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FinTech and the Search for Full Stack Financial Inclusion

Remarks by

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at

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Thank you for inviting me to join today's discussion. Like many of you, I have long been interested in the potential for innovation to improve financial access for families and small businesses who are underserved. The combination of smartphone apps, big data, artificial intelligence, and cloud technology holds out intriguing possibilities in financial services. But no single app is likely to be a silver bullet for the complex challenges faced by underserved households and small businesses. Achieving inclusion will require a holistic understanding of the challenges faced by underserved groups in order to develop full stack solutions to address them.[1]

Fortunately, an emerging generation of metrics may offer a more complete picture of consumers' financial needs. In addition, technological infrastructure is developing, such as faster payment systems, along with the potential for more transparent and simpler product offerings enabled by richer data and lower-cost processing. These new building blocks may make a difference on their own--and, more importantly, may be combined in powerful ways to bring end-to-end solutions to financial inclusion. I will briefly discuss each of these developments in turn.

Lessons from the First Wave

Let's start with the basic question of how to measure financial inclusion in order to evaluate the impact of financial innovations and inclusion policies. The World Bank's Global Findex Database starts with a seemingly reasonable proxy for financial inclusion: access to financial accounts. Having access to basic transaction and savings accounts has

[1] I am grateful to Kelvin Chen of the Federal Reserve Board for his assistance in preparing this text. These remarks represent my own views, which do not necessarily represent those of the Federal Reserve Board or the Federal Open Market Committee.

been shown to be an important step to financial inclusion, particularly in developing countries. For instance, a 2013 experiment provided savings accounts to a random sample of market vendors in Kenya, most of whom were women. The vendors with accounts saved at a higher rate and invested 60 percent more in their businesses relative to those who did not have accounts.[2] Similarly, women-headed households in Nepal ultimately spent more on nutritious foods and education when they received free savings accounts relative to those who did not.[3]

Using account access as a proxy for financial inclusion suggests substantial progress has been made. According to the Findex Database, over two-thirds of adults around the globe now have some form of financial account, up from roughly half just seven years ago.[4] This represents an increase of 800 million people. Here in the United States, the Federal Deposit Insurance Corporation's (FDIC's) most recent survey of unbanked and underbanked households found that 7 percent of U.S. households in 2015 were "unbanked."[5] The unbanked rate was nearly a percentage point lower than the prior survey in 2013 and is lower than in earlier years. Even with this modest improvement,

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[2] Pascaline Dupas and Jonathan Robinson, "Savings Constraints and Microenterprise Development: Evidence from a Field Experiment in Kenya," *American Economic Journal: Applied Economics* (2013): 163–192, https://web.stanford.edu/~pdupas/SavingsConstraints.pdf cited in World Bank Group, The Global Findex Database 2017 (2017).

[3] Silvia Prina, "Banking the poor via savings accounts: Evidence from a field experiment," *Journal of Development Economics*, vol. 115, (July 2015): 16–31, https://www.sciencedirect.com/science/article/pii/S0304387815000061

[4] World Bank Group, *The Global Findex Database 2017*, (2017): xi, https://globalfindex.worldbank.org/. The Findex Database is widely considered the authoritative database for measuring progress and need for financial inclusion from an international perspective.

[5] Federal Deposit Insurance Corporation, *2015 FDIC National Survey of Unbanked and Underbanked Households* (October 20, 2016), https://www.fdic.gov/householdsurvey/2015/2015report.pdf.

however, lower-income and minority households have substantially higher rates of being unbanked.

The widespread adoption of mobile phones and the data they generate are expected to extend these gains even further. The World Bank noted, for instance, that about 1.1 billion unbanked people, about two-thirds of the unbanked population, has a mobile phone.[6] Here in the United States, the Federal Reserve Board's 2015 Survey of Consumers' Use of Mobile Financial Services found that nearly 60 percent of the U.S. adult population had a smart (internet-enabled) phone.[7] It also found that the rates of mobile banking usage are higher among minorities. And even amongst the unbanked population, 40 percent of adults had access to a smartphone in their households; the same was true for 70 percent of underbanked adults.

