

A RECENT CONFERENCE SERVED AS AN OPPORTUNITY TO CATCH UP ON SOME OF THE ADVANTAGES AND POTENTIAL PROBLEMS OF FINTECH LENDERS.

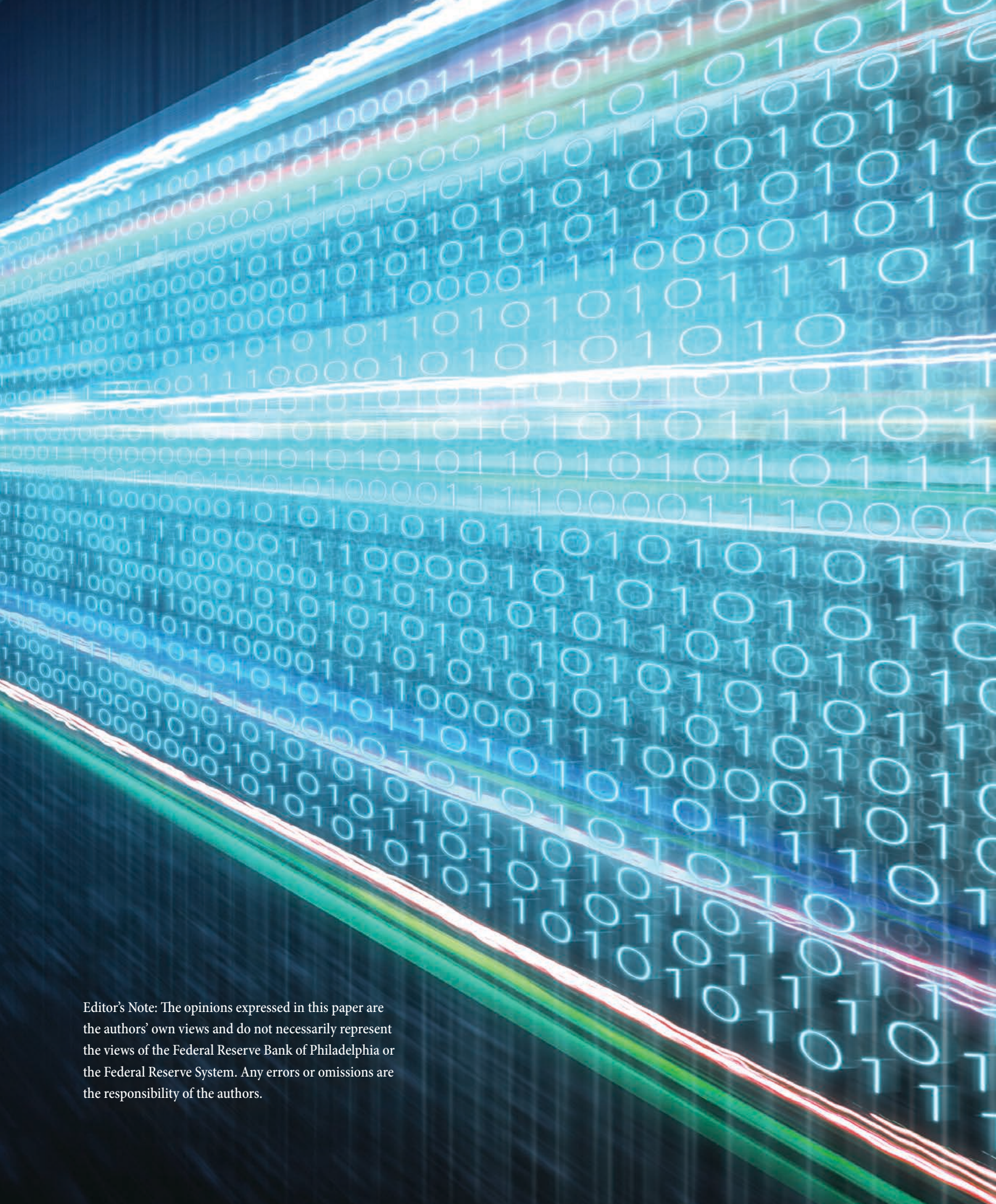
# **FINTECH AND THE NEW FINANCIAL LANDSCAPE**

**BY ITAY GOLDSTEIN,**  
THE WHARTON SCHOOL,  
UNIVERSITY OF PENNSYLVANIA,

**JULAPA JAGTIANI,**  
FEDERAL RESERVE BANK OF PHILADELPHIA,

**AND AARON KLEIN,**  
THE BROOKINGS INSTITUTION





Editor's Note: The opinions expressed in this paper are the authors' own views and do not necessarily represent the views of the Federal Reserve Bank of Philadelphia or the Federal Reserve System. Any errors or omissions are the responsibility of the authors.





