers from defaulting in the first place. Typical forms of recourse are collateral and personal guarantees, and both play multiple roles. Lenders use collateral to (1) assess a borrower's financial condition; (2) motivate repayment because a borrower would want to avoid losing the asset; and (3) offset losses in the event of default by seizing and selling the collateral. Personal guarantees signal that the borrower has reputable relationships that the lender can call on to repay a loan in the event the borrower defaults; this is both an indicator of financial standing and a loss mitigant in the event of default. Guarantees also formalize an element of social pressure to motivate repayment. Providing collateral or personal guarantees has long been a challenge for micro-, small, and medium enterprises (MSMEs) and households in emerging economies. Group guarantees as part of microfinance lending are an attempt to fill that gap for individual microentrepreneurs. Guarantees from government or development finance institutions are another form of recourse, and these may be made more available to MSMEs under some programs. Less traditional forms of recourse—such as automatic repayments, liens on future digital receipts and cash flows, and exclusion from marketplace platforms in case of default on a loan from the platform—can be incorporated into MSME and consumer lending, particularly in the embedded finance models discussed later in this chapter. The bankruptcy and resolution frameworks described in previous chapters can influence how effectively and efficiently lenders can use certain types of recourse.

Recourse options during the pandemic were reduced by moratoria, and the value of traditional forms of collateral was altered. Will a commercial building losing tenants (due to the pandemic) be as valuable as it was with full occupancy? If many restaurants are going out of business, what is the resale value of a commercial oven? Beyond the theoretical value of an asset, will a bank be able to realize that value during a period of economic uncertainty? Monetary policy and moratoria temporarily forestalled defaults and liquidations, supporting asset prices. Implemented over long periods, however, debt moratoria, rent

holidays, and credit guarantees can have the unintended effects of heightening volatility and further eroding collateral asset values. The lifting of moratoria and government support measures could provoke further post-default liquidations, triggering fire sales of assets.[5] These factors have reduced not only the degree to which lenders can rely on traditional forms of recourse, but also their ability to project the value of that recourse.

Reacting to the combined effects of higher credit risk in the economy, low visibility, and reduced recourse, lenders have tightened credit standards and reduced the amount of new credit available to support the recovery.[6] A review of quarterly central bank surveys on credit conditions from both emerging and advanced economies finds that the majority of economies have experienced several quarters of tightening credit standards since the onset of the crisis. Figure 4.1 presents the quarterly net change in credit conditions relative to previous quarters for a sample of 38 countries, as reported in the central bank or monetary authority surveys of credit conditions in those countries. March 2020 onward saw a sharp increase in the share of countries whose financial service providers tightened credit standards compared with the previous quarter. Although the pace of tightening appears to have slowed in 2021 with lenders across many countries beginning to ease credit conditions, the data suggest that for many of the countries surveyed credit standards remain substantially tighter than their prepandemic levels.

**Figure 4.1** Quarterly trends in credit conditions, by country income group, 2018–21
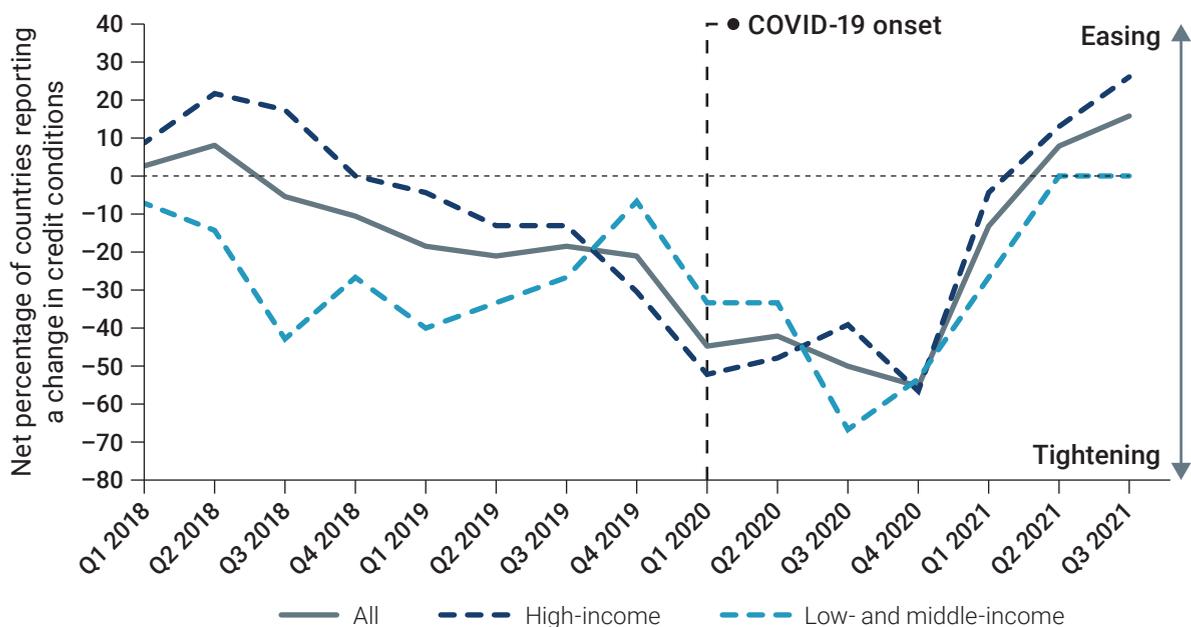


*Source*: WDR 2022 team calculations, based on data from survey reports by the central banks of 38 countries published or accessed as of December 15, 2021: Albania, Argentina, Austria, Belgium, Canada, Chile, Cyprus, Czech Republic, Estonia, France, Germany, Ghana, Greece, Hungary, India, Indonesia, Ireland, Italy, Japan, Latvia, Lithuania, Mexico, the Netherlands, North Macedonia, the Philippines, Poland, Portugal, Romania, the Russian Federation, Serbia, Spain, Thailand, Turkey, Uganda, Ukraine, the United Kingdom, the United States, and Zambia.

*Note:* The figure shows the net percentage of countries in which banks reported a change in overall credit conditions in quarterly central bank loan officer or credit condition surveys. The net percentage is the difference between the share of countries that report an overall easing in credit conditions and the share of countries that report an overall tightening of credit conditions relative to the previous quarter. A negative net percentage value indicates an overall tightening of credit conditions in the sample of countries covered. For Chile, Japan, Mexico, Poland, Russia, the United States, and Zambia, the overall credit conditions are estimated from an index of reported credit conditions in business and consumer segments.

Reduced credit in the context of crises is particularly challenging for MSMEs and other segments of the economy such as women and informal entrepreneurs who even before the crisis were viewed by financial institutions as riskier and more challenging to serve.[7] These businesses tend to be more thinly capitalized, have fewer assets and little excess liquidity, and be relatively undiversified in terms of product markets and customer base. The systemic, negative, real sector shock of the pandemic interrupted revenue streams of the segments already viewed as riskier.[8] Because of this differential impact on their customer base, specialized lenders, including credit unions, savings banks, microfinance institutions (MFIs), and other nonbank financial institutions that focus on MSMEs and underserved households, faced operational and fundraising challenges that affected their ability to deliver credit. In addition, access to short-term trade finance was a challenge for small and medium enterprises (SMEs) during the COVID-19 pandemic as costs and application rejection rates increased.[9] The International Chamber of Commerce reported that banks either retrenched from segments perceived as high risk such as SMEs or hiked prices for short-term trade financing for them.[10]

Many lenders lack the capacity to mitigate effectively the new risks introduced by the COVID-19 crisis and have responded by limiting credit to all but the lowest-risk borrowers. If financial markets continue this trend, they could unleash a vicious cycle (see figure 1.2 in chapter 1). In such a cycle, the widespread reduction in credit to MSMEs forces more of them out of business before they can recover and drive growth, with follow-on impacts on the households whose members are employed by or otherwise depend on these businesses for income, products, or services.[11] Business failures can have a domino effect, with the first failures pushing upstream companies out of business because of the reduced demand for their products or services. Over time, accelerating business failures increase the bad debt burden on lenders and reduce their capital and capacity to lend, as well as their willingness to take risk. Movement in this direction would cut government tax revenue while at the same time increasing the need for fiscal support for households, firms, and potentially financial institutions in need of bailouts.

Markets in which lenders are able to manage and mitigate the risk of new lending to meet the financing needs of businesses and households despite the heightened uncertainty could unleash a virtuous cycle, supporting the efforts of small and large businesses and households to restart spending and to invest in the economic recovery. For example, a small shop may be solvent and viable but need additional working capital to replace spoiled inventory and cover costs until retail activity recovers. Or a manufacturer may need to invest in raw materials and production well before it receives income from sales. For households, credit could help them maintain consumption—such as paying fees for school or childcare—or meet financial emergencies before their income has fully recovered, with benefits for the broader economy through spending. Improved prospects for businesses and households have a positive impact on the income and capital of the lenders serving them, further increasing lenders' capacity to lend and their risk appetite.

Regulators have a central role in supporting a virtuous cycle by encouraging the financial sector's efforts to adapt while monitoring financial stability. Recovery of economic activity and spending can raise tax revenue and allow governments to shift their focus from broad-based fiscal support programs to targeted ones to support those parts of the economy hardest-hit by the crisis and to lower the risk associated with longer-term investments to support job creation and a sustainable recovery. Finally, as economic conditions stabilize in the recovery, lenders that have successfully adapted to the "new normal" may become better able to extend longer-term financing to support capital investments by MSMEs and to reach low-income households and informal businesses previously excluded by the financial sector, thereby further reducing the need for government intervention.

To prevent onset of the vicious cycle and unleash a virtuous one, lenders will have to embrace tools that allow them to overcome the visibility and recourse challenges affecting their ability to measure and manage risk.

# Improving risk mitigation

This section highlights strategies that lenders can adopt to manage or mitigate risk so they can provide financially viable borrowers with credit in an environment of heightened risk and uncertainty. Digitalization, which accelerated during the pandemic, can facilitate the feasibility and adoption of many of these strategies.

To continue to lend through the pandemic and the recovery, finance providers need new approaches to measuring risk, as well as new approaches to product design, both of which can improve visibility and strengthen recourse in order to balance risk. Lenders can start by reassessing their existing sector and borrower scoring models and updating them where possible based on information on economic activity by sector or geography. Most lenders have by now recognized that there has been a structural break, and both business models and financial models need to be retuned. Supervisors can help ensure this is done in a timely fashion and that any approvals needed to adapt underwriting and collection procedures or deploy updates of risk models are expedited.

Some banks have assessed the impact of lockdowns by characterizing the risk for each industry-geography intersection.[12] Banco Pichincha in Ecuador personalized repayment terms and adapted its financial and nonfinancial services to support borrowers and continue lending, while Konfío in Mexico took time to adapt its credit algorithms before resuming its growth. 4G Capital in Kenya piloted mobile surveys to seek to incorporate a measure of borrower financial stress in its credit underwriting.[13] Lenders can also improve the data and analytics they use for risk modeling, adjust product mix and design, and incorporate risk-sharing facilities where available. These approaches, and their potential impacts on visibility, recourse, and credit risk to the lender are outlined in figure 4.2.

**Figure 4.2** Impacts of selected risk mitigation strategies on visibility, recourse, and risk



*Source:* WDR 2022 team.
*Note:* Shaded circles indicate the increasing relevance of each solution for the respective challenge, from not applicable (○) to degrees of relevance (◔◑◕) to highly relevant (●).

Policy makers can also help by establishing the infrastructure and regulatory environment needed to support new approaches to visibility and recourse and to encourage innovation and the growth of new players with diverse business models and risk appetites. For riskier sectors and segments, governments may also have to continue deploying risk mitigation instruments, such as well-calibrated credit guarantees, to support access to finance. Targeted liquidity or income support schemes may continue to be required for those in need for whom borrowing is not appropriate.

## Alternative data

Although the pandemic reduced lenders' visibility into credit risk, they are not without options. Alternative data sources can inform risk assessments and allow lenders to fill pandemic-related information gaps. As risk and uncertainty decline, these approaches can also be used to extend credit to underserved segments that were informationally opaque even before the pandemic.

The term *alternative data* refers to information not included in traditional credit reports, which focus on outstanding loans and repayment history. For example, a wide range of transactional data are available from financial service providers, mobile network operators and other utilities, traditional businesses and online platforms, and governments. These data include bank deposits and withdrawals, mobile money use, airtime top-ups and utilities payments, payroll, rent, taxes, supply orders and deliveries, sales orders, invoices, and business receipts. Nonfinancial data from social media footprints, psychometrics, online behavior, and telecommunications usage, including top-up and calling patterns, contacts, and global positioning system (GPS) data, can supplement transactional data.[14] These data have been found to provide information that is at least as predictive as that held by credit bureaus. Many of these data are considered "big data"—that is, data produced by digital channels and characterized by high volume, variety, and velocity.[15]

One study found that in Germany credit scoring models based on digital footprints were better at predicting creditworthiness than credit bureau scores. The two assessments can complement each other for greater sensitivity.[16] A study of loan data from a large fintech lender in India showed that use of mobile and social footprints can improve risk assessments for individuals with credit scores and be an effective indicator for individuals who lack credit bureau records.[17] Research from South America found similar results from the use of call data records to predict credit repayment outcomes for individuals lacking a credit history.[18] Meanwhile, a US study found that transaction data can be used to create risk profiles capable of serving individuals otherwise excluded or charged higher interest rates.[19] Finally, research from China found that the use of big data to assess the probability of default led to increased credit access for borrowers who otherwise would have remained unbanked or who would have been required to pledge collateral to access financing.[20]

Alternative data can also help lenders to update sector and business assessments (see box 4.1). Because some industries have been more (and some less) directly affected by the pandemic, standard market reports are no longer as accurate. Retuning existing models is an important first step to improving risk assessments, although the scale and depth of the crisis will likely continue to require lenders to update or reset benchmarking data over time.