Another proxy used to gauge financial inclusion is access to credit. When I worked on microcredit 3 decades ago, it was very difficult to scale up the provision of loans to small businesses.[8] Reaching small enterprises and evaluating their creditworthiness was very expensive, especially in small cities and rural areas, and it was difficult to secure loans with collateral. The high transaction costs were reflected in interest rates many times greater than those available for established businesses in urban areas.

[6] *The Global Findex Database 2017*, 11, https://globalfindex.worldbank.org/.
[7] Federal Reserve Board, *Consumers and Mobile Financial Services*, 12, see table 4.
[8] See, e.g., Brainard, "Senegal Community and Enterprise Development Project" in C. Mann, M. Grindle, and P. Shipton, eds., *Seeking Solutions: Framework and Cases for Small Enterprise Development Programs*, 1989. For a more recent perspective, see "Mobile financial services are cornering the market," *The Economist*, May 3, 2018, https://www.economist.com/special-report/2018/05/03/mobile-financial-services-are-cornering-the-market.

Today, new technologies are lowering transaction costs by automating the customer interface and underwriting processes. A recent analysis by staff at the Federal Reserve Bank of Atlanta notes that automated fintech platforms have lower operating costs relative to storefront payday lenders.[9] A recent study by staff at the Federal Reserve Bank of New York finds that fintech lenders process mortgages on average 20 percent faster than traditional lenders. Of course, these differences focus on costs and do not address loan pricing.[10]

But alongside these promising developments, we have also learned some cautionary tales from the early wave of fintech. In particular, while access to accounts and to credit may be beneficial, they are by no means sufficient to ensure financial resilience on their own.

Not surprisingly, access to an account is only a small part of achieving financial health. The Findex database itself notes that a quarter of all accounts worldwide are "inactive," meaning that there were no deposits or withdrawals made over the prior 12 months. In some cases, customers that are provided financial accounts quickly return to the cash economy. For example, in 2014, India launched an ambitious financial inclusion program with the goal of connecting every citizen to a basic bank account that

[9] Larry D. Wall, "Fintech and Financial Inclusion," *Notes from the Vault* (Federal Reserve Bank of Atlanta, August 2017), https://www.frbatlanta.org/cenfis/publications/notesfromthevault/08-fintech-and-financial-inclusion-2017-08-30.aspx#_edn6 (quoting J. Michael Evans, President of Alibaba). The Federal Reserve Bank of Atlanta compared the high operating costs of storefront payday lenders with the automation of the Chinese fintech Alibaba's savings tools.

[10] Andreas Fuster, Matthew Plosser, Philipp Schnabl, and James Vickery, "The Role of Technology in Mortgage Lending," Working Paper 24500 (Federal Reserve Bank of New York, April 2018), https://www.newyorkfed.org/research/staff_reports/sr836.html.

facilitated the opening of 240 million accounts. Before too long, however, it became evident that over a quarter of the new accounts held balances of one rupee or less.[11]

As for credit, fintech lending has moved beyond niche to the mainstream. In 2010, fintech lenders made only 1 percent of personal loan originations in the United States. By mid-2017, fintech lenders--often in conjunction with bank partners--were responsible for nearly a third of the personal loan market.[12] It is not clear how much of this fintech lending is making a significant dent in financial inclusion, as opposed to serving prime and near-prime consumers in the United States.[13] A 2017 study by TransUnion found that fintech lenders focused 59 percent of their originations in the near prime and prime risk tiers by the end of 2016--up marginally over the previous two years.[14] Researchers at the Federal Reserve Banks of Philadelphia and Chicago found that at least some fintech lenders were able to slot "some borrowers who would be classified as subprime by traditional criteria" into better loan grades.[15] But the differences from existing channels may not be large: TransUnion found that around

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[11] See, e.g., "Financial inclusion is making great strides," *The Economist*, May 3, 2018, https://www.economist.com/special-report/2018/05/03/financial-inclusion-is-making-great-strides.