THE FEDERAL RESERVE BANK of Philadelphia, the Wharton School, the Bank Policy Institute, and the FDIC jointly held a conference called “Fintech and the New Financial Landscape” this past November that focused on potential disruption that FinTechs could cause and their impact on the financial landscape.<sup>1</sup> This article provides an overview of the broad issues facing the financial industry in light of comments made during the conference discussions, broadly encapsulated as the “FinTech revolution.”

We want to understand how disruptive FinTech lending affects the financial services industry and, more generally, the overall financial landscape and consumer behavior. The optimistic scenario is clear: FinTech could benefit underserved consumers around the globe by allowing approximately 2 billion unbanked consumers to be connected to the financial system.<sup>2</sup> It can also make processes more efficient for currently served borrowers. However, FinTech’s potential could face substantial barriers. The regulatory structure built around the provision of financial services includes many assumptions, both stated and unstated, that new technologies are challenging. Moving to a new market equilibrium between established financial institutions and new FinTech lenders will cause regulatory and market-based frictions that could result in unintended consequences.

When we describe FinTech lending, we are not referring to all online lending. After all, technology is not new in finance. Most credit card applications are online and decisions can be reached in seconds. We define lending as FinTech only if it involves advanced technology and nontraditional processes in credit decision-making, such as utilizing alternative data about consumers (including utility payments, medical payments, rent, etc.). Below, we review the types of data that FinTech lenders use as well as their advantages and potential disadvantages.

We also review the target population of FinTech lenders. A common assumption is that FinTech lenders target younger borrowers, particularly millennials. However, data shows that about 60% of consumers who borrow from FinTech lenders are over 40 and that the age distribution of consumers who take loans from FinTech lenders is similar to that of borrowers from traditional lenders (banks, credit unions, and finance companies).<sup>3</sup>

One population especially served by FinTechs are people with thin credit files – those who have few pieces of data on their traditional credit report and hence are frequently assigned low or no composite credit score. FinTech lenders have been able to utilize nontraditional data to make more-informed decisions, sometimes providing credit to borrowers who otherwise would not have access to loans.<sup>4</sup> However, there is no specific target population for FinTechs; different types of FinTech lenders aim at different populations.

We also discuss some of the legal challenges that FinTech lending faces. Consumer advocates have had concerns about the use of alternative data in predicting a consumer’s ability and willingness to pay back a loan. These concerns involve privacy and discrimination. One must balance them against the opportunity of expanding access to credit, which is valuable because many people have been left out of the financial system.

We conclude with general thoughts about future challenges and the need for active debate involving academics, practitioners, and regulators.

## **1. HOW ALTERNATIVE DATA, ARTIFICIAL INTELLIGENCE (AI), AND MACHINE LEARNING (ML) HAVE TRANSFORMED LENDING LANDSCAPES**

FinTech lenders use technology to obtain new kinds of data that can make lending decisions more efficient and informed.

**CASH-FLOW DATA:** FinTech lenders utilize additional (that is, nontraditional) data such as cash flows and bank transactions for credit decisions, unlike the traditional approach. For example, Petal

relies heavily on cash-flow data analysis for its credit decision-making, which is easy to understand because cash flows are a close proximate of a consumer's ability to pay back a loan, perhaps more illustrative than backward-looking data on a consumer's repayment of prior loans. Hence, this new technology has substantial opportunity to improve upon the industry-dominant model of credit report underwriting.

Cash flows could serve as (almost) a real-time update of a consumer's financial situation through salary as well as utility and medical payments, alimony, and other fixed expenses. Unlike data from rating agencies or consumer credit panels (CCPs) (such as the Equifax, Experian, and TransUnion), cash-flow data would immediately reveal any gaps between income and expenses while the traditional CCP data would become available after a lag.