Despite the opportunity presented by the growing abundance of alternative and big data, several challenges are posed by issues of availability, validation, and interpretation in underwriting. Availability is affected by a prospective borrower's use of the services and platforms that generate and hold alternative data. These platforms are often owned and controlled by private third parties, and so lenders must secure access to the data. For example, although a bank may have payment transaction data, the mobile operator collects call records, and the electric company has utility billing and payment records.

Lenders may collect some data directly from the borrower's phone, which raises privacy concerns about, for example, other people's data that may reside in the borrower's contacts list and text message records. Some prospective borrowers may have documents such as bills or payment records containing these data, but these can be hard to assemble and validate. In some markets, credit registries and bureaus, as well as new fintech data companies, are beginning to collect and validate this information (see box 4.8 later in this chapter). Data privacy and open banking frameworks are increasingly seeking to vest ownership and control of data in data subjects,[21] enabling those subjects to grant permission to third parties—including lenders—to access their data. The 2021 *World Development Report* discusses issues related to accessibility and intellectual property of this type of private intent data.[22]

In addition to accessing and validating new data, lenders need ways to confirm its interpretation as credit-relevant and incorporate it into underwriting models, while ensuring fairness and validity.

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**Box 4.1**  **Case study: Adaptive underwriting in Mexico**

Konfío is a Mexican technology-based company seeking to boost the growth of underserved micro-, small, and medium enterprises (MSMEs) by way of an array of offerings, including financial services, payment solutions, and business tools. Through its digital lending platform, Konfío provides these MSMEs with the working capital funds they are unable to borrow from banks, often because they lack the collateral and credit history that banks require.[a]

Konfío, which launched operations in 2014, uses the data generated by MSMEs to meet government-established electronic invoicing requirements in its underwriting. Konfío developed an algorithm that supplements traditional financial history with electronic invoicing data, as well as data on a firm's network and digitally acquired information from payroll and annual statements. The company employs technology and machine learning to integrate these forms of alternative data in its underwriting and automate much of the traditional manual MSME credit scoring and underwriting process.

After the first measures to contain the spread of the COVID-19 virus were enacted in Mexico in March 2020, MSMEs' access to finance significantly deteriorated.[b] Faced with heightened portfolio risk and great uncertainty, lenders tightened loan requirements and reduced lending to MSMEs. A national survey of Mexico's businesses found that as recently as February 2021 a large share of MSMEs previously served by banks were suffering challenges in accessing financing.[c]

Konfío also reduced lending in the first months of the crisis in response to tightening credit standards and a drop in loan applications. It adapted its credit algorithm to integrate data on the impacts of COVID-19 containment measures across industry subsectors. The result was a new index to inform portfolio collection strategies, loan renewals, and new loan originations. Konfío's leadership believes that approach enabled them to limit portfolio delinquencies and to recalibrate credit underwriting to identify lower-risk MSMEs. As demand for credit among MSMEs picked up, Konfío was able to resume lending to both existing and first-time clients. In August 2020, Konfío began to rapidly grow its new loan bookings. Indeed, it achieved records in both the number and volume of monthly loans disbursed as of February 2021 (figure B4.1.1).

As economic conditions and outlook evolve, Konfío continues to track business performance by industry and economic activity to continually recalibrate how it classifies performing versus underperforming industries. By dynamically adapting its credit policies, Konfío has been able to gradually expand its coverage. The company claims that as of July 2021 it was serving more than 90 percent of the industries and regions in Mexico.

*(Box continues next page)*

**Figure B4.1.1** Growth in loan disbursements by Konfío, 2019–21
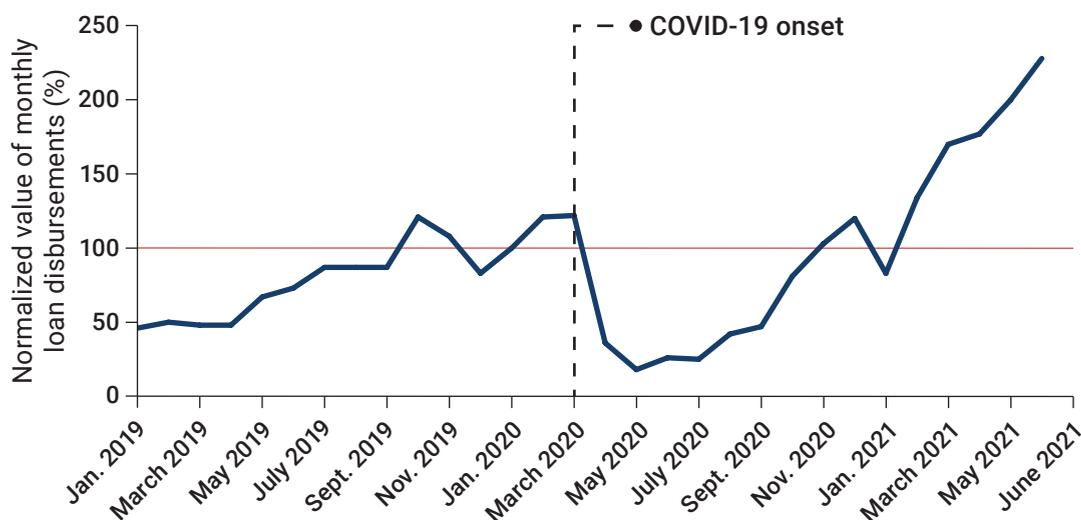


*Source:* Konfío, proprietary portfolio data, 2021.
*Note:* The figure shows the ratio between the value of monthly loan disbursements and that for January 2020.

a. IFC (2017b).
b. National Institute of Statistics and Geography (Instituto Nacional de Estadística y Geografía), ECOVID-IE (Survey on the Economic Impact Generated by COVID-19 on Enterprises) (dashboard), Aguascalientes, Mexico, http://en.www.inegi.org .mx/programas/ecovidie/. This survey on the impact of COVID-19 on businesses in Mexico found that as of April 2020, 12 percent of MSMEs had suffered a reduction in access to financial services.
c. ECOVID-IE. As of February 2021, 8 percent of MSMEs still suffered from lower access to finance. An earlier economic census by Mexico's National Institute of Statistics and Geography found that access to finance is historically limited for MSMEs in Mexico. In 2019, an estimated 11.4 percent of microenterprises (0–10 employees) and 25.7 percent of small and medium enterprises (11–250 employees) had access to finance (INEGI 2020).

Regulators typically require lenders to ensure the *explicability* of their credit scoring models and algorithms and of the data they use.[23] This is particularly important in the use of nontraditional data to predict creditworthiness. Reliance on such data can lead to unintended biases due to the differential availability or use of some of the data sources. The sheer newness of complex algorithms may be a factor as well (see box 4.2). The widespread use of alternative data, which depends on a customer having access to utilities, mobile money, smartphones, e-commerce or social media platforms, or other data generators, could result in "digital redlining"—that is, the exclusion of individuals whose activities, location, or socioeconomic situation are data-poor. For example, alternative data such as the operating system used by a borrower's smartphone, the timing and location of a loan application, or device data on mobile phone top-ups and e-commerce activity, can indicate asset ownership and the regularity of behavior and cash flows.[24] In some markets, however, they may also map to the protected characteristics[25] of potential borrowers or exclude borrowers who do not have smartphones.

## Box 4.2  Credit and algorithmic biases

How will credit risk modeling innovations such as machine learning and alternative data affect the distribution of credit? Who can access credit, and at what cost? Gender bias and discrimination in face-to-face loan officer decision-making are well documented.[a] As the COVID-19 crisis accelerates the adoption of machine learning and big data, there is potential to reduce the historical biases on gender and race stemming from human discretion in lending decisions. On the other hand, new types of discrimination through algorithms and biases in programming and data could be introduced.[b] The emerging academic literature on the topic paints a nuanced picture of whether these new sources of bias reduce or exacerbate the overall level of discrimination in financial services.[c]

A study from Pakistan of 5,500 digital loan applications compared outcomes of submissions randomly assigned for review by loan officers or by a machine learning algorithm. The study found that the algorithm achieved a 21 percent reduction in loan defaults while serving a similar share of female and ethnic minority group borrowers.[d]

However, when the gender of the applicants was revealed in the data, loan officers exhibited a positive bias, approving 22 percent more applications from women than those based on an anonymized review, without leading to an increase in defaults. When the algorithm was exposed to gender information, it was better able to predict defaults than loan officers, but it approved 16–21 percent fewer applications from women than when it was fed anonymized data.

A study that examined data on over 9 million loans from the US mortgage market found that moving from "traditional" statistical models to machine learning models improved the accuracy of default predictions, leading to an overall reduction in default risk for the median borrower.[e] However, as shown in figure B4.2.1, the benefits from the new technology are not distributed equally across groups in society. The researchers in this case concluded that gains from new technology are skewed in favor of racial groups who already have better access to credit, while disadvantaged groups are less likely to benefit. The study also found that

**Figure B4.2.1**  Share of borrowers who appear more creditworthy when using a machine learning model than when using traditional statistical methods
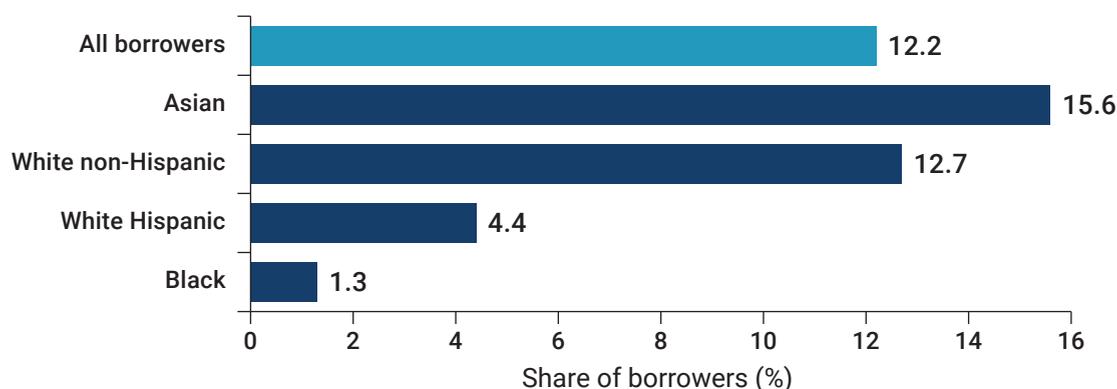


*Source:* WDR 2022 team, adapted from Fuster et al. (2021).

*Note:* The figure shows the share of borrowers assigned a lower risk of default as lenders move from traditional predictive technology (a "Logit" classifier) to machine learning technology (a "Random Forest" classifier) in the US mortgage market.

*(Box continues next page)*

both the improved predictive power from machine learning models and its unequal outcomes stem from the ability of this new technology to learn how nonlinear combinations of characteristics predict default.

These studies indicate that, although machine learning algorithms appear to be more efficient than other methods in assessing credit risk, in some contexts artificial intelligence may lead to undesirable biases. The results from the Pakistan study are consistent with nondiscrimination laws, which typically do not allow lending decisions to be based on personal characteristics.[f] The results of the US mortgage study suggest that in a different context algorithms may use available borrower characteristics (such as income, credit score, or collateral value) to implicitly proxy for a borrower's race or gender, effectively (though not always intentionally) sidestepping fair lending regulations. Legal scholars, economists, and computer scientists have debated how the texts of fair lending laws could need to be adjusted to take into account the realities of data-driven lending and prevent intended or unintended discrimination.[g]

a. Montoya et al. (2020).
b. World Bank (2021c).
c. Morse and Pence (2020).
d. Kisat (2021).
e. Fuster et al. (2021).
f. For a more detailed discussion of potential biased and discriminatory outcomes, see World Bank (2021a, 2021c).
g. Bartlett et al. (2020); Gillis and Spiess (2019); Yang and Dobbie (2020).