[12] John Wirth, "Fact or Fiction: Are FinTechs Different than Other Lenders," *TransUnion* (blog), November 17, 2017, https://www.transunion.com/blog/fact-or-fiction-are-fintechs-different-than-other-lenders.

[13] See, e.g., Press Release, TransUnion, FinTechs Taking Larger Share of Personal Loan Market While Increasing Portfolio Risk-Return Performance (Nov. 2, 2017), https://newsroom.transunion.com/fintechs-taking-larger-share-of-personal-loan-market-while-increasing-portfolio-risk-return-performance /

[14] Wirth, "Fact or Fiction," https://www.transunion.com/blog/fact-or-fiction-are-fintechs-different-than-other-lenders and TransUnion, "FinTechs Taking Larger Share of Personal Loan Market While Increasing Portfolio Risk-Return Performance," press release, November 2, 2017, https://newsroom.transunion.com/fintechs-taking-larger-share-of-personal-loan-market-while-increasing-portfolio-risk-return-performance/.

[15] Julapa Jagtiani and Catharine Lemieux, "Do Fintech Lenders Penetrate Areas That Are Underserved by Traditional Banks?" Working Paper 18-13, (Federal Reserve Bank of Philadelphia, March 2018), https://www.philadelphiafed.org/-/media/research-and-data/publications/working-papers/2018/wp18-13.pdf.

10 percent of loans originated by fintech lenders were to subprime consumers, as compared to 14 percent for the overall market for personal loans.

What We Are Learning About Financial Inclusion

Account access and credit may be helpful and possibly even necessary components of a solution. But they are unlikely to provide a complete solution on their own. Continued progress on financial inclusion is likely to require solutions that are designed with an understanding of the issues that underserved communities face.

In particular, it appears that many unbanked or underbanked people in the United States are intentionally choosing not to maintain a bank account, which may hold clues to what underserved families and small businesses actually need. The data show that nearly half of the unbanked households actually had bank accounts in the past, based on a 2015 FDIC survey.[16] A third of these previously banked households explained that they currently did not have bank accounts because of high or unpredictable fees, as did roughly a fifth of unbanked households that previously did not have accounts. The single most cited reason for not having accounts was not having “enough money.” More than 10 percent of the unbanked explained that they simply “don’t trust banks.” Those findings were echoed at an international level by the Findex database, where roughly a fifth of adults without a financial account cited a lack of trust in the financial system.[17]

To explore why consumers would choose to use alternative financial services over traditional bank accounts, Lisa Servon of the University of Pennsylvania worked for both

[16] *FDIC National Survey of Unbanked and Underbanked Households*, https://www.fdic.gov/householdsurvey/2015/2015report.pdf.
[17] The Global Findex Database 2017, 5, https://globalfindex.worldbank.org/.

a check-cashing firm and a payday lender.[18] Servon observed that check-cashing firms used simple fee structures that were transparent and prominently displayed, similar to an overhead priced menu at a fast-food restaurant. As a result, individuals could understand clearly what fees they will have to pay up front. In contrast, checking accounts can be more unpredictable. The funds from a deposited check may not be immediately available. By the same token, it may not be clear exactly when the funds associated with a payment by check are likely to be deducted from the account. That lack of predictability can be extremely important to a family that is living paycheck to paycheck.

Bouncing a rent check, phone payment, or utility payment can have a destabilizing impact on day-to-day life with further knock-on effects and costs. When a check for a utility payment is rejected due to insufficient funds, for instance, the account holder may have to make time-consuming calls to get the lights turned back on, while also struggling to pay the associated overdraft fee. That may, in turn, lead to a vexing chain of additional late payments and fees. A 2013 study by the Bureau of Consumer Financial Protection found that more than a quarter of checking accounts in the study experienced at least one overdraft fee in 2011.[19] The average fee total for overdrawn accounts was $225, but varied as much as $200 between banks. Among bank customers who bounced checks, a relatively small minority bore the brunt of the fees: A quarter of

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[18] See, e.g., “What Is Driving the ‘Unbanking of America’?” National Public Radio, Fresh Air, January 10, 2017, https://www.npr.org/2017/01/10/509126878/what-is-driving-the-unbanking-of-america, cited in Wall, “Fintech and Financial Inclusion,” https://www.frbatlanta.org/cenfis/publications/notesfromthevault/08-fintech-and-financial-inclusion-2017-08-30.aspx#_edn6 .