In addition, consumer behaviors observed through bank transactions could reveal additional information about the type of the consumer and the patterns of behavior. For example, some people spend quickly and never save, while others spend money slowly and put what they can into savings.

More data is needed to build a robust credit-risk model that accounts for changes in economic circumstances. CCP data could be useful to understand how consumers behaved in the past recession. A long history of data would allow for a deeper understanding of trends and a consumer's behavior.

We need a broader ecosystem to facilitate deeper and more liquid markets for cash-flow-based loans. Secondary market structures to securitize consumer credit have been defined by FICO scores: Market participants broadly understand a securitization of loans from consumers who have FICOs in the 720s or 660s. Could similar structures exist for consumers with \$300+ excess cash per month? Part of this ecosystem involves financial regulators. Regulatory rules, guidance, and experience often have been based on credit scores. Regulators could incorporate a broader set of credit risk factors in defining rules and guidance to adapt to a potential cash-flow underwriting system.

**The optimistic scenario is clear: FinTech could benefit underserved consumers around the globe by allowing approximately 2 billion unbanked consumers to be connected to the financial system.**

#### **BIG DATA, ALTERNATIVE DATA, AND ADVANCED**

**AI TECHNOLOGY:** Alternative data tells a lot about a consumer's life, such as wealth (assets, equity, loan to value, tax payments, cars [brand, age, how many]), cash flow (salary, rental, utility, alimony, medical payments), lifestyle (education major, grade point average, school attended, occupation, appearance [weight/height], number of dependents), digital footprints and web tracking (where the consumer has visited, shopping habits), device tracking (how fast the consumer scrolls as well as typing speed and accuracy), and social profiles (network, topics that a person is engaged in). Over time and with technological development, an increasing amount of information becomes available and could potentially be used for credit decisions with rich-enough models.

**SOCIAL MEDIA DATA:** Most FinTech lenders claim not to use social media information in credit decisions, instead using this type of information for marketing and fraud-detection purposes. One concern about social media data is that the relationships are likely to be unstable, and thus models would likely fail to predict default, especially during or after economic contractions. The potential use of social media footprints as they relate to protected classes, including race, gender, and age, is another concern.

#### **RECENT DEVELOPMENTS AT RATING AGENCIES:**

Traditional credit rating agencies like FICO and VantageScore recently have attempted to incorporate some additional data into the ratings, using bank and non-bank data such as utility and rent payments. For example, FICO, through its financial inclusion initiative, has explored more-advanced modeling techniques often used by FinTech lenders. These complex models,

however, often present their own set of challenges and limitations in terms of interpretability.<sup>5</sup> Recognizing AI's challenges, an AI tool could be used to build better models if used with appropriate controls. In addition, VantageScore is incorporating some trend data (rather than status at a point in time) as well as utility payments.<sup>6</sup> The new approach would explore trends and look back at through a consumer's history trying to learn more about periods where some are rated as prime but have been deteriorating, or others are rated nonprime but have been improving in credit ratings.

**“Tying small business lending to payment processing allows greater security for the lender; while the loan is still technically unsecured by a physical or financial asset, the lender can be repaid directly through the gross receipts processed for the business.”**

## 2. FINTECH IMPACT ON CONSUMER ACCESS TO CREDIT

FinTech lenders focus on diverse sets of consumers. Some FinTech companies chase prime consumers while others look to serve near-prime and subprime consumers.

**BELOW PRIME AND THE “INVISIBLE PRIME” CONSUMERS:** A presentation by Upstart’s Paul Gu shows that 33% of borrowers with FICO scores below 620 default, suggesting that the other 67% did not default. Using alternative data and AI algorithms, FinTech lenders promise to identify from the subprime pool those consumers who are less risky. In other words, FinTech lenders could identify those who will perform as prime customers but who are not identified as such.<sup>7</sup>

One example is Elevate, which has reported that it has served 2 million nonprime consumers in the U.S. and U.K., using electronic platforms and nontraditional data. Another is Petal, which uses cash-flow underwriting to

identify the “invisible prime.” While cash flows and bank transactions are closely related to a consumer’s ability to pay, the data has not yet been factored into mainstream credit ratings. Petal pulls and aggregates all financial information across several sources and institutions. Through this automated process, FinTech lenders could prequalify those “invisible prime” consumers in seconds and at significantly lower cost.