## Enhanced analytics for underwriting

Just as important as the data used to measure and assess creditworthiness are the models that lenders use to analyze that data. Conventional statistical models, which are based on multivariate regression analysis and similar tools, can be adapted to incorporate a wide range of data. Yet it is difficult to adapt them quickly and dynamically in fluid situations such as the one sparked by the COVID-19 pandemic. Even if the overall form of the models is maintained, retuning the parameters requires a period of data measurement under the new conditions to validate predictive capacity. If typical monthly or quarterly data were used, by the time the impact of one wave of the pandemic has been incorporated, many markets could be in another wave, with potentially different sectoral impacts. Although subject to many of the same constraints related to data access and validation, machine learning (ML) models can more easily integrate real-time, high-frequency data and adapt to changing economic situations. Because ML models continually adapt to changes in data, they can tune and retune as a situation evolves, with potentially higher predictive capacity over time than traditional multivariate models and analyses.[26]

The benefits of alternative data, artificial intelligence (AI), and ML for improving visibility in credit underwriting have become increasingly well understood by financial institutions, but the barriers to adoption—technical, operational, and regulatory—can be significant.[27] On the technical side, legacy systems often lack the capacity and flexibility to support the data processing and analysis requirements of AI applications. Effectively employing AI therefore requires significant investments in platform modernization, as well as investments in the AI models themselves. It also requires access to expert data scientists and software development engineers, who are in short supply in both emerging and advanced economies.[28] On the operational side, adoption of AI technology by the leading financial institutions

is steadily increasing, yet an industry survey estimated that, going into the pandemic, just 25 percent of financial sector firms relied on ML to detect fraud or support underwriting and risk management.[29] Increasingly, software-as-a-service solutions as well as integrations with specialized technology allow for modular offerings and subscription models that are reducing barriers to entry and time-to-market for incumbent finance providers. In the regulatory realm, slow supervisory approvals may delay adoption of underwriting innovations by financial service providers. Lack of adequate or clear regulations on data usage, privacy, and permitted credit information sharing could prevent financial institutions from taking full advantage of the data available to them.[30]

Alternative lenders with operating models designed to leverage technology for process automation and to incorporate alternative data in credit underwriting grew rapidly in the years prior to the pandemic. COVID-19 demonstrated that these lenders could also withstand a major shock.[31] The business models of alternative lenders vary widely, as do the size and economic status of the borrowers they target. The range of business models includes crowdfunding and marketplace platforms; mobile phone lenders that access transaction and mobile phone data; lending to MSMEs based on invoices, payment flows, or order information from suppliers; and personal loans based on regular salary or remittance income.[32] Many of these business models target formalized small businesses and middle-income to affluent individuals. However, some alternative lending models specifically focus on microloans and microleases to individuals or working capital for informal businesses and MSMEs. Although it is too early to conclude that during the pandemic alternative lenders as a whole demonstrated greater resilience than traditional financial services providers, the case studies in this chapter on Konfío (box 4.1) and MYbank (box 4.6) show that these models can adapt to a new normal for a tier of borrowers that otherwise would find it difficult to access credit.

Scaling up the use of alternative data and AI to enable equitable access to finance during the pandemic recovery will require investments not just by alternative, digital-first lenders, but also by traditional banks and other financial service providers, including those that serve lower-income households and microenterprises. Meanwhile, alternative finance businesses serve too few customers relative to the scale of finance likely to be needed to drive the recovery in most markets. More specifically, alternative finance providers represent less than 1 percent of credit flows worldwide. Lending by fintech and technology companies in 2019 was estimated to be 5.8 percent of the stock of credit in Kenya, 2 percent in China, 1.1 percent in Indonesia, and less than 1 percent of overall credit to the private sector in other major markets.[33] Incumbent financial institutions, by contrast, have the capital, size, and client relationships to supply credit to drive a broader recovery in their economies. It will be imperative that they overcome any cultural and capacity constraints and regulatory frictions that limit their ability to innovate to both support the recovery from the pandemic and compete longer term with new technology-driven lenders.

Two areas needing attention in the near term to ensure that innovations in the use of data and analytics—and, indeed, all of the technological advances discussed in this chapter—are truly beneficial are consumer protection and cybersecurity. Globally, supervisors listed cybersecurity (78 percent) and consumer protection (27 percent) among the top three growing risk areas related to the use of financial technology emerging during the pandemic because of the accelerated transition to digital services and remote interactions.[34]

A significant risk from which consumers need protection is cybercrime. Surveys of users of digital financial services in Kenya and Nigeria found that over 50 percent of respondents reportedly experienced fraud or attempted fraud when using a financial service since the onset of COVID-19.[35] Meanwhile, cybersecurity breaches increased by an average of 15 percent for fintech firms during the pandemic.[36] Recent reports from the G20/OECD Task Force on Financial Consumer Protection (FCP) and the World Bank provide extensive policy guidance on FCP in the digital age.[37]

Consumer protection guidelines must also ensure that digital financial service providers deliver products appropriate for a given customer. Financial literacy levels among households and MSMEs remain low.[38] The proliferation of digital finance has outpaced the financial literacy of many consumers, as well as their ability to use credit wisely. Mobile lending apps in Kenya and Tanzania provide just one example.[39] Because the use of new data can reveal borrowers' willingness and ability to pay, those data can be exploited to bring prices in line with what lower-income segments can afford. These data can also be used for predatory pricing. Although the price discrimination enabled by AI-powered models is a form of economic efficiency, it can lead to unfair outcomes for riskier or less financially literate borrowers.[40]

Digital technologies can play a role in helping to address this challenge. Consumer advocates can use technology channels to deliver simple, actionable, accessible, and personalized financial education, especially to youth. Many governments delivered financial education messages through digital channels during the pandemic. Innovations such as personalized financial counseling and behavioral nudges related to financial goals can also strengthen financial consumer protection.[41] Technology, and social media in particular, can also be used to achieve a more robust redress mechanism for consumers.[42] Although digital delivery of financial education promotes financial resilience in several ways, it requires basic digital skills and access to information infrastructure (such as a smartphone and broadband/internet). Lack of connectivity may exclude the households most in need of financial literacy support.[43]

Substantial evidence is emerging of a lasting "digital dividend" of the pandemic related to the adoption of digital channels for the delivery of and access to financial services (see box 4.3). However, many of the access gaps that existed before the crisis persist, risking a further deepening of financial and economic exclusion for those segments of the population that lack mobile phones or internet access. As discussed in detail in the 2021 *World Development Report,* countries will be limited in their ability to adapt many of the innovative mitigation strategies without investing in digital infrastructure and supportive regulatory frameworks.[44]

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### Box 4.3  The COVID-19 digital shock

The pandemic created near-immediate challenges for financial service providers across all facets of their operations. The most immediate impact was on physical branch operations, which in several countries closed to protect clients and staff. Although banks were often considered essential services and so were exempted from lockdowns, the microfinance institutions (MFIs) and mobile money agents that act as front-line providers of financial services to low-income and rural customers did not always receive similar dispensations. Within a matter of weeks, institutions had to combine on-site activities with remote work to keep operations running and ensure staff safety.[a] Remote working operations of financial institutions in emerging economies were significantly limited by deficiencies in internet access and systems.[b]

Digital payments and mobile and internet banking helped financial institutions continue to serve customers during lockdowns.[c] In many countries, this was a massive transition because most financial transactions used cash prior to the pandemic.[d] The first wave of lockdowns spurred a spike in downloads of digital banking apps.[e] A study of 71 countries estimated that the pandemic led to an increase of 21–26 percent in the rate of daily downloads of finance-related mobile applications from the countries' first confirmed COVID-19 cases through December 2020.[f]

Likewise, mobility restrictions fueled a surge in the adoption of digital payments.[g] In Indonesia, the value of e-money transactions grew about 39 percent between 2019 and 2020.[h] In India, the monthly volume of digital payments as of November 2021

*(Box continues next page)*

Box 4.3 **The COVID-19 digital shock** (continued)

was 57 percent higher compared to the year before.[i] A survey in Pakistan found that active mobile money users increased from 8 percent of adults in February–March 2020 to 14 percent by the end of the year.[j] These new banking behaviors resulted in several challenges for financial institutions. In India, for example, repeated service outages led the Reserve Bank of India to ask one of the country's largest commercial banks to temporarily halt the rollout of new digital financial services.[k]

The growth in digital financial services spurred by COVID-19 was in many ways built on a foundation laid well before the pandemic. The share of adults who made or received a digital payment grew from 32 percent in 2013 to 44 percent in 2017.[l] In Sub-Saharan Africa, the number of mobile money accounts surpassed 500 million in 2020.[m] In several emerging economies during the pandemic, an initial drop in digital payments concurrent with a decline in economic activity was followed by a rapid recovery and growth of digital payments and electronic transactions that surpassed previous levels. For example, data for the first semester of 2021 from Colombia's Superintendencia Financiera show that the number of monetary transactions conducted through a mobile phone doubled, replacing ATMs as the most common transaction channel.[n]

The uptake of digital platforms did not occur evenly across or within countries. Figure B4.3.1 shows how the adoption of digital channels among businesses was greater in middle-income countries, albeit with significant differences across markets. Some of the larger markets and markets that already had a certain percentage of connected residents saw the highest growth in the share of businesses that adopted or increased use of digital channels during the pandemic. By contrast, in low-income countries and markets with low internet penetration, the impact of the pandemic on the use of digital channels among businesses was also lower.[o] Surveys conducted in 2020 also found that firm size influenced digital adoption: as many

as 44 percent of large enterprises reported that they adopted or increased use of digital channels for their business, compared with just 27 percent of microenterprises.[p]

Women and rural residents have less access to the key enablers of financial access, such as mobile connectivity and accepted forms of identification (ID), than men or urban dwellers. A GSMA report estimates that 234 million fewer women than men use mobile internet.[q] Continued lack of connectivity or ID risks entrenching precrisis financial exclusion. Surveys in Pakistan revealed that gains in mobile money adoption in 2020 were concentrated among urban and financially literate groups.[r]

Beyond payments, financial service providers had to ensure the continuity of a wide range of operations, from account opening to loan underwriting and loan collections. Prior to the pandemic, the majority of financial institutions relied fully or in part on face-to-face engagement of their staff with clients. A survey of International Finance Corporation (IFC) financial institution clients on the early impacts of COVID-19 found that over 60 percent of respondents indicated that the crisis had led them to introduce or prioritize the digitalization of internal operations or the rollout of digital channels.[s] Technology and digital channels can significantly lower operating costs for lenders and enable them to sustainably offer small-value loans and products, reach underserved segments, and maintain viable operations through the crisis.[t]

Among MFIs, adoption of technology and digital financial services has been slower historically. However, anecdotal evidence indicates that institutions were better able to maintain operational resilience and support access to financial services if they had invested in back-office automation and digital channels prior to the pandemic. For example, Bancamía, one of the largest MFIs in Colombia, played a central role in the government's digital cash transfer programs.[u] The institution also leveraged its agent network and mobile banking services and accelerated the rollout of a process automation initiative

*(Box continues next page)*

Box 4.3 The COVID-19 digital shock *(continued)*

**Figure B4.3.1** Impact of the COVID-19 pandemic on adoption of technology by businesses, by country income group



High-income ● Upper-middle-income ● Lower-middle-income ● Low-income
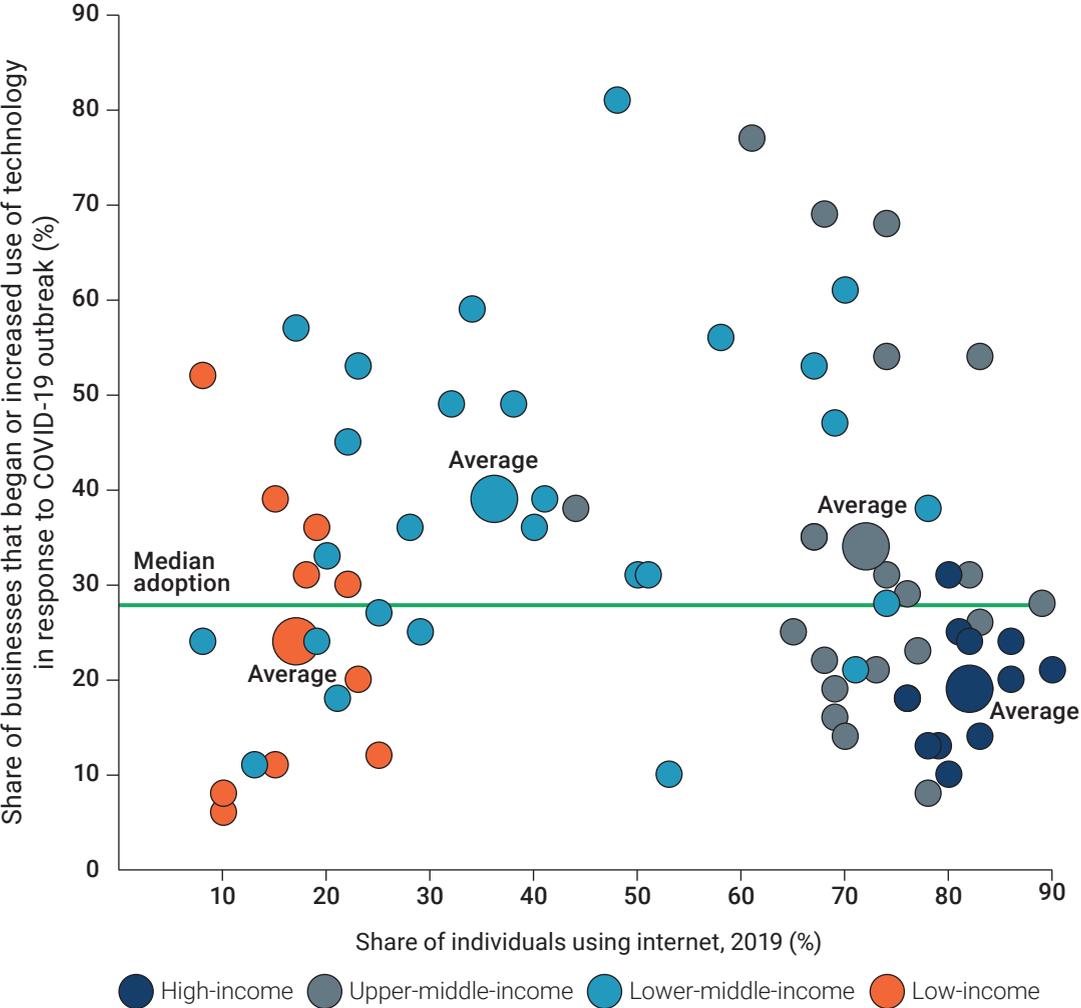
*Source:* WDR 2022 team, based on International Telecommunication Union, Statistics (database), https://www.itu.int /en/ITU-D/Statistics/Pages/stat/default.aspx; World Bank, COVID-19 Business Pulse Survey Dashboard, https://www .world bank.org/en/data/interactive/2021/01/19/covid-19-business-pulse-survey-dashboard; World Bank, Enterprise Surveys (database), https://www.enterprisesurveys.org/.