[19] Bureau of Consumer Financial Protection, “CFPB Study of Overdraft Programs,” white paper (June 2013), https://files.consumerfinance.gov/f/201306_cfpb_whitepaper_overdraft-practices.pdf. The findings here refer to banks in the study “that tracked all incidences for all accounts opened at any time during 2011.”

accounts with overdrafts incurred in 2011 had more than 10 overdraft fees during that year.[20]

It is increasingly clear that financial inclusion is less about account access and more about families' financial resilience in the face of volatile income and expenses. It is common to assess households' earnings and living expenses in terms of annual totals. But what keeps many people up at night is their ability to pay *this week's* bills, especially when their paycheck is not coming until next week.

The U.S. Financial Diaries Project finds that the low- and moderate-income families studied experienced fluctuations in income either 25 percent above or below average for five months over the course of a year. Nearly a third of households whose annual incomes were twice the supplemental poverty measure dipped below the poverty line for at least one month during the year.[21] The Federal Reserve Board's Survey of Household Economics and Decisionmaking (SHED) similarly finds that 10 percent of all adults self-reported that they struggled to pay their bills at least once in the past year due to volatile income.[22] Jonathan Morduch and Rachel Schneider, the principal investigators

[20] The findings here refer to banks in the study "that tracked all incidences for all accounts opened at any time during 2011."

[21] See Jonathan Morduch and Rachel Schneider, *The Financial Diaries: How American Families Cope in a World of Uncertainty* (Princeton University Pres, 2017). See also Jeanne C. Marra, "The Financial Diaries Authors Discuss Income Volatility," *Bridges*, (Federal Reserve Bank of St. Louis, Fall 2017), https://www.stlouisfed.org/publications/bridges/fall-2017/financial-diaries-authors-income-volatility.

[22] Board of Governors of the Federal Reserve System, *Report on the Economic Well-Being of U.S. Households in 2017* (May 2018), 12, https://www.federalreserve.gov/publications/files/2017-report-economic-well-being-us-households-201805.pdf.

of the Financial Diaries, argue that access to steady, predictable cash flows is an important source of financial inequality.[23]

Expenses can be just as unpredictable as income, and financial fragility results from the mismatch between the two. The Pew Charitable Trusts showed that 60 percent of households self-reported that over the prior 12 months, they had experienced at least one financial shock, like a job change, divorce, major illness, or breakdown of a car or major household appliance.[24] The median household spent half-a-month's income on the most expensive shock (the median expense being $2,000). Further complicating things, expense shocks rarely occur on their own, but instead can cascade into additional expenses and stress for families on the margins. Pew showed that a third of households they studied self-reported two or more different financial shocks over the course of a year.[25] Morduch and Schneider found that 65 percent of spending spikes involved increases in two categories of expenses, such as transportation and health care. In more than half of the spending spikes they studied, spending was well above average in three categories.[26] Moreover, the spikes in expenses tended not to coincide with corresponding spikes in income.

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[23] Jonathan Morduch and Rachel Schneider, "Mismatch: How Income and Expense Volatility Are Undermining Households," *Stanford Social Innovation Review*, January 12, 2016, https://ssir.org/articles/entry/mismatch_how_income_and_expense_volatility_are_undermining_households

[24] The Pew Charitable Trusts, *The Role of Emergency Savings in Family Financial Security: How Do Families Cope With Financial Shocks?* (October 2015), http://www.pewtrusts.org/-/media/assets/2015/10/emergency-savings-report-1_artfinal.pdf.