Another firm, Urjanet, performs this task using data on \$70 billion of utility payments for consumers in 43 countries. It argues that 100 million more consumers have been able to access credit through its utility payment information. Overall, these FinTech lenders claim to make loans to the “invisible prime” at a lower interest rate than alternatives currently available to them (for example, payday loans and subprime credit cards) and have losses below industry average.<sup>8</sup>

Students, recent graduates from universities, and immigrants usually have thin credit files. Given that some are likely to have high and stable earnings, particularly graduates of top universities or immigrants with established high-income jobs, they are a natural target of FinTech lenders. However, this category represents only a small fraction of thin-file consumers who have been served by FinTech firms.

**MIDDLE-INCOME CONSUMERS:** Some FinTech lenders, including Avant and Amount, do not focus on prime or subprime customers but look to serve those in between – so-called middle-income consumers. These are not people with thin credit files; instead, they have longer histories and thicker files but do not always get access to credit easily and not usually at a good rate. Through their partnership with traditional banks, these FinTech firms provide white-label service and technology solution to bank partners – helping large and small banks digitize their lending processes. Due to banks’ legacy structures and products, it is argued that they often could not easily build their own platforms.

**PRIME CONSUMERS:** Some other FinTech lenders, such as Marlette Funding, focus on prime consumers who have mature credit histories and documented histories of good incomes. This segment of consumers may be viewed

as currently being well served by traditional lenders. The focus of these lenders is on a more-efficient lending process, providing consumers with more convenience and transparency. Some prime consumers prefer to deal with FinTech lenders and may be willing to pay a premium for convenience – loan applications can be completed in minutes and funding can be obtained within 24 hours for three- to five-year terms. FinTech lenders apply innovative tools to consumer banking as they leverage their ability to tap into dozens of data sources (with thousands more items of data) through the API protocol and Amazon Web Services cloud base. Partner banks, such as Cross River Bank and WebBank, could originate the loans so that the FinTech lenders do not need to obtain their own license in each state. FinTech lenders could utilize technology to more accurately or more efficiently perform risk-based pricing.

**SMALL-BUSINESS OWNERS:** Several firms conduct small-business lending, including PayPal, OnDeck, LendingClub, Funding Circle, and Kabbage. They all have unique advantages and specialize in different small-business products – for example, loan amounts range from \$5,000 to \$400,000, maturities range from 30 days to seven years, and the annual percentage rate (APR) ranges from less than 10% to over 200%. FinTech lenders such as PayPal, Amazon, and Square have a comparative advantage with access to cash-flows data (through their own payment platforms) allowing for additional insights into how a borrower’s business performance compares with other similar business owners.

Tying small-business lending to payment processing also allows a greater security for the lender; while the loan is still technically unsecured by a physical or financial asset, the lender can be repaid directly through the gross receipts processed for the business. Hence, access to credit can be expanded to those small-business owners who may have a short credit history but are not likely to default. Unlike the situation for consumers, there are fewer legal or regulatory protections for small-business owners engaging in small-business borrowing. Some small-business owners had to take very short-term loans at extremely high rates, and they may not be aware of the actual APRs that they are getting. Absent federal action, state governments have attempted to increase transparency to protect small-business borrowers,

leading to California passing the historic Small Business Borrowers’ Bill of Rights.<sup>9</sup>

### 3. HOW TO PROTECT CONSUMERS AND PROMOTE FINTECH INNOVATIONS

Fast technological development has led to many challenges involving the legal framework and the boundaries delineating how lending should be conducted.