*Note:* The figure shows, by country income group, the share of firms that started using or increased the use of internet, online social media, specialized apps, or digital platforms, or invested in any new equipment, software, or digital solution in response to the COVID-19 outbreak. The vertical axis indicates the percentage of firms in low- and middle-income countries that adopted or increased use of digital channels after the onset of COVID-19. The horizontal axis indicates the percentage of individuals within a country using the internet by the end of 2019, or the most recent value before then.

*(Box continues next page)*

to facilitate remote work for part of its back-office staff. Likewise, LAPO Microfinance Bank in Nigeria was able to rely on its agent network to continue to provide basic services to customers during an early lockdown that required it to stop branch operations. As Nigeria eased restrictions, the microfinance bank continued to rapidly scale up its agent network, more than doubling transaction volumes over precrisis levels by August 2020.[v]

a.  See International Monetary Fund, Policy Responses to COVID-19: Policy Tracker (dashboard), https://www.imf.org/en/Topics/imf-and-covid19/Policy-Responses-to-COVID-19.
b.  Garrote Sanchez et al. (2021).
c.  Klapper and Miller (2021).
d.  McKinsey (2020).
e.  Koetsier (2020).
f.  Fu and Mishra (2020).
g.  Auer et al. (2020).
h.  Crisanto (2021).
i.  RBI (2021b).
j.  Ghosh (2020); Karandaaz (2021).
k.  The temporary ban issued on new digital initiatives to safeguard consumer protection and systemic stability was partially lifted in August 2021, allowing the concerned bank to issue new credit cards.
l.  World Bank, Global Findex Database 2017 (Global Financial Inclusion Database), https://globalfindex.worldbank.org/.
m.  GSMA (2021b).
n.  SFC (2021).
o.  Apedo-Amah et al. (2020); World Bank, COVID-19 Business Pulse Survey Dashboard, https://www.worldbank.org/en/data/interactive/2021/01/19/covid-19-business-pulse-survey-dashboard.
p.  Adian et al. (2020).
q.  GSMA (2021a).
r.  Khan and Jaffar (2021).
s.  IFC (2021).
t.  Pazarbasioglu et al. (2020).
u.  Banca de las Oportunidades (2020).
v.  Froeling, Garcia Vargas, and Savonitto (2021).

## Product choice and design

In addition to improving data and analytics, lenders can manage the heightened credit risk environment of the pandemic by focusing on credit products and product features that offer higher levels of visibility and recourse. For example, shorter-term loans require less information to gauge a borrower's ability and willingness to repay than loans with longer tenors. A projection of the next year's income and risks may not be necessary if a loan's duration is only one month, and yet a one-year projection would offer inadequate visibility for a three-year unsecured loan. Alternatively, a loan secured by inventory may not require as much visibility into future cash flows. This logic applies to personal lending as well. For example, a mortgage has different terms and longer tenor than an unsecured loan because recourse to the property reduces both the probability of default and loss in the event of a default. Lending products linked to other revenue-generating activities may provide greater visibility of the borrowers and enable credit losses to be offset by other revenue streams, thereby increasing the ability of lenders to assume credit risk.

## Loan tenor

Matching the exposure period of a loan to the time frame over which the lender has visibility into the borrower's prospects is an age-old way to manage credit risk. During the COVID-19 recovery, lenders may reduce tenors for new loans to avoid having to predict longer-term economic outcomes. The challenge with shorter-term loans is that the costs of origination and servicing are essentially fixed, which reduces the potential profit from the loan. Digital technologies can reduce these costs by automating credit underwriting, monitoring, and collection and by using low-cost digital disbursement and repayment processes, making short-term loans to digitally connected MSMEs and households more viable.

Digital loans offered through mobile phones are one example of short-tenor loans that have grown rapidly in emerging economies (box 4.4). Research from Kenya found that access to these products increases household resilience in the face of economic shocks.[45] On the other hand, concerns have arisen about the cost, transparency, and consumer risks of these types of loans.[46] However, if these loans are appropriately designed and regulated, they have the potential to help unbanked customers build or rebuild credit history and gain access to more formal, larger, and longer-term loans.

Well-known products such as installment plans and point-of-sale financing are additional lending approaches that mitigate credit risk through short tenors and ongoing reviews of borrower risk. Installment plans allow borrowers who do not have enough cash to buy a product outright to divide a

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### Box 4.4 Case study: Mobile money overdrafts in Kenya

In Kenya, the migration of payments, savings, lending, and investment to digital channels predates the COVID-19 pandemic. By 2019, 79 percent of adults had a mobile money account, and nearly 60 percent of micro- and small enterprises used mobile money for business transactions.[a] Short-term digital loans had also become mainstream: survey data indicate that 14 percent of adults borrowed digitally in 2019, compared with the 9 percent of adults who had access to traditional sources of bank and nonbank credit.[b]

The number and types of digital lenders and the products they offer range from bank loans disbursed into mobile money accounts (such as M-Shwari) to digital loan apps (such as Tala, Branch) that were mostly unregulated until December 2021.[c] These products typically allow customers to conveniently access short-term, low-value credit from their phones. The lenders manage risk by analyzing alternative data and limiting exposure through low-value loans that can be easily renewed. These credit

products have proven useful to many borrowers but raise concerns about transparency, appropriateness, high rates of default, and overindebtedness.[d] Emerging research suggests that they can be an important tool for smoothing consumption and financial management.[e] According to survey data, during the pandemic entrepreneurs and households across Kenya found it challenging to access traditional bank and nonbank credit, while digital credit continued to be used widely to support short-term liquidity and smooth consumption, complementing social networks and informal risk coping channels.[f]

During the crisis, lenders tightened credit standards significantly on both digital and traditional products in response to increased uncertainty.[g] New regulations issued in April 2020 introduced a moratorium on loan repayments and set a minimum threshold for negative reports to credit bureaus for both.[h] As a result, disbursements for the two largest digital term loan products fell significantly (a 41 percent year-on-year decrease as of

*(Box continues next page)*

Box 4.4 Case study: Mobile money overdrafts in Kenya *(continued)*

March 2021) stemming both from a reduction in demand and from lenders rejecting applications for smaller-value loans and focusing on a smaller pool of lower-risk borrowers.[i] Digital loan apps saw the largest decline in use, from 8.3 percent of adults in 2019 to 2.1 percent in 2021, according to the 2021 FinAccess Household Survey.[j]

By contrast, Fuliza M-PESA, the mobile money overdraft facility launched in 2019 by Safaricom, in partnership with NCBA Bank Kenya and KCB Bank Kenya, grew rapidly (figure B4.4.1). The Fuliza M-PESA overdraft facility saw its number of daily

active users more than double, from 0.7 million to 1.7 million between April 2020 and September 2021, and the disbursement value grew by 62 percent year-on-year.[k] The 2021 FinAccess Survey results indicate that 18.3 percent of adult respondents used Fuliza in the last 12 months.[l] By allowing mobile money account holders to complete payments or execute transfers even without sufficient balance in their accounts, the Fuliza facility effectively functions as low-value, short-term credit, most commonly used for household expenses, emergencies, and business expenses.[m] The overdraft is

**Figure B4.4.1** Growth of merchant payments and mobile money overdrafts in Kenya, 2019−21
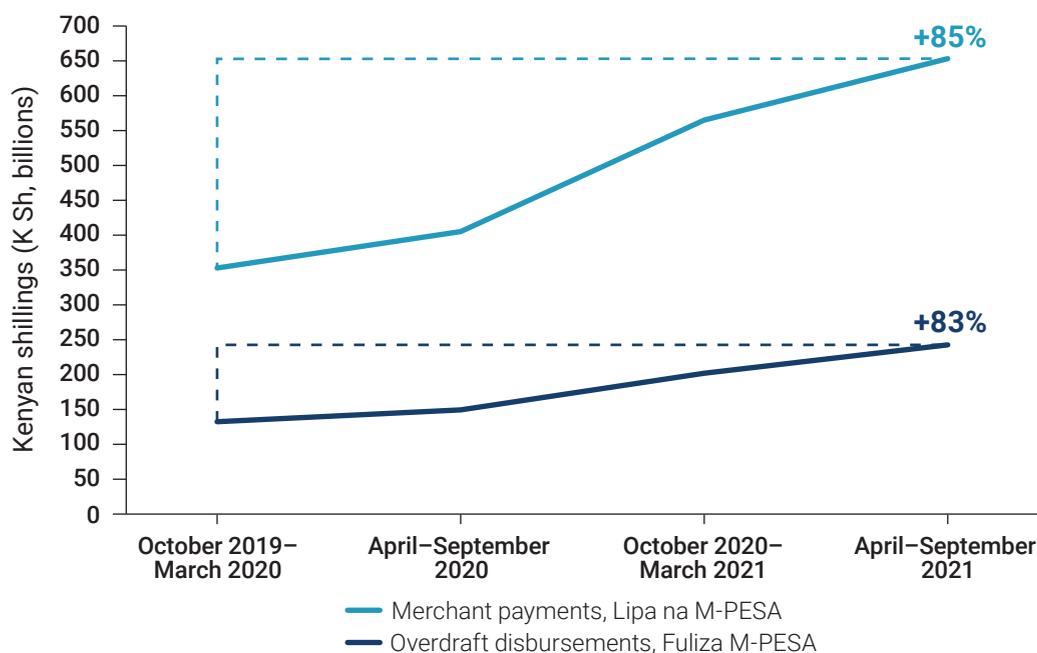


*Source:* Safaricom 2021b.

*Note:* The value of payments for goods and services through the Lipa na M-PESA platform grew from K Sh 353 billion ($3.4 billion) in October 2019−March 2020 to K Sh 653 billion ($5.9 billion) in April−September 2021. The value of overdraft disbursements grew from K Sh 132.4 billion ($1.3 billion) in October 2019−March 2020 to K Sh 242.6 ($2.2 billion) in April−September 2021.

*(Box continues next page)*

Box 4.4  Case study: Mobile money overdrafts in Kenya (continued)

automatically credited back when payments or cash arrive in the borrower's mobile money account. These product features offer lenders more visibility and recourse than a term loan product, allowing lenders to continue providing liquidity to Fuliza users through the crisis.

Together with government policies that temporarily removed transfer fees for low-value mobile payments, the overdraft product is likely to have been an important factor in the doubling of digital payments processed in Kenya in 2021.[n] Fuliza gave account holders much-needed flexibility to execute digital payments to merchants—including through the Lipa na M-PESA merchant payment service—and business transactions in a context of heightened uncertainty and payment delays. Although the growth of the Fuliza overdraft product has democratized access to low-value credit, including for low-income consumers,[o] concerns about transparency,[p] the cost of these short-term digital products, and the risk they pose to consumers suggest a need for careful oversight.

a. CBK (2019, 2021c).

b. For a more detailed review of the Kenyan credit market in 2019, see Gubbins (2019).

c. CBK (2021b).

d. Burlando, Kuhn, and Prina (2021); Izaguirre, Kaffenberger, and Mazer (2018). A study in Mexico found evidence that delaying digital loan disbursements can significantly reduce default rates, suggesting that easy access to loans may lead to significant impulse and temptation buying.

e. Bharadwaj and Suri (2020).

f. Blackmon, Mazer, and Warren (2021); FSD Kenya (2021).

g. CBK (2020a, 2020b, 2021a). Credit officer surveys show a progressive tightening of credit standards for households and personal loans starting in March 2020.

h. CBK (2020c).

i. Safaricom (2021a).

j. CBK, KNBS, and FSD Kenya (2021). The report attributes the decline in usage of digital loan apps to competition from formal digital credit products (including Fuliza), unfair debt collection practices, the impact of new regulation prohibiting listing of small-value loan borrowers to credit bureaus, and anticipated regulation by the CBK.

k. Safaricom (2021b).

l. CBK, KNBS, and FSD Kenya (2021).

m. Putnam, Mazer, and Blackmon (2021).

n. Safaricom (2021a). Total Fuliza M-PESA transaction value grew 58.2 percent year-to-year, while the volume of Fuliza M-PESA transactions grew 29.8 percent year-to-year as of March 2021. The Fuliza M-PESA ecosystem saw increased activity as customers took advantage of no fees on Lipa na M-PESA transactions below K Sh 1,000 (approximately $9).

o. CBK, KNBS, and FSD Kenya (2021) identifies Fuliza as the likely driver of the increase in adoption of formal credit products regulated and supervised by the Central Bank among lower-income segments of the population.

p. For a discussion on transparency of overdraft accounts, see Sule et al. (2018).

purchase into smaller payments that are collected over time. Installment loans can be used for household purchases as well as for the machinery or equipment needed for a small business. These lending products have a long history, with many examples of positive uses, as well as some abuses by bad actors.