[25] The Pew Charitable Trusts, *The Role of Emergency Savings*, http://www.pewtrusts.org/-/media/assets/2015/10/emergency-savings-report-1_artfinal.pdf.

[26] Morduch and Schneider, "Mismatch: How Income and Expense Volatility Are Undermining Households," https://ssir.org/articles/entry/mismatch_how_income_and_expense_volatility_are_undermining_households

Financially vulnerable families typically do not have sufficient savings to smooth through the income and expense volatility mismatches they experience. Households in the Financial Diaries expected to spend more than 80 percent of their savings within the year. [27] Nearly half of households studied by the Pew Charitable Trust had not recovered from financial shocks at least six months afterward.[28] And the Federal Reserve SHED finds that 40 percent of adults report they would have difficulty covering an unexpected expense of $400.[29]

This inability to plan for the future dramatically affects individuals' ability to engage in the investments, such as cutting back on work hours to pursue education and training, and the risk-taking that is necessary to improve their financial lives.[30]

Access to credit can be an important part of weathering these shocks. The Federal Reserve SHED finds that families with less access to credit are more likely to self-report financial hardship due to income volatility.[31] But credit is only useful if consumers have the means to repay the debt in a timely manner and stabilize their financial lives. Research increasingly shows that borrowers often choose lenders based on their

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[27] Morduch and Schneider, "Mismatch: How Income and Expense Volatility Are Undermining Households," https://ssir.org/articles/entry/mismatch_how_income_and_expense_volatility_are_undermining_households

[28] The Pew Charitable Trusts, *The Role of Emergency Savings*, http://www.pewtrusts.org/-/media/assets/2015/10/emergency-savings-report-1_artfinal.pdf.

[29] Federal Reserve Board, *Report on the Economic Well-Being of U.S. Households*, 21, https://www.federalreserve.gov/publications/files/2017-report-economic-well-being-us-households-201805.pdf ("Over the past five years, as the economy has recovered, the fraction of families able to easily cover this emergency expense has increased by about 9 percentage points.").

[30] See Marra, "The Financial Diaries Authors Discuss Income Volatility," https://www.stlouisfed.org/publications/bridges/fall-2017/financial-diaries-authors-income-volatility.

[31] Federal Reserve Board, *Report on the Economic Well-Being of U.S. Households*, https://www.federalreserve.gov/publications/files/2017-report-economic-well-being-us-households-201805.pdf. For example, one-fourth of adults who are not confident in their ability to be approved for a credit card self-reported that they had experienced hardship from income volatility over the past year, as compared to only 6 percent of those who were confident in their credit availability.

perceived chance of being approved for funding rather than on the cost or their ability to repay the debt. The Federal Reserve System's 2017 Small Business Credit Survey finds that this is one of the most appealing features of online lenders for small business borrowers.[32] With regard to consumers, a 2014 report by the Bureau of Consumer Financial Protection found that 80 percent of payday loans are rolled over or followed by another loan within 14 days.[33] The Bureau found that many loan sequences end quickly, but 15 percent of new loans are followed by others--and half of all loans were part of a sequence of at least 10 loans.

Full Stack Financial Inclusion for Financial Health

A sustainable solution is likely to require a comprehensive understanding of the needs of financially underserved families and small businesses. Accordingly, policymakers and financial services providers are beginning to assess financial inclusion in more nuanced ways. And, in parallel, new technological building blocks increasingly can be used to build more full-stack approaches to financial inclusion.

When considering how to think about progress, we are seeing a move away from basic financial inclusion to a more holistic understanding of financial health. Financial health is more difficult to measure than bank accounts, and policymakers and researchers are learning how to better work with that complexity. For instance, when the Bureau of

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[32] Federal Reserve Banks of Atlanta, Boston, Chicago, Cleveland, Dallas, Kansas City, Minneapolis, New York, Philadelphia, Richmond, St. Louis, and San Francisco, *2017 Small Business Credit Survey: Report on Employer Firms*, https://www.fedsmallbusiness.org/medialibrary/fedsmallbusiness/files/2018/sbcs-employer-firms-report.pdf.