**CHALLENGES WITH DATA AGGREGATORS AND AI VENDORS:** The amounts of data generated raise major questions about the future use, storage, and aggregation of this vast amount of new information. In the keynote speech that opened the conference, Federal Reserve Governor Lael Brainard noted that “the world is creating data to feed those models at an ever-increasing rate. Whereas in 2013 it was estimated that 90% of the world’s data had been created in the prior two years, by 2016, IBM estimated that 90% of global data had been created in the prior year alone. The pace and ubiquity of AI innovation have surprised even experts.”<sup>10</sup>

**This is an opportune time for academics, practitioners, and regulators to engage in debate over the landscape of the financial industry’s future. What will the market structure become?**

Indeed, this vast amount of data and advanced technology have presented the possibility for enhanced credit-risk models that would allow more consumers on the margins of the current credit system to be included in the financial system because of their improved credit standing. FinTech lenders could build and utilize more-complex models for better credit decision-making and more-accurate risk-pricing as well as bringing greater speed to credit decisions. Several data aggregators and AI vendors have also emerged to serve as white-label platforms for traditional lenders to enhance their credit decision-making process. But there exist several data consortiums that contain a gigantic amount of



consumer data and are currently not regulated. It is not clear who owns the data. Consumers may not be aware of what information about them is being used, for what purpose, and by whom – thus potentially having their privacy violated.

Protecting consumer information is clearly an important goal. Recently, data aggregators and AI vendors have considered blockchain technology as a way to provide decentralized permission access to consumer data so that lenders could use the data for credit decisions without actually seeing the data – and, therefore, with little or no chance of losing data and allowing for more protection to consumers. One concern around this approach (when consumers start limiting data access to FinTech lenders) is that it might limit lenders' ability to train the models. It is important for all the regulatory agencies to work together to find the right balance between protecting consumers and encouraging more FinTech innovations.

#### DEFINING FAIR LENDING AND PROTECTED

**CLASSES:** According to the Fair Credit Report Act (FCRA), the use of social media data in credit decision-making may not be legal. While there has been a lot of talk about lenders using social media data for credit decisions, most lenders argue that they do not really use the data because of FCRA regulation.<sup>11</sup> Other online data such as online footprints and shopping habits have been used in credit decisions.

AI and big data are necessary to expand credit access but not sufficient. FinTech lenders need policy guidance related to the use of ML techniques – what determines disparate impact; whether it is all right to use bank and other payment transactions; whether to use data from households versus individual accounts; use of a consumer's character and other non-credit data to decline credit applications.

The application of AI, ML, and big data is particularly challenging given the unique and differing laws covering protected classes from illegal discrimination. For example, gender is a protected class, and its consideration in providing access to credit or the terms of credit is illegal. As Fed Governor Brainard remarked

in her speech, AI can unknowingly incorporate gender factors, such as attendance at an all-woman's college, as part of the ML process. Incorporation of such a factor in a credit algorithm would be highly problematic. However, gender is an allowable factor for underwriting in the business of insurance. Car insurance premiums explicitly differ for men and women, with substantial price differences for teenagers based on gender. Legal and regulatory protections differ even within what constitutes a protected class within financial services. These differences will translate into different adoption challenges for FinTech firms and financial institutions incorporating AI, ML, and big data.

#### 4. LOOKING AHEAD

FinTech activities are progressing fast and penetrating all areas of the financial system. Recent developments reflect increased collaboration and partnerships between traditional lenders and FinTech platforms. The use of AI/ML and data collection has been growing exponentially. While consumers could send their data to specific lenders/providers, the automation through AI/ML processes and data aggregation could enhance efficiency, reduce costs, and further expand credit access – within regulatory compliance. Several AI/ML vendors (including traditional firms such as IBM Watson and Promontory, its consulting firm) have also been serving lenders in this space. Partnership opportunities between banks and FinTech firms have been increasing.

Overall, FinTech lenders have serious concerns about the lack of clarity under the current regulatory and legal regime, as well as question about where we are headed. There are also concerns regarding compliance with too many different sets of rules. Although some aspects of the market are marching ahead, others are delayed pending regulatory approval. FinTech approaches expose issues with basic assumptions of our entire system: 1) the dual charter and regulatory regime of federal and state governments; 2) where the line is drawn between banking and commerce; 3) the ability of credit providers to comply with legal and regulatory requirements (knowing why credit is denied, disparate impact, what is/isn't a protected class); 4) incorporating new technology that probes the boundaries of acceptable behavior while offering possibilities of benefits to many.

There is room for concerted effort involving scholars, policymakers, and regulators to clarify the framework going forward.