Data from Poland's credit bureau (figure 4.3) show that, although demand for consumer loans fell in the months following the outbreak of the pandemic, lenders reacted by significantly tightening credit conditions for consumer cash loans, leading to a significant reduction in loan approval rates. For installment products, which typically offer more visibility to lenders, approval rates fell only slightly and rapidly returned to precrisis levels.

**Figure 4.3** Impact of the COVID-19 pandemic on consumers' loan approval rates, by product type, Poland, 2019–21
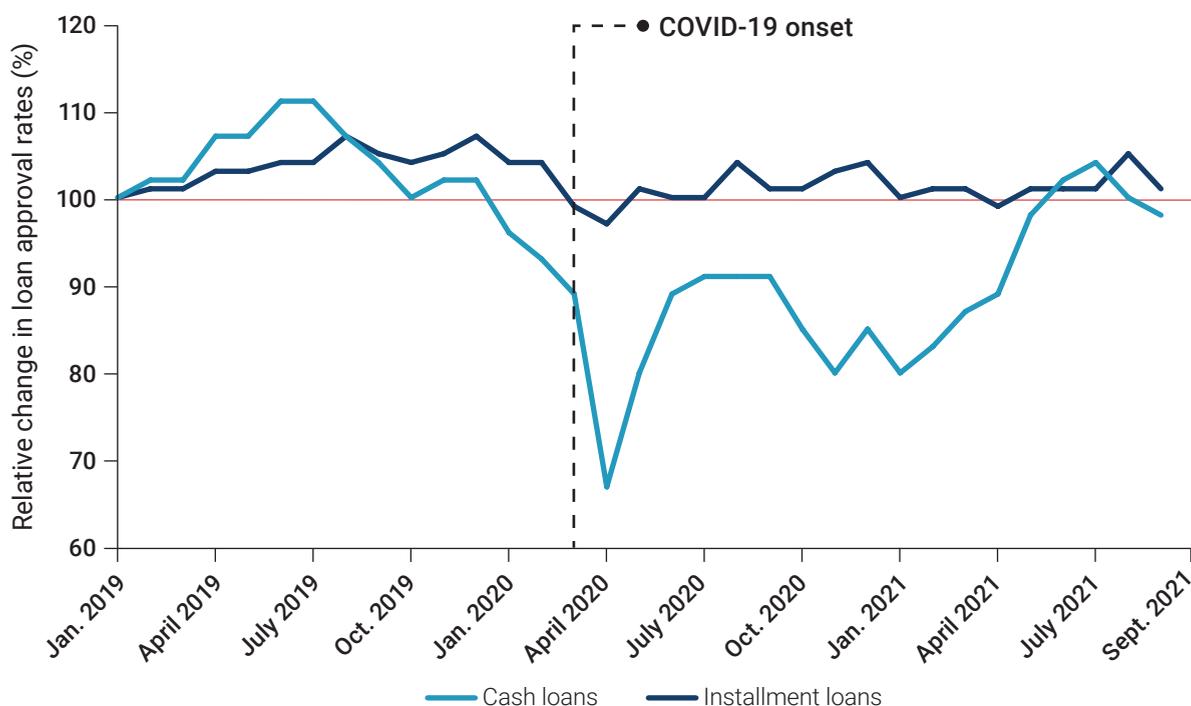


*Source:* Biuro Informacji Kredytowej S.A. (Credit Information Bureau) analysis based on proprietary data.

*Note:* The figure shows for Poland the relative change in approval rates for cash and installment consumer loan products from January 2019 to September 2021, compared with their respective approval rates as of January 2019. Approval rates are defined as the share of customers who applied for a cash or installment loan during a two-week period and were granted the respective loan product by any Polish lender.

Short-term financing is not appropriate for all borrowers. For example, a short-term loan, even with rollovers, may not be suitable for long-term projects or capital investments. Short-duration credit terms can, however, help lenders improve visibility on certain informationally opaque borrowers and open the door to subsequent longer-term financing.

## Secured credit

Another approach to mitigating risk is through product configurations that improve recourse. Traditional recourse options are limited for many borrowers in emerging economies because real estate is the preferred collateral for most banks, and many small firms and individuals do not own property. As a result, loan applications from small firms are frequently rejected for lack of collateral, according to World Bank Enterprise Surveys data.[47] Because the pandemic introduced uncertainty around the value of collateral, financial institutions increased collateral requirements, making it harder to obtain financing, even for those who do have qualifying assets. In quarterly surveys of credit conditions in Mexico, for example, firms reported a progressive increase in bank collateral requirements through June 2021.[48] Other forms of recourse more common for lower-income borrowers,

such as personal guarantees and the reputational sanctions characteristic of group microfinance lending models, may also have been affected by the pandemic. For example, social distancing prevented group meetings.

Widening the range of assets accepted as collateral could enable lenders to find effective means of recourse where hard collateral is not available, allowing them to better manage the risk of extending credit through the pandemic and the recovery. Movable assets account for roughly 78 percent of enterprise capital stock in emerging economies, and yet many lack modern, secured transaction regimes that would permit the use of movable assets as collateral.[49] The modernization of legal frameworks for secured transactions and the introduction of movable asset collateral registries create new options to mitigate credit risk. Technology, including digital ledgers, can be implemented to facilitate the design and implementation of collateral registries, as well as for the creation and transfer of digital assets to be used as collateral.[50] A study found that collateral registries for movable assets effectively address information asymmetries and foster access to finance. In countries that introduced registries, the number of firms with access to finance increased by an average of 10 percentage points, interest rates declined, and tenors lengthened, with stronger impacts on smaller and younger firms.[51]

Asset-based lending can thus reduce the risk of default and create the conditions for lenders to provide larger loans and serve borrowers with no previous credit history. A study in Kenya found that farmers who were offered an asset-backed, small down payment loan to purchase water tanks were much more likely to make the investment than farmers offered a standard collateralized loan—and the repayment rates were comparable.[52] Another study in Pakistan found that hire purchase agreements—a type of leasing contract—motivated an MFI to finance business assets worth several times its prevailing borrowing limit, while maintaining low default rates and offering flexible repayment options. The asset-based finance contracts had significant and persistent effects on the resilience and growth of the microenterprises, as well as on corresponding household wealth, compared with the MFI's traditional loan products.[53]

Another type of asset-based, flexible leasing contract known as pay-as-you-go (PAYGo) had been emerging as an effective product for small asset financing prior to the pandemic, and it has shown resilience through the crisis. The product was originally developed to enable households to finance solar home systems, but it has also been used for the purchase of two-wheel transport and appliances.[54] Some PAYGo providers incorporate innovative forms of recourse, such as a remote "lockout" that makes the asset unusable for nonperforming borrowers (see box 4.5).

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### Box 4.5 Case study: Pay-as-you-go home solar systems

An estimated 590 million people in Africa live without access to electricity. COVID-19 deepened this challenge, in part because some governments redirected limited resources from energy subsidies to funding for emergency response measures.[a] The impact of lockdown measures on household budgets, as well as on the operations and supply chains of solar energy providers, also contributed to an 18 percent fall in off-grid solar lighting sales in 2020.[b] In a challenging year for off-grid energy, however, pay-as-you-go (PAYGo) financing models swiftly recovered, proving to be an accessible, resilient way to support access to electricity for households and microentrepreneurs.

PAYGo is a form of asset-based financing that relies on mobile technology to offer flexible financing

*(Box continues next page)*

**Box 4.5** Case study: Pay-as-you-go home solar systems *(continued)*

for small asset purchases such as solar home systems and consumer electronics. Low-income consumers who lack credit histories or collateral are able to acquire these types of assets with a relatively small down payment.[c] For solar home systems, borrowers also enter into a contract, typically ranging from one to three years, to buy credits for daily, weekly, or monthly energy usage. By purchasing credits, borrowers pay down the loan interest and principal. When credits run out, the system automatically shuts off until the user tops up the balance. Embedding loan repayments in a fee-for-service model (akin to buying mobile phone airtime) is a flexible form of financing that allows clients to reduce or pause payments in the event of a shock. The lockout technology likewise reduces the risk for providers that would have no recourse in the event of default other than to repossess the asset—an expensive option. Although the lockout technology does not necessarily reduce loss in the event of default, it encourages borrowers to behave in a way that reduces the probability of default.

According to industry data, PAYGo solar companies have been able to weather the COVID-19 crisis relatively well (figure B4.5.1). Cash sales for solar systems through June 2021 were well below those for previous years, whereas sales through PAYGo contracts recovered and continue to grow. Performance data on 20 PAYGo providers found some signs of distress, including an increase in write-offs and receivables at risk. But many performance measures remained consistent with pre–COVID-19 metrics.[d]

The resilience of the PAYGo market can be attributed to a few factors. Most fundamentally, electricity is a basic need, and therefore some governments gave solar companies essential business status, like that given to the traditional power sector. High demand also helped buffer the effects of the pandemic. Many PAYGo companies reported record sales during the early months of COVID-19,

**Figure B4.5.1** Volume of off-grid lighting products sold as cash products and via PAYGo, 2018–21
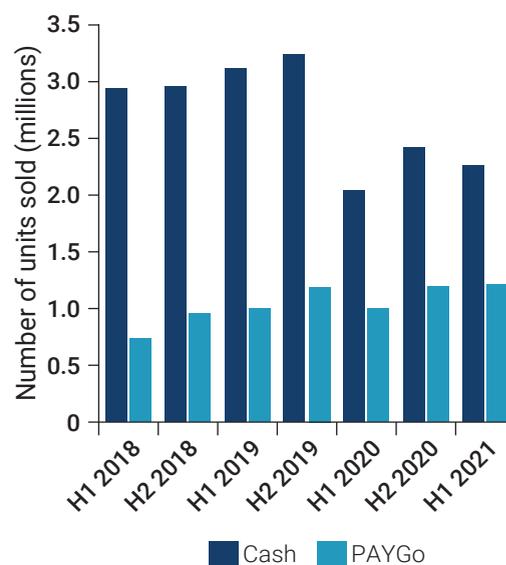


*Source:* GOGLA 2021.

*Note:* Products are classified as cash when sold in a single transaction (including products purchased via tenders) or as PAYGo when the customer pays for the product in installments over time or pays for use of the product as a service. H1 and H2 refer to the first and second halves of the fiscal year, respectively. PAYGo = pay-as-you-go.

which may indicate that consumers facing lockdowns anticipated the need for reliable electricity at home and so took advantage of the PAYGo model to acquire it at low initial costs. They were then able to use (and pay for) the asset only when they needed it.

Finally, a field experiment in Uganda demonstrated the viability of PAYGo asset-secured financing models beyond their initial use to acquire the solar home systems. The study found that the lockout technology can enable lenders to leverage

*(Box continues next page)*

the solar asset as collateral to secure other types of household finance—in this case, school loans. The fact that the lender could temporarily disable the flow of energy to solar home systems led to a 19 percentage point reduction in default rates compared with default rates for uncollateralized loans. Researchers concluded that the recourse provided by the asset lockout feature led to a reduction in adverse selection and moral hazard among borrowers.[e]

a. IEA (2020).
b. GOGLA (2021).
c. This is typically a lease-to-own contract with down payments lower than 20 percent of the value of the asset.
d. The PAYGo COVID Impact Monitor, an initiative by the Consultative Group to Assist the Poor (CGAP), Global Off-Grid Lighting Association (GOGLA), and International Finance Corporation (IFC) under the PAYGo PERFORM program, collected data from 20 companies to gauge the effect of COVID-19 on the sector. See Global Off-Grid Lighting Association, "PAYGo COVID Impact Monitor (PCIM)," Amsterdam, https://www.gogla.org/sites/default/files/overview_paygo_covid_impact_monitor_17082020.pdf.
e. Gertler, Green, and Wolfram (2021).

## Embedded finance

Where data on a borrower's credit history are no longer reliable and visibility into future economic activity is limited, linking lending directly to an underlying economic activity is a powerful way for lenders to mitigate credit risk. Contextual finance provides credit in the context of another transaction, such as the payment of a utility bill or the purchase of an appliance or business inventory. The category of embedded or contextualized finance[55] includes a wide range of products and credit underwriting modalities, which typically combine features that lead to greater visibility and recourse in the context of a monitorable transaction or a broader relationship with the borrower.

When lending in the context of another transaction, lenders typically have access to a range of current data on the borrower, the other parties involved, the use of funds, and the timing of the underlying economic activity. Lending in the context of supply and distribution chains, for example, has a long history dating back to early trade and commerce between regular counterparties. In increasingly digitalized economies, lenders connected to or integrated with a marketplace or a transaction platform can combine contextual information about the current transaction with historical, high-frequency transaction data to further improve visibility.

Embedding credit in another transaction motivates borrowers to repay the loan, as doing so helps maintain the ability to engage in future transactions with that counterparty. Embedded lending may also have recourse through a lien on future cash flows between the parties, or it may benefit from the effect of automated payments on delinquencies.[56] Merchant cash advances, which are based on patterns of credit and debit card receipts, are one example of automated payments. These loans are typically repaid as a percentage of daily or weekly receipts directly from the account through which the merchant's card payment receipts flow.