[33] Kathleen Burke, Jonathan Lanning, Jesse Leary, and Jialan Wang, Bureau of Consumer Financial Protection, *CFPB Data Point: Payday Lending*, (March 2014), https://files.consumerfinance.gov/f/201403_cfpb_report_payday-lending.pdf.

Consumer Financial Protection released the findings of its research on financial well-being, it included a 10-item Financial Well-Being Scale Questionnaire, a self-evaluation tool designed to help an individual think comprehensively about his or her financial life.[34] The questionnaire asks consumers to rate statements such as "I can enjoy life because of the way I'm managing my money" and "I am securing my financial future."

Similarly, this April, the Center for Financial Services Innovation announced the launch of a new data set that uses subjective consumer responses to survey questions and pairs that information with actual data on their financial transactions.[35] The regularly refreshed data is designed to give industry, researchers, and policymakers better insight into consumers' financial lives by providing more accurate metrics for assessing changes over time. The new initiative, which they call "Financial Health Pulse," aims to bring the siloes of a consumer's financial life into one comprehensive picture, encompassing "income, spending, savings, debt, retirement, and credit scores."

Just as we are learning how to assess financial health more effectively, we are also seeing progress on tools that are specifically designed to address the challenges underlying financial inclusion. Moreover, these tools can be built upon a new generation

[34] "Measuring financial well-being: A guide to using the CFPB Financial Well-Being Scale," Bureau of Consumer Financial Protection, https://www.consumerfinance.gov/data-research/research-reports/financial-well-being-scale/.

[35] Center for Financial Services Innovation, "Center for Financial Services Innovation Launches 'U.S. Financial Health Pulse,'" press release, April 3, 2018, https://s3.amazonaws.com/cfsi-innovation-files-2018/wp-content/uploads/2018/04/27001554/U.S.-Financial-Health-Pulse-2018-Press-Release-FINAL-FOR-WEB.pdf.

of platforms and other basic building blocks, which can be used in combination to develop more effective full-stack solutions.

Within the Federal Reserve System, we recognize that we have a role and, potentially, a responsibility to help create an infrastructure that facilitates safe, innovative, and ubiquitous faster payment services. Earlier this month, we announced that we are seeking public comment on whether the Reserve Banks should take a more active role in modernizing our infrastructure to support interbank settlement of faster payments in real time.[36]

For households living paycheck to paycheck, the difference between waiting for a payment to clear and receiving a payment in real time is not merely an inconvenience; it could tip the balance toward overdraft fees, bounced checks, or collection fees. Of course, faster payments would not address the root causes of financial fragility, but they could help reduce the strain on some.[37]

In addition, many small businesses cite immediate access to working capital to finance inventories or pay employees as their number one constraint on growth. If a small business could count on its customers' payments being immediately accessible in its bank account, it could reduce the need for short-term financing to cover the costs of ordering materials and goods well in advance.

This could also make a difference for the many hourly wage employees that receive their pay in the form of paper checks. Electronic payments currently can take

[36] Lael Brainard, "Supporting Fast Payments for All," (speech at the Fed Payments Improvement Community Forum, Chicago, IL, October 3, 2018), https://www.federalreserve.gov/newsevents/speech/brainard20181003a.htm.
[37] See, e.g., Aaron Klein, *How the Fed can help families living paycheck to paycheck*, Brookings (November 22, 2017), https://www.brookings.edu/research/how-the-fed-can-help-families-living-paycheck-to-paycheck/.

multiple days to process, so if an employer seeks to ensure that an employee receives their pay on the last day of a pay period, the employer usually has to release the funds a few days in advance. With hourly employees, it can be hard to know how much pay is owed until the hours are actually worked. So employers may wait until the last day of the pay period and then release a paper check at the end of the day, potentially leading to delays for the employee in receiving the funds or a fee to obtain immediate availability.[38]