In addition to the AI/ML algorithms, there has been a lot of hype about how blockchain technology could potentially disrupt the entire financial service industry. Blockchain platforms have been used in several applications, most notably for cryptocurrencies and initial coin offerings. However, there may have been misunderstandings about the blockchain applications and their potential as a mainstream technology for the future. For example, the conference highlighted that smart contracts can exist independently without a blockchain.<sup>12</sup> In addition, a speaker from Cambridge Quantum Computing explained that current encryption technology might no longer be effective because quantum computing will be fast enough to hack even the blockchain platforms; the only effective encryption process of the future would require quantum computing technology. There are many uncertainties regarding the rapid advance in technology.

A final issue to consider relates to financial stability. Unlike banks, FinTech firms do not take deposits, and thus they need to rely on private investors (through peer-to-peer or marketplace lending) and capital market funding through securitization or loan sale to financial institutions. Through securitization, they are also required to self-fund part of the loan pools on their balance sheets (as required by the Dodd-Frank Act). Like any new business model, there are concerns that FinTech lending has not gone through an entire economic cycle. During a recession, FinTech funding could dry up – thus potentially driving most of the FinTech lenders out of business. Another concern is that risks are sent off the balance sheet for the FinTech and into the capital markets, and so the impact of a downturn on FinTech firms themselves may be limited, but the effects will spill over to other players who have purchased the loans. Technology can improve lending, but risk cannot be completely eliminated.

This is an opportune time for academics, practitioners, and regulators to engage in debate over the landscape of the financial industry's future.

What will the market structure become? Will the new FinTech players threaten the existence of established financial institutions? What will be the response of these institutions to such threats? What are the effects of FinTech on the well-being of different participants, and will it ultimately lead to better outcomes for borrowers and consumers? These are all questions that need to be evaluated using empirical and theoretical analysis that could be conducted by academics and relying on the hands-on experience of practitioners and regulators. The conference was a great opportunity to catch up on some of these issues, and we are sure that much more debate will follow in future events and writings. ■

## ENDNOTES

- 1 More information about the conference (including papers, presentation slides, speaker bios, and videos) are available from the conference website: <https://philadelphiafed.org/bank-resources/supervision-and-regulation/events/2018/fintech>
- 2 This has been documented in Julapa Jagtiani and John Kose, "Fintech: The Impact on Consumers and Regulatory Responses," *Journal of Economics and Business* 100 (2018): 1-6.
- 3 See TransUnion (TU) study by John Wirth (2018), "Fact Versus Fiction: Fintech Lenders," presentation slides and video are available through the conference website.
- 4 See Julapa Jagtiani and Cathy Lemieux (2018a), "The Roles of Alternative Data and Machine Learning in Fintech Lending: Evidence from the LendingClub Consumer Platform," Federal Reserve Bank of Philadelphia, Research Working Paper #18-15.
- 5 See FICO study by Gerald Fahner (2018), "Developing Transparent Credit Risk Scorecards More Effectively: An Explainable Artificial Intelligence Approach," presentation slides and video are available through the conference website.
- 6 See VantageScore study by Nick Rose and Jeff Richardson (2018), "Impacts of Trended Data on Consumer Risk Scores," presentation slides and video are available through the conference website.
- 7 See Jagtiani and C. Lemieux, op cit.
- 8 See Upstart's presentation by Paul Gu (available on the conference website) and see Knowledge@Wharton (2018) "How Fintech Serves the 'Invisible Prime' Borrower," interview of Ken Rees, CEO of Elevate (November 27, 2018). Available at this link: <http://knowledge.wharton.upenn.edu/article/fintech-serving-invisible-prime-borrower/>
- 9 For more detail, see presentation by Louis Caditz-Peck (Director of Public Policy, LendingClub) on "Responsible Small Business Lending," available on the conference website.
- 10 See Governor Lael Brainard's speech titled "What Are We Learning about Artificial Intelligence in Financial Services?" given at the conference on "Fintech and the New Financial Landscape," at the Federal Reserve Bank of Philadelphia, PA (November 13, 2018). Link: <https://www.federalreserve.gov/newsevents/speech/brainard20181113a.htm>
- 11 Facebook, for example, has an agreement with all users to not use Facebook data for credit decisions.
- 12 See Hanna Halaburda (2018), "Blockchain Revolution Without the Blockchain," Bank of Canada Staff Analytical Note 2018-5; video of the discussion is also available from the conference website.