Providing finance in the context of another transaction may also motivate lenders to take on more risk than they would in the context of a stand-alone loan. For example, a seller might offer credit to a buyer that lacks collateral because the seller is willing to bear the risk in order to make the sale. Merchant working capital provided by an online marketplace platform allows the merchants to do more business on the platform, generating more revenue for the marketplace. Buy now, pay later (BNPL) products are

an example of lending in which sellers bear all or some of the costs and risks of providing credit to their customers in order to increase sales.[57]

Although embedded finance is not new, innovative uses and larger scale are now possible in the context of digitally enabled economic activity. The disaggregation and reconfiguring of financial services by fintech innovators have lowered the barriers to entry for nonbanks. Likewise, technology platforms are enabling embedded financial products to scale by inserting them directly into the workflows of an inventory order, invoicing process, crop planting, or e-commerce transaction.[58] This insertion can lead to significant cost efficiencies in customer acquisition and loan processing. Loans may be offered directly by the platform (or other business counterpart), or they may be originated and serviced by the platform using its customer information and transaction processes, but funded by a third-party financial institution.

The surge in digital adoption during the pandemic created opportunities to turn to digital channels and platforms to extend credit to consumers and businesses. The major e-commerce platforms are increasingly offering embedded financing to merchants selling on their marketplaces. These platforms use data about their sellers—including their sales, revenue, and returns history—to underwrite working capital loans. Platform providers with a wealth of data have been shown to have better visibility into credit risk than traditional lenders.[59] Some e-commerce marketplaces such as Amazon, Mercado Libre, and Alibaba lend directly or through subsidiaries (box 4.6). Others, such as Hepsiburada, Jumia, Lazada, and Shopee, provide data to third-party banks and accredited finance providers that offer loans via the marketplace. The loans may be disbursed and collected by the platform or by a partner financial institution.[60]

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## Box 4.6  Case study: Doubling down on MSE finance throughout the pandemic

MYbank, an online bank serving mostly micro- and small enterprises (MSEs) in China, continued to grow throughout the COVID-19 pandemic, nearly doubling its reach from 21 million MSEs in 2019 to 40 million MSEs as of June 2021.[a] MYbank has expanded its customer base beyond e-commerce merchants, reaching millions of offline merchants, rural and agricultural customers, and supply chain MSEs, among others. MYbank was able to accomplish this expansion by using its unique data partnerships and digital business model to adjust its underwriting models during the pandemic. MYbank also broadened its reach by partnering with other banks to offer MYbank's adaptable scoring and risk management through them. Approximately 80 percent of MYbank's MSE clients had fewer than 10 employees, and most had limited or no access to finance from banks.[b] An analysis of over 40,000 MSE clients of MYbank found a positive association between access to working capital financing during the early months of the pandemic and higher sales revenue. The average loan size was ¥38,000 (less than $6,000) with an average term of about 12 months.[c]

MYbank leverages channel integration with Alibaba Group e-commerce platforms and Alipay to serve e-commerce customers. Alipay offers electronic payments and a broader range of digital financial services to more than 1 billion customers and 80 million MSEs across China. MYbank's credit underwriting uses machine learning techniques to integrate payments and transaction data, as well as other user information from these platforms to inform its risk profiles.[d] Such techniques not only enable more accurate risk assessments, but also reduce the risk of excessive lending. As of June 2021, MYbank's nonperforming loan ratio was 1.52 percent. Research has found that smaller businesses and enterprises in less-developed cities benefit the

*(Box continues next page)*

most from big tech lenders because proprietary data allow these lenders to compensate for the lack of traditional data from credit assessment.[e] Although MYbank is a stand-alone bank, its ability to rely on e-commerce and payments platforms allows it to better assess the customer's ability to repay (visibility), as well as take advantage of recourse features such as automatic loan payments from the client's Alipay account.

China's economy improved faster than many other markets during the second half of 2020, but the impact of the COVID-19 crisis on Chinese firms was severe. A survey on the early impact of the pandemic revealed that more than half of the Chinese MSE respondents expected their income to fall by 50 percent in the first quarter of 2020.[f] As of June 2021, an index of MSE operations indicated that smaller businesses had not yet returned to prepandemic levels.[g] MYbank was able to use real-time business transaction information to adjust its credit underwriting models and strategy to continue to lend to these customers and expand its reach in China. MYbank made nearly 100 changes

in its model in the first quarter of 2020 and continues to adjust its underwriting through regular sectoral analysis and client updates.

One of MYbank's responses to the COVID-19 crisis was initiating in March 2020 a partnership with the All-China Federation of Industry and Commerce to collaborate with over 100 banks to offer a jointly financed and administered loan product.[h] Through this partnership, banks were able to provide access to finance for MSEs by leveraging MYbank's loan processing facility and its transaction data. Each bank followed its in-house credit policies using MYbank's updated sector-level and firm-level assessments to provide additional risk mitigation. MYbank's role in providing MSEs with access to credit during the pandemic using alternative forms of data is consistent with earlier research on 2 million Chinese firms that received credit from MYbank and from traditional banks between 2017 and 2019.[i] In the study, researchers found MYbank's underwriting to be less dependent on the financial cycle than that of traditional lenders and therefore potentially less affected by a negative shock.

a. *Businesswire* (2021).
b. Sun et al. (2021).
c. Sun et al. (2021).
d. Gambacorta et al. (2020).
e. Huang et al. (2020).
f. Sun et al. (2021).
g. PSBC (2021).
h. *China Banking News* (2020).
i. Gambacorta et al. (2020).

Embedded finance opportunities can be found across many types of digital platforms. Kobo360 is an African e-logistics platform for truck drivers and small-fleet operators in Ghana, Kenya, Nigeria, Togo, and Uganda. Because Kobo360 has insight into the portion of a truck operator's cash flow that stems from bookings through the platform, it can offer participating operators working capital financing. The platform underwrites loans using proprietary data on the trip and income history of the driver or company, as well as on supply, demand, and bookings. Because payments for trips booked on the platform flow through Kobo360's systems, the company can automate loan repayments.[61] Moreover, because drivers rely on Kobo360 for future trip bookings and income, they would be more likely to prioritize repayment of a loan to the platform relative to other expenses.

## Supply chain finance

Supply chain finance shares many of the features of embedded finance in terms of its ability to mitigate risk by linking credit to a commercial interaction. By tying short-term credit exposures to the movement of goods or inventories in the context of an established relationship between supply chain participants, supply chain finance improves visibility into the borrower's probability of default.[62] Even though credit in a supply chain transaction is typically unsecured, lenders gain recourse from the fact that transactions take place within a network that includes anchor buyers or distributors on whom the borrower depends for business. These relationships within a supply chain mitigate risk, improve efficiency, and lower the cost of providing finance.

Larger corporate buyers or distributors often provide their value chains with financing. For example, buyers may decide to pay their suppliers faster to support their working capital and operations, or sellers and distributors may allow downstream MSMEs to pay later or in installments. This form of supply chain finance depends on the liquidity of these corporate anchors and their willingness to take on the risk of providing—and typically subsidizing—credit to ensure the viability of their value chains. As the pandemic broke out, many corporate anchors sought to support the liquidity of their suppliers and distributors.[63] For example, 10 global fast-moving consumer goods (FMCGs) manufacturers increased their own use of working capital during the first half of 2020, largely to support their commercial counterparties.[64] To protect the liquidity of their distributors, seven of the 10 FMCGs manufacturers on-lent working capital by extending receivable payment terms. The same corporate anchors reduced accounts payable by around 10 percent, thereby channeling working capital to suppliers. The anchors increased their outstanding debt by 13 percent (approximately $45 billion) from the end of 2019 to the second quarter of 2020, effectively intermediating between the capital markets and their value chains to take on credit risk that banks or other lenders may not have been willing to assume.

Not all anchors are willing or able to take on the balance sheet volumes and risks involved in extending financing to their suppliers and distributors. Supply chain finance programs that involve a third-party financial institution (such as factoring or reverse factoring programs) can be very effective in reducing risk and supporting access to finance for suppliers.[65] Lenders in these programs—embedded between a corporate buyer and its suppliers, often SMEs—use invoice data to gain visibility into the future cash flows of the borrowing suppliers. In some programs, the lender may have additional recourse to the buyer that established the program. Hepsiburada, a Turkish e-commerce platform, facilitates financing for merchants and suppliers both directly and by enabling bank lending through an internal platform that submits a supplier's or merchant's invoices to the lending bank as evidence of receivables.[66] Supply chain finance can be less risky than a standard (unsecured) working capital line even when the lender is not a direct participant in the supply chain. Through the pandemic, the supplier finance program of the International Finance Corporation (IFC) saw greater growth and borrower uptake (see box 4.7).

Digitalization has significantly reduced the operating costs of supply chain accounts.[67] Digital technologies enable supply chain partners and lenders to automate processes and lessen the burden of documenting receivables, tracking amounts due, and collecting payments. Advances in the use of digital technologies in both commerce and finance are enabling supply chain finance programs to scale up and serve more businesses with a broader range of loan sizes, including smaller loans that were previously uneconomical to service.

In Latin America, Citibank announced in October 2020 its partnership with PepsiCo and the fintech Amigo PAQ to digitalize payments and offer small shops working capital lines of credit. The partners underwrote, monitored, and collected payment for a portfolio of small loans to thousands of *tienditas*. By the end of 2020, the partnership was serving more than 4,000 SMEs in Peru, with ongoing operations

## Box 4.7  The supply chain finance response to the pandemic

The pandemic profoundly disrupted international trade and domestic supply chains. Faced with a sudden drop in revenue and greater uncertainty about future cash flows and operations, many buyers sought to reduce inventory by delaying or canceling orders. They also sought to preserve liquidity by extending their payment terms with suppliers. The suppliers, for their part, were also concerned about preserving liquidity and attempted to provide discounts for early payments in an attempt to cash in receivables. Despite these efforts, many struggled to remain viable. On average, the crisis led to an immediate increase in working capital requirements for firms, driven by the reduction in revenue and the increase in accounts receivables and inventory.[a]

During the pandemic, the trade finance programs of the International Finance Corporation (IFC) saw a surge in interest from suppliers driven by these factors. For example, IFC's Global Trade Supplier Finance (GTSF) Program, which provides short-term financing to suppliers that sell to large domestic buyers or export to international buyers, saw total commitments rise from $1.2 billion in the

year ending June 2019 to just over $2 billion in the year ending June 2021. Sixty-five percent of this volume was disbursed to suppliers based in six lower-middle-income countries: Bangladesh, Cambodia, Honduras, Pakistan, Sri Lanka, and Vietnam.

The increase stemmed from the growth in volume financed by existing suppliers in the program, some of which had previously used bank finance that became less available during the crisis, and by new anchor buyers that joined in 2020 to broaden the availability of finance to their suppliers. For example, a GTSF anchor buyer in the automotive industry—one of the sectors most affected by the pandemic—saw 300 percent growth in the number of its suppliers that joined the program and more than 10 times the volume financed. Overall, the number of suppliers actively participating in IFC's GTSF Program surged 230 percent between the year ending June 2019 and the year ending June 2021. This activity suggests the value during the pandemic of a program enabling buyers to help their suppliers access finance, thereby stabilizing the buyers' supply chains.

a. PwC (2021a, 2021b).

in Mexico and Guatemala.[68] The size and number of these loans would not have been feasible if the end-to-end processes had not been digitalized.[69] As digital order, inventory, and payment systems become more widely used and the track records of smaller borrowers and supply chain instruments are established, the receivables assets can be bundled and transferred, so funding could move from corporate balance sheets to bank balance sheets, the capital markets, or to other investment vehicles. Such developments would create new options for the external finance of downstream payables.[70]

## Insuring credit risk and catalyzing long-term investments

This chapter has highlighted examples of lenders adopting innovative and often tech-enabled approaches to improving visibility and recourse so they can continue and even increase lending. Achieving the right mix of risk management approaches is challenging in a high-risk and rapidly changing context. For that reason, credit guarantees (CGs) have been, and will continue to be, a useful tool for motivating lenders to continue offering credit during high-risk periods.

By having recourse to a guarantor when a borrower defaults, lenders are able to significantly reduce their losses. Guarantors are often government agencies or public institutions, but mutual guarantee

systems are available in some markets, especially in Europe. Private trade credit insurance also plays an important role in global markets and particularly trade finance. Public development banks and development finance institutions also play an important role in promoting lending to MSMEs, other productive sectors, and areas of policy priority.[71]

Credit guarantee schemes have been a central pandemic response by governments in advanced and several emerging economies. In 2020, public credit guarantee schemes amounted to an estimated 2 percent of global gross domestic product (GDP).[72] Evidence from some countries such as Spain that embraced CGs during the COVID-19 crisis indicates that CGs have improved MSMEs' access to finance and have imposed a smaller fiscal burden relative to government-backed grants or direct lending.[73] A recent study of the impact of COVID-19 on SME failures estimates that loans backed by government guarantees can be more effective and efficient than cash grants for limiting bankruptcy rates and returning trends to precrisis levels.[74] Furthermore, guarantees played a crucial role in supporting the access of SMEs to trade finance products. A survey of member countries of the Organisation for Economic Co-operation and Development (OECD) found that commercial banks and trade credit insurance providers displayed a diminished appetite for risk, while government-supported export credit agencies saw a significant increase in applications and volume.[75]

As economies reduce the use of broad fiscal and monetary support measures, guarantors may have to continue supporting lenders where credit risk remains high and visibility and recourse remain limited. Because CGs play a role in balancing the risk equation for lenders even during normal times, they could be among the last fiscal measures to be reduced or withdrawn, possibly playing an even bigger role than before the crisis. In addition to reducing the risk of financing MSMEs and sectors especially affected by the crisis, guarantee programs can be adjusted to reduce lenders' risk of providing longer-term financing to support investments by businesses in adapting to their new economic reality as well as to de-risk financing to emerging areas and sectors with the potential to support a sustainable, inclusive recovery.