Faster payment systems can change that. Employers would be able to push funds to employees shortly after their shifts have ended. Indeed, some "gig economy" employers have begun to offer "instant pay" options that allow contractors to cash out their earnings as frequently as five times a day.[39] But when these options recently stopped working for about a week, news reports cited comments from drivers that were hindered in their ability to refuel, pay rent, or buy groceries because they were temporarily unable to access their pay as they earned it.[40]

We are similarly seeing infrastructure-level innovations in the basic accounts offered to consumers. Many of the recent mobile apps provided by bank and fintech providers, separately or in partnership, enable consumers to check balances, pay bills, and

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[38] See, e.g., Faster Payments Task Force, *The U.S. Path to Faster Payments* (January 2017), https://fedpaymentsimprovement.org/wp-content/uploads/path-to-faster-payments.pdf; Center for Financial Services Innovation, *Beyond Check-cashing: An examination of consumer demand and business innovation for immediate access to check funds* (June 2014), http://cfsinnovation.s3.amazonaws.com/RESEARCH_FIS_CFSI_BeyondCheckCashing_6.3.2014_FINAL.pdf.

[39] See, e.g., "Get Paid Quickly with Lyft and Express Pays," *Lyft Blog*, December 21, 2016, https://blog.lyft.com/posts/get-paid-quickly-express-pay; "Instant Pay: Your money, when you want it," *Uber Newsroom*, August 16, 2016, https://newsroom.uber.com/instant-pay/.

[40] See, e.g., Levi Sumagysay, Uber says Instant Pay is fixed, but issue still affecting some drivers, The Mercury News (Sept. 17, 2018), https://www.mercurynews.com/2018/09/17/uber-says-instant-pay-is-fixed-but-issue-still-affecting-some-drivers/.
https://www.usnews.com/news/business/articles/2018-09-15/uber-glitch-leaves-drivers-unpaid-and-frustrated

deposit checks around the clock and every day of the week via their phones. Some banks have introduced innovative online-only accounts that are fee-free and require no minimum deposits, while offering phone-based deposits, account interfaces, and bill payment.[41]

Some banks offer no-fee, phone-based accounts that incorporate savings and budgeting tools that look and feel like nonbank fintech apps. Consumers can set goals and ask that the account begin "automatically" saving toward those objectives.[42] For example, consumers might be able to swipe to see how much they can safely spend on a purchase without falling behind on their financial goals or missing scheduled payments. With other tools, using just their phone, a customer can set rules for their bank account, ranging from declining transactions that would overdraw the account, to automatically transferring funds from a related account, to opening an overdraft line of credit, or being charged a fixed-dollar overdraft fee, with a one-day grace period to avoid the fee.

New platforms like faster payment systems have the potential to combine with other technological improvements, like cheap access to cloud computing and an open-source approach to artificial intelligence, to create more full-stack approaches to financial inclusion. A new generation of offerings experiments with using machine-learning tools and data aggregation to study consumers' expense and income flows in order to offer

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[41] See, e.g., "What's a 360 Checking account?" Capital One, https://www.capitalone.com/bank/checking-accounts/online-checking-account/.

[42] See, e.g., Simple, https://www.simple.com/; Frank Chaparro, "JPMorgan Chase launched an online bank for millennials called Finn, and I prefer it to the real thing," *Business Insider*, July 8, 2018, https://www.businessinsider.com/jpmorgan-chase-online-bank-finn-for-millennials-2018-7.

credit to consumers with little to no traditional credit histories.[43] As mentioned earlier, other apps are using faster payments and cheap accounts to offer consumers tools to smooth volatility in their incomes.[44] Still other products are using behavioral economics-based "nudges" to help consumers grow their savings.[45]

It is still very early, and many of these products have difficult issues to work through with respect to consumer data security and privacy, which may have important implications for pricing of services. Again and again, we are reminded that when products are free, the consumers themselves may be the product. For instance, many financial apps that provide "free" services earn revenue by being paid for lead generation. Other apps may sell consumer data in ways that consumers may not be aware of.[46] For some workers, their employers may be able to be part of the solution, by subsidizing some or all of the costs of using these new tools. For example, some employers are partnering with fintechs to offer their employees better savings tools and the ability to draw emergency funds as an advance on their paycheck.

While financial innovation may hold great promise, a lot of work is needed to ensure it will be able to reach communities that lack infrastructure for digital service delivery. In the colonias area on the Texas-Mexico border, I met with families that are

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[43] See, e.g., Petal, https://www.petalcard.com/; Lend Academy, Podcast Transcription Session No. 101 – Raul Vazquez, Oportun (May 2017), https://www.lendacademy.com/wp-content/uploads/2017/05/Podcast-101-Raul-Vazquez.pdf.
[44] Earnup, "Money. The Way It Should Be," http://www.earnup.com/.
[45] See, e.g., Lael Brainard, "Where Do Consumers Fit in the Fintech Stack?" (speech at the "FinTech Risks and Opportunities" conference, Ann Arbor, MI, November 16, 2017), https://www.federalreserve.gov/newsevents/speech/files/brainard20171116a.pdf. See Richard H. Thaler and Cass R. Sunstein, *Nudge*, (Penguin Random House, 2009).
[46] See, e.g., Brainard, "Where Do Consumers Fit in the Fintech Stack?", https://www.federalreserve.gov/newsevents/speech/files/brainard20171116a.pdf.

unbanked, students that could not complete their homework, and businesses that could not serve customers outside their local area because they lacked the internet connectivity that many of us take for granted.[47] The Federal Reserve, and other federal banking agencies, view access to technology as increasingly essential to households and small businesses in underserved low- and moderate-income communities. That is why we have clarified that efforts to provide communications infrastructure, such as broadband internet service, may be viewed favorably under the Community Reinvestment Act or CRA.[48]

Expanding access to financial services is most effective when consumers and small businesses are equipped with the ability and information to determine which financial products are suitable for their needs. Financial literacy and consumer protections are critically important regardless of whether financial services are delivered through traditional means or smartphone apps. Here too, digital delivery can expand the reach of traditional financial education systems by providing consumers with online and mobile education, just-in-time information, and interactive financial tools to evaluate their options.

Financial services providers have an affirmative obligation to deliver clear and transparent products and services and to protect the personal information and financial assets of the customers they serve. Our challenge as regulators is to ensure trust in

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[47] See Federal Reserve Bank of Dallas, *Closing the Digital Divide: A Framework for Meeting CRA Obligations*, (revised December 2016), https://www.dallasfed.org/cd/pubs/digitaldivide.aspx. and "There is a major digital divide on the Texas-Mexico border, one of least connected parts of the country," National Public Radio, Marketplace, May 2018, https://www.marketplace.org/2018/05/03/tech/there-major-digital-divide-texas-mexico-border-one-least-connected-parts-country.

[48] On July 15, 2016, the federal bank regulatory agencies issued new CRA guidance that includes references to broadband access, (https://www.ffiec.gov/cra/pdf/2016_QA_Federal_Register_Notice.pdf).

financial products and services by maintaining the focus on consumer protection, while supporting responsible innovation that provides social benefits.[49]

It is too early to tell if many of these innovations will ultimately make good on their promise to help underserved consumers navigate their complex financial lives. And, of course, no app can solve a persistent gap between living expenses and real wages in some occupations, sectors, or counties.

Still, I am cautiously optimistic. Together, we are developing a more holistic understanding of the financial needs of underserved households and small businesses. We are seeing the development of powerful new technologies. There is reason to hope these new technologies will be combined in ways that move the needle on financial inclusion.

[49] Lael Brainard, "The Opportunities and Challenges of Fintech," (speech at the Conference on Financial Innovation, Washington, DC, December 2, 2016), https://www.federalreserve.gov/newsevents/speech/brainard20161202a.htm