In the transition from pandemic response to economic recovery, guarantors should, however, adjust CG program parameters gradually and in sync with the unwinding of fiscal support measures. Many of these adjustments may require tightening the program design to ensure that only firms that are well run yet need support benefit from guarantees.[76] Like cash grants and loans by state-owned banks, CGs can potentially misallocate resources to weak "zombie firms," or to strong firms that do not need the CG to survive. A recent analysis concludes that the more common resource misallocation is use of guarantees for firms that did not need them (thus tying up limited capital).[77]

Digital technologies can enable the collection and analysis of data to facilitate timely performance assessments of CGs and ensure transparent reporting. As the economy recovers, stricter screening should aim to exclude zombie firms and reduce the portion of each loan that is guaranteed to motivate strong underwriting practices by loan originators and maintain program sustainability to reduce the fiscal burden. To direct resources toward smaller enterprises, governments could lower the size cap for eligible borrowers. An appropriately priced guarantee premium could help discourage lenders from overusing guarantees; guarantors should revise pricing as economic conditions improve. (For more on the design and execution of effective credit guarantees, see spotlight 4.1.)

Beyond insuring against credit risk, development banks, as well as regional and international financial institutions, will continue to play an important role in the recovery by providing long-term finance and support for capacity development and digital transformation. That role could include catalyzing private lending that can produce positive long-term returns, such as adapting to climate change or shifting to low-carbon business models. It could also include reaching those underserved parts of the economy (such as women and their businesses, minorities, rural areas, and migrants) at risk of being excluded from the economic recovery because of lack of access to finance.

The experience of Banco Pichincha (BP), the largest commercial bank in Ecuador, illustrates how technical assistance and funding from development finance institutions can help financial institutions achieve their strategic objectives despite the crisis. In 2017, BP, with the support of IFC and other institutions, significantly expanded its MSME portfolio and tackled the country's large gender gap in access to finance.[78] It did so by addressing biases in credit review and customizing credit products for women entrepreneurs. BP entered the pandemic having doubled its portfolio of women entrepreneurs. As the pandemic unfolded, the bank continued to focus on women entrepreneurs, adapting its financial and nonfinancial services offerings to continue growing its portfolio. Between March 2020 and August 2021, BP's MSME loan portfolio grew by 16 percent, with over 50 percent of new loans disbursed to MSMEs owned by women.[79]

# Policies to enable access to credit and address risks

Approaches to restoring credit growth involve adapting or innovating ways in which finance providers manage risk. Product features and existing approaches to risk modeling can be adapted to the pandemic economy, while other measures to improve visibility and recourse may depend on digital channels and tools. Many of the solutions supporting new lending in this context will be technology-driven. Policy makers should therefore consider taking measures to facilitate such innovations in business models and products, including by supporting the participation of new types of credit providers in the market and by enabling use of new types of data and analytics. Upgrades in financial infrastructure can further foster access to finance and support resilience in credit markets. However, financial innovation may also pose new risks to businesses and consumers, as well as to financial stability and integrity (see online annex 4A[80]). Addressing these risks requires adequate oversight by regulators. In fact, in many countries legacy financial sector regulatory and supervisory frameworks and approaches need to be updated.[81] This section reviews some of the policies that may help foster innovation and access to credit while minimizing risks to consumers and the financial sector.

## Facilitating innovation through new providers, products, and uses of data and analytics

The digital transformation of finance is enabling the atomization of services, the recombination of value chains, and the participation of nontraditional providers.[82] These advances can contribute to greater efficiency, more diverse and inclusive markets, and the expanded availability of credit. New entrants, from challenger banks to fintech lenders, can improve the range of products and the appetite for risk in a market that includes banks, MFIs, supply chain finance providers, and others. Regulatory and supervisory frameworks can support healthy innovation by allowing diverse lenders with modern business models to participate in the market.

The entry of new financial service providers may require adjustments in the regulatory perimeter. Digital credit providers, for example, offer products similar to those provided by regulated banks, but may not be subject to oversight by the financial regulator because of the current definitions of regulated activities or institutions.[83] For example, in Kenya between 2016 and 2019, the providers of app-based, short-term, small-value loans operated outside of the regulatory perimeter. During those years, use of these products expanded from 0.6 percent to 8.3 percent of adults and resulted in instances of irresponsible lending.[84] This is one example of a new provider playing an important role that should be encouraged, but also overseen within an expanded regulatory perimeter.[85] Regulators worldwide are developing

capacity and assessing their approaches to regulating institutions and activities to accommodate the entry of new providers on a level playing field, while ensuring soundness, financial integrity, consumer protection, and inclusion.

Rapid innovation and shifts to new providers and infrastructure can pose risks to stability.[86] Some promising approaches to managing these risks include expanding the regulatory perimeter, deploying differentiated licensing requirements proportionate to the risks presented by a product or provider, and introducing activity-based regulation. New guidance is also emerging from the global standard-setting bodies.[87]

The need for well-designed regulatory and supervisory frameworks applies not just to new entrants, but also to all providers to encourage sound experimentation with new channels, products, and processes. Regulatory or supervisory restrictions could impede revisions of risk models to adapt to sectoral shifts and new economic conditions, as well as the adoption of new technologies, products, and processes needed to adapt to changing postpandemic markets. There is scope to provide more latitude for experimentation and innovation without sacrificing institutional or systemic soundness, such as by allowing innovative products or business models to be deployed within a given risk envelope or exposure limit. For example, in 2018 the Bank of Thailand indicated a move from specific product reviews to umbrella approvals covering a range of related products or setting exposure thresholds.[88]

New regulatory approaches to spur innovation will naturally require that regulators build their own internal capacity to understand new technologies and monitor the market to ensure that experimentation is consistent with the broader goals of a stable, productive financial sector. Regulatory innovation hubs and sandboxes can help regulators be digitally informed and narrow the gap between regulation and financial innovation. A survey of regulators in 2020 found that 16 percent had introduced regulatory sandbox initiatives, while about 36 percent had accelerated deployment during the pandemic.[89]

Supervision technologies (suptech) can also enable supervisory agencies to monitor a broader and more complex financial sector more efficiently.[90] Just as financial service providers are reaping gains from technology, regulators and supervisors can embrace technology to improve market surveillance, enforce market conduct and consumer protection standards, and better respond to complaints. During the pandemic, many supervisors either accelerated or introduced new suptech initiatives.[91] Technology can also lower the cost to collect and analyze data for regulators, to identify potential discrimination in lending practices, and to inform policy design. The example of Chile[92] indicates that consideration can be given to producing anonymized gender disaggregated data for the financial sector, with the goal of capturing differential developments in borrowing and credit risk, identifying potential discrimination in lending practices, and informing market and policy efforts to close the gender gap in credit access.

The bigger role of data, coupled with advanced analytics enabled by machine learning and AI, also requires new regulatory and supervisory policies. Financial institutions will provide some of the data used to measure risk during and after the pandemic. Other data will come from third parties such as credit bureaus, utilities, employers, and government databases. Data governance frameworks will be critical for defining the rules around data ownership and use. For example, a rights-based data governance framework can enable data sharing while protecting against misuse.[93] Fair lending frameworks should encompass algorithmic accountability and transparency to reduce the chances that bias becomes hardwired into AI-based decision models (see box 4.2 earlier in the chapter). Several jurisdictions are crafting policies for algorithmic transparency and accountability.[94] Regulation should address the ownership of and access to data, protection of data (including cybersecurity), and potential bias in data analysis.

Adoption of emerging technologies such as cryptocurrency and decentralized finance will also require new regulatory frameworks. Cryptocurrency and blockchain technologies do not appear to be

positioned to play a significant role in access to credit during the near-term pandemic recovery. But applications such as remittances and central bank digital currencies are being deployed, and the underlying distributed ledger technology could have applications in capital markets and credit markets and as foundational infrastructure for permissioned sharing of validated data such as identity or credit history. These technologies bear monitoring from financial regulatory and market conduct perspectives, with the goals of supporting sound innovation in financing and equal access to digital solutions. Authorities, the private sector, and development institutions need to work together to address technology gaps, enhance digital literacy, and ensure adequate transparency and management of cyber risks.

Operationalizing advances in technology, new products, alternative data, and data protection frameworks requires infrastructure that protects data subjects from breaches and cybercrime. Regulators will therefore have to strengthen their capacity to address cyber risks, enhance international coordination, and implement guidance and evolving best practices on operational resilience from international standard-setting bodies.[95] Efforts by regulators to address data governance, fair lending, and cybersecurity will not only enable lenders to develop and deploy innovative approaches to lending, but also improve the transparency, equity, and consumer protection needed to create trust and drive responsible adoption.

## Improving financial sector infrastructure

Financial infrastructure comprises the legal and regulatory frameworks and public and private sector institutions and practices that support the efficient and sound functioning of the financial systems. This infrastructure must also keep pace with digitalization to support the evolving needs of lenders.

Digital identity, an important element of financial infrastructure, can enable broader access to finance while maintaining system integrity. A recent study revealed that 49 percent of surveyed regulators implemented measures related to eKYC (electronic Know Your Customer) and digital identity during the pandemic. Examples include digital contracts and signatures to support access to and resilience of financial services.[96]

Payment systems are another key element of financial infrastructure. The physical infrastructure used by clearinghouses and switches, as well as the soft infrastructure of rules and practices on participation, origination, recission rights, and finality, must be modernized to cope with the digital transformation of finance and the shift away from cash accelerated by the pandemic.

Credit infrastructure includes the hard infrastructure of asset registry systems and credit bureau databases and the soft infrastructure of laws and institutions designed to support efficient and responsible allocation of credit in the economy. Together, they reduce lending costs and frictions and facilitate access to credit.[97] For the data-driven innovations discussed in this chapter to be broadly usable, lenders must be able to access and integrate a wider range of data into their underwriting models. Credit bureaus such as Creditinfo, CRIF, Dun & Bradstreet, Experian, and TransUnion are working toward expanding access by leveraging technology to incorporate alternative data to enrich their data sets (see box 4.8). Regulators must also update their credit information-sharing regimes to guarantee the safe use of alternative data.[98] Credit information system regulations that guide credit bureaus and registries should ensure that nontraditional lenders also have access and report their credit exposures because a gap in reporting by any set of lenders renders the credit information system less valuable to everyone. The People's Bank of China, for example, granted alternative lenders access to its credit registry.[99]

Another form of infrastructure that can facilitate access to credit during and after the pandemic is the laws and registries that allow lenders to accept innovative forms of collateral, such as movable

## Box 4.8 Case study: Use of alternative data by credit bureaus during the pandemic

The COVID-19 pandemic accelerated efforts by credit reporting service providers (CRSPs), such as credit bureaus, to integrate alternative data into credit reports to help address the limitation of historical repayment data and inform credit underwriting decisions through the crisis.

As governments provided direct financial support, regulatory authorities implemented moratoria, and credit bureaus adopted adjusted technical reporting codes, traditional credit data became less useful to inform risk assessments. Some of these measures would tend to result in "false positives"—that is, borrowers with the ability to service existing debt and apparently qualified to borrow further, despite their underlying viability being compromised by job loss or permanent business closure. Other measures exacerbated "false negatives"—that is, borrowers who otherwise would be able to meet debt obligations but were flagged as ineligible because of the short-term impacts of the COVID-19 crisis on their ability to meet loan obligations. For example, in South Africa the rate of false negatives increased from its precrisis level of 1.5 percent of credit applicants to 8 percent in October 2020.[a]

To address this gap in usability of traditional data, many CRSPs accelerated efforts to incorporate alternative data into their scoring.[b] Alternative data typically increase the precision of credit score models,[c] especially during periods of stress.[d] The crisis also gave lenders and policy makers new incentives to integrate these new models and overcome the risk management and regulatory barriers that had stifled adoption of third-party scoring innovation (the most popular third-party scoring model used in 2020 was based on data from before the 2007–09 global financial crisis).[e]

The three main US credit bureaus have launched partnerships with data aggregators to supplement traditional credit scores with consumer permissioned data on positive repayment behavior.[f] For example, Experian reported that as of March 2021 nearly 7 million consumers in the United States and the United Kingdom had connected to its Experian Boost service. Launched in 2019, the service allows customers to authorize Experian to access real-time payments data from customers' utility, telecom, and streaming service providers. The credit bureau reported that by adding real-time alternative data, the majority of Experian Boost users improved their credit score—for example, 22 percent of users with "poor" credit ratings were shifted to a "fair" score band.[g]

Meanwhile, the data analytics company FICO and three consumer reporting agencies (Equifax, TransUnion, and Experian) launched products in the summer of 2020 incorporating analytics and sector data for users who are experiencing financial distress from the pandemic or have benefited from moratoria. Similar products were launched across the world, including in Croatia,[h] the Baltics, and Iceland.[i]

a. Experian (2021).
b. GPFI (2018).
c. Djeundje et al. (2021).
d. Gambacorta et al. (2019).
e. FinRegLab (2020).
f. FinRegLab (2020).
g. Gambacorta et al. (2019).
h. Fina (2021). The COVID Score developed by the Financial Agency of Croatia (Fina) is an input in the process used to evaluate applications by businesses and income-generating professions for government support. The Fina COVID Score evaluates the impact of the pandemic on a business, assesses the results of previous government support, and estimates whether there will be any need for additional financing. The score has seven risk elements, including business, industry, staffing levels and ability to meet salary payments, and credit risk.
i. Creditinfo (2021). Launched by Creditinfo, the COVID-19 Impact Score is a synthetic score designed to help identify companies hardest-hit by the COVID-19 crisis and likely to soon have solvency problems. The score incorporates data on supply chain, health, and proximity to industries most affected, such as tourism.

assets and receivables. For example, Pakistan launched an electronic registry in 2020 to enable financial institutions to register rights in movable assets (machinery, furniture, inventory, accounts receivable, and digital assets) and accept these as collateral for loans. The launch was particularly timely considering the urgent need for credit by low-income households and MSMEs arising from the pandemic.[100] Collateral registries must adhere to harmonized requirements for secured transaction law and prudential regulation, specifically capital and loan-loss provisioning requirements.[101] Product- or sector-specific digital platforms can complement this core infrastructure by accepting security in the form of assets such as invoices and warehouse receipts.[102] An example is Mexico's Nafinet invoice financing platform.

Finally, digital infrastructure in the form of reliable fixed and mobile telephony and data services underpins the functioning of digital economies and all noncash financial services. Gaps in coverage and high costs continue to exclude significant portions of the population of emerging economies. Likewise, disruptions of information and communications technology, the communications network, and energy supplies can be a serious source of operational risk to financial service providers. Policy makers should ensure that core telecommunications and energy infrastructure is robust and that competitive markets produce adequate capacity, fault tolerance, and redundancy.

The systems on which financial services delivery depends have also become more complex because technology has enabled the atomization of service components and the reconfiguration of what had been internalized processes owned by distinct service providers.[103] One example of the consequences of these dependencies is the widespread internet outage in February 2021 that affected Fiserv, a major financial services technology outsourcer. That outage resulted in interruptions in payment acceptance at many businesses across the United States.[104] In another example, a hardware failure in June 2018 disrupted the Visa network in Europe, halting digital payments across the continent.[105] The growing adoption of digital financial services, coupled with the concentration of infrastructure in large payment networks and cloud computing platforms, will make even rare events more damaging. Financial regulators must set minimum standards for risk management and operational reliability that cover outsourcing and partnership arrangements. Individual regulators are increasingly doing this, as are standard-setting bodies.[106]

## Increasing collaboration among regulators

Digitalization has increased the cross-border and cross-sector dimensions of financial services. A country's regulator defines when a foreign provider can offer services to domestic customers and what services it can provide, but compliance relies on cooperation across jurisdictions. The digital transformation of finance also brings multiple domestic regulators into play. A digital finance provider or product may fall within the jurisdictions of telecommunications, information, data, consumer protection, competition, and other regulators. Regulators need to establish modes of collaboration both within and across borders and within and across regulatory domains.[107] In Bangladesh, for example, the Central Bank and the Telecommunications Regulatory Commission are part of a multistakeholder consultative committee on Unstructured Supplementary Service Data (USSD) communications, a key enabler of mobile money.[108] A coordinated regulatory approach can narrow disparities between regulatory frameworks and anticipate new risks.

The growth of alternative lenders, including fintechs, big techs, and other embedded finance providers, has the potential to change the market structure of the financial sector, with implications for

competition as well as consumer protection.[109] Digital technology and new entrants in the credit market can foster competition, increase innovation and efficiency, and challenge incumbents.[110] On the other hand, economies of scale and scope in data and network effects can compound the existing scale advantages of incumbents' capital and customer bases. Crossover big tech platforms may provide additional competition in financial services, bringing their own scale advantages, but market abuses by some big tech companies are already a concern in their core product areas. Financial regulators must work with competition authorities as well as consumer protection entities to monitor and prevent anticompetitive or abusive practices as the sector evolves in each market.

Open access to customer data and financial infrastructure could reduce the tendency toward market concentration, particularly as data and credit infrastructure become critical factors for lending in the COVID-19 crisis recovery. By leveling the playing field, open data frameworks can empower smaller players and increase contestability and competition. However, open access to personal and financial data is technically difficult to implement securely. A proliferation of entities involved in providing a single service could reduce accountability for service quality and data use and leave consumers wondering who is responsible when a transaction fails or fraud occurs. Although data portability can increase bank lending, the effects on consumer welfare can be nuanced.[111] Efforts to spur competition through open banking[112] need to move in tandem with cybersecurity, privacy protections, consumer financial education, and an analysis of market dynamics.

## Conclusion

The ability of credit markets to reach and serve businesses and households—including micro- and small businesses and low-income households—will be central to an equitable recovery. To effectively support the recovery, lenders will have to adjust their credit models and product portfolios to improve visibility and recourse in a way that manages heightened risks and counters the impacts of the pandemic. Digitalization of economic activities and adoption of financial technology can enable development of the solutions and product innovations needed.

Governments and regulators should support sound innovations in financing, particularly those for MSMEs and vulnerable segments; facilitate upgrades in data-driven underwriting; encourage product diversification; and enable the entry of innovative lenders such as fintechs into the market. Maximizing the benefits of innovation in the financial sector will require modernizing regulatory and supervisory approaches, along with financial infrastructure. Collaboration among regulators will become increasingly important as financial activities cut across sectors and the powerful advantages of scale and scope in networks, data, and capital lead to greater provider concentration.

Although credit markets can effectively support MSMEs and households in the recovery, governments may need to continue to help balance the risks and returns for lenders serving the most affected segments and sectors of the economy. In addition to enabling markets through the measures outlined above, some credit markets may benefit from well-targeted guarantee schemes.

The solutions and policy recommendations discussed in this chapter are aimed primarily at countering a reluctance to lend in the context of the heightened risk and uncertainty of the pandemic and ensuring adequate access to finance to allow even the more affected households and entrepreneurs to take part in the recovery. These measures can also serve as the foundation for more efficient and resilient credit markets that can address structural constraints, progressively reduce long-standing gaps in access to finance, and foster responsible financial inclusion.

# Notes

1. Ayyagari, Demirgüç-Kunt, and Maksimovic (2011).
2. Byrne et al. (2021).
3. Berger et al. (2021) found that relationship clients of some US financial institutions were more negatively affected by loan contract terms than other borrowers.
4. Haughwout et al. (2021).
5. Shleifer and Vishny (2011).
6. Bodovski et al. (2021).
7. Wagner and Winkler (2013); Wehinger (2014).
8. Apedo-Amah et al. (2020).
9. OECD (2021d).
10. ICC (2020).
11. Gourinchas et al. (2021b).
12. Koulouridi et al. (2020).
13. Simanowitz, Hennessy-Barrett, and Izaguirre (2021).
14. World Bank (2019b).
15. Some definitions of big data add a fourth "v"—veracity. It is a characteristic needed so that the data are truly useful. See Lukoianova and Rubin (2014). Some add a fifth "v"—value (BBVA 2020).
16. Berg et al. (2020).
17. Agarwal et al. (2020).
18. Björkegren and Grissen (2020).
19. Jagtiani and Lemieux (2018).
20. Gambacorta et al. (2020).
21. A data subject is a person who can be identified directly or indirectly through personal data identifiers.
22. World Bank (2021c). Parlour, Rajan, and Zhu (2020) examine the impacts of financial technology (fintech) competition in the payments market, concluding that, although payment innovations promote financial inclusion, they may lead to ambiguous effects on consumer welfare.
23. Ostmann and Dorobantu (2021).
24. Berg et al. (2020); Hurley and Adebayo (2017).
25. Personal characteristics are regulated by legislation seeking to prevent discrimination or bias. Although these characteristics may vary by legislation, commonly regulated characteristics include gender, familial status, race, disability, religion or belief, and sexual orientation.
26. Leo, Sharma, and Maddulety (2019); Ostmann and Dorobantu (2021).
27. Feyen et al. (2021).
28. IFC (2020a).
29. McKinsey (2019).
30. Alonso-Gispert et al. (2022).
31. Ziegler et al. (2021).
32. For a comprehensive review, see Teima et al. (forthcoming).
33. Cornelli et al. (2020).
34. World Bank and CCAF (2020).
35. Blackmon, Mazer, and Warren (2021).
36. World Bank and CCAF (2020).
37. OECD (2018, 2021b); World Bank (2017, 2021a).
38. OECD (2021c).
39. Izaguirre, Kaffenberger, and Mazer (2018).
40. Calvano et al. (2020) find that AI/ML techniques can encourage collusive behavior.
41. Carpena et al. (2017).
42. Garz et al. (2021).

43. OECD (2021a).
44. World Bank (2021c).
45. Bharadwaj and Suri (2020).
46. Gwer (2019); Melzer (2011); Morse (2011); Skiba and Tobacman (2019).
47. Fan, Nguyên, and Qian (2020).
48. Banco de México (2021).
49. World Bank (2019c).
50. World Bank (2020a).
51. Love, Martínez Pería, and Singh (2016).
52. Jack et al. (2016).
53. Bari et al. (2021).
54. GOGLA (2021); Waldron (2016).
55. Feyen et al. (2021).
56. Automation of payments is a behavioral strategy to overcome inattention. See Moulton et al. (2014).
57. Buy now, pay later (BNPL) products—an e-commerce version of point-of-sale financing—experienced a surge in adoption, fueled by the growth in e-commerce and digital payments during the pandemic. See Alfonso et al. (2021).
58. Feyen et al. (2021).
59. Gambacorta et al. (2019).
60. World Bank (2020c).
61. Amosun and Unger (2020); Maylie (2020).
62. IFC (2019).
63. Caniato, Moretto, and Rice (2020).
64. Dunbar and Singh (2020).
65. For a review, see IFC (2019).
66. SEC (2021).
67. IFC (2017a, 2020c).
68. Perú21 (2021).
69. Citigroup (2020).
70. See Meki, Quinn, and Roll (2021) for another example of how technology can enable product innovations that allow anchors to sustainably take on more risk to improve the performance of a last-mile distribution network leading to higher profits for microdistributors and a substantial increase in sales for the anchors.
71. See Xu, Marodon, and Ru (2021) for an effort to map development banks worldwide.
72. Calice (2020).
73. Corredera-Catalán, di Pietro, and Trujillo-Ponce (2021).
74. Gourinchas et al. (2021a).
75. OECD (2021d).
76. World Bank and FIRST Initiative (2015).
77. Gourinchas et al. (2021a).
78. Ecuador has one of the largest gender gaps in access to finance in Latin America. Men are twice as likely as women to borrow from a financial institution or use a credit card, and they are nearly 40 percent more likely than women to have a savings account. See BCE (2020) and World Bank, Global Findex Database 2017 (Global Financial Inclusion Database), https://global findex. worldbank.org/.
79. Banco Pichincha (2021).
80. Annex 4A can be found at http://bit.do/WDR2022 -Chapter-4-Annex.
81. Alonso-Gispert et al. (2022); IMF and World Bank (2018); World Bank (2021c).
82. Feyen et al. (2021).

83. World Bank (2021a).
84. CBK (2019).
85. CBK (2021b). Since December 2021, an amendment to the Central Bank of Kenya Act has provided the financial sector regulator with the power to license and oversee app-based lenders.
86. Feyen et al. (2021).
87. Alonso-Gispert et al. (2022).
88. IMF (2019).
89. World Bank and CCAF (2020).
90. Broeders and Prenio (2018); di Castri et al. (2019).
91. World Bank (2021b); World Bank and CCAF (2020).
92. Data2x (2016).
93. World Bank (2021c).
94. European Parliament (2019). For example, the European Parliamentary Research Service put forward four policy elements: (1) awareness-raising: education, watchdogs, and whistleblowers; (2) accountability in public sector use of algorithmic decision-making; (3) regulatory oversight and legal liability; and (4) global coordination for algorithmic governance.
95. Major elements include BCBS (2021); BIS and IOSCO (2016); FSB (2018, 2020); and G-7 (2016).
96. World Bank and CCAF (2020).
97. Pazarbasioglu et al. (2020).
98. World Bank (2019a, 2020b).
99. Pazarbasioglu et al. (2020).
100. Ruch (2020).
101. IFC (2020b).
102. Pazarbasioglu et al. (2020).
103. Feyen et al. (2021).
104. Dailey and Taylor (2021). Fiserv serves about 6 percent of the merchant acquiring market.
105. Togoh and Topping (2018).
106. For example, see IOSCO (2020); MAS (2018); OJK (2017a, 2017b); and RBI (2021a), paragraph 17 and annex VI.
107. Alonso-Gispert et al. (2022).
108. Plaitakis, Wills, and Church (2016).
109. Feyen et al. (2021).
110. Claessens (2009).
111. Parlour, Rajan, and Zhu (2020).
112. He, Huang, and Zhou (2020) highlight that although open banking favors new entrants in the credit market, it may under certain conditions negatively affect borrowers because of its impact on market dynamics and because of its signaling effect on borrowers, who may decide to opt out from sharing data.

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