Summary of the Fourth Workshop on Payments, Lending, and Innovations in Consumer Finance

By José Canals-Cerdá and Larry Santucci [1]

Abstract

The Federal Reserve Bank of Philadelphia's Consumer Finance Institute (CFI) and Supervisory Research Forum (SURF) held the Fourth Workshop on Payments, Lending, and Innovations in Consumer Finance on October 26–27, 2022. The workshop included sessions on innovation in consumer lending; the normalization of credit after the pandemic and its effect on credit usage, real-time payment systems, and financial innovation; and developments in the use of machine learning and artificial intelligence (ML/AI) in lending.

[1] The views expressed here are solely of the authors and do not necessarily reflect the views of the Federal Reserve Bank of Philadelphia or the Federal Reserve System.

Introduction[2]

Robert Hunt, senior vice president at the Federal Reserve Bank of Philadelphia and director of the Consumer Finance Institute (CFI), introduced the workshop. In his introduction, he discussed the mission of the two co-organizing entities — CFI and the Supervisory Policy Forum (SURF) — and the purpose of the event. As Hunt explained, the objective of the workshop was to gather the views of experts from industry, academia, and regulatory agencies and to bring together diverse perspectives about current and emerging issues in consumer finance. He also briefly touched on some of the topics that were discussed during the workshop, including fintech; buy now, pay later (BNPL); faster and real-time payments; cryptocurrencies; stablecoins; central bank digital currencies (CBDCs); and ML/AI applications in consumer finance.

Module 1: Consumer Finance Lending

Presenters and panelists discussed the current financial health of the consumer, shifts in consumer behavior, and normalization in consumer credit after the pandemic. They also examined the adoption and use of new lending products, innovation, competition, and disruptions in consumer lending, as well as consumer behavioral responses to rewards and saving nudges.

The keynote speaker for this module was Silvio Tavares, VantageScore president and CEO. Tavares started his keynote speech by highlighting that we are at an inflection point in consumer credit and payments with many concurrent factors impacting consumers, including inflation, geopolitics, and the ongoing pandemic. Focusing on the consumer, he noted that average credit scores during the last three years have increased steadily and appear healthy. Borrower accommodations, stimulus payments, and extended unemployment benefits during the pandemic contributed to this situation. Consumers deleveraged their balance sheets during the pandemic, but the trends are shifting. Credit card balances are increasing, and delinquent accounts are also starting to increase in part because of higher prices, higher interest rates, and a reduction in savings accumulated during the pandemic.

Tavares also highlighted three megatrends that are going to drive consumer behavior over the next decade: financial inclusion, big tech, and alternative data. First, he explained that the lack of a traditional credit score is one of the main reasons why individuals are excluded from the financial system. By allowing greater competition in the use of credit score models, regulators and policymakers can create opportunities for lenders to boost financial inclusion. Next, Tavares explained that traditional big-tech players have increased their influence during the pandemic, especially in mobile payments, and that he expected the

[2] The views of the conference participants are their own and do not reflect those of their employers, the Federal Reserve Bank of Philadelphia, or the Federal Reserve System.

trend to continue. Finally, the use of alternative data has been recognized as a factor that can improve credit decisions, lower the cost of credit, and increase access to credit.

The keynote address was followed by a research paper session, which included presentations at the frontier of research in consumer lending. The first paper was presented by Emily Williams, assistant professor at Harvard Business School. Her research on buy now, pay later (BNPL) credit indicates that its use increases total spending levels and the retail share of total spending for consumers with and without liquidity constraints. Williams provided additional insights into BNPL and discussed how the observed consumer spending behavior contrasted with predictions from standard economic models. Presenter Andrea Filippo Presbitero, senior economist at the International Monetary Fund, analyzed rewards in credit cards and showed that reward cards induce more spending and lead to redistribution from less to more financially sophisticated consumers.[3] The last presenter, Paolina Medina, assistant professor at Texas A&M University, shared research coauthored with Michaela Pagel (session chair) and discussed whether nudges designed to encourage consumers to save more might cause those consumers without savings to borrow to fill the savings gap. Their data included information on borrowing as well as spending. They found that consumers increase savings by reducing spending rather than by borrowing and do not use the new savings to pay off existing debt.

Next, a panel of consumer finance experts discussed recent trends in household finance, innovations in consumer credit, and the outlook going forward. Anna Zhou, U.S. economist at the Bank of America Institute, provided an overview of the current state of the consumer balance sheet. The household balance sheet looks healthy, but mortgage payments and the cost of debt more generally is getting more expensive. John Cabell, managing director at J.D. Power highlighted positive readings in consumer sentiment in the firm's monthly surveys, while David Fieldhouse, director at Moody's Analytics, pointed to some warning signs observed in credit card data for credit score segments. Moshe Orenbuch, managing director at Credit Suisse, noted that revolving credit is normalizing and concurred with Fieldhouse's assessment. On the topic of product innovation, Orenbuch said the bulk of the discussion focused on the emergence of BNPL. Cabell pointed out that BNPL is a small but growing payment alternative to credit cards, and that debt and fees on credit cards are two reasons why consumers are gaining interest in BNPL. An area of concern with BNPL is that younger consumers in particular are less likely to pay on time. Orenbuch suggested that merchants recognize that BNPL allows them to reach a different segment of consumers, and this is likely why they find this product attractive. Fieldhouse highlighted concerns of risky BNPL debt being transferred to credit cards, which are an accepted method of payment in some cases, and some additional pitfalls of BNPL for consumers. Cabell

An area of concern with BNPL is that younger consumers in particular are less likely to pay on time.

[3] See Sumit Agarwal, Andrea Presbitero, Andre F. Silva, and Carlo Wix, "Who Pays for Your Rewards? Redistribution in the Credit Card Market," SSRN 4126641, December 2022.

suggested that BNPL is likely to evolve and solidify its presence among consumers with more traditional lenders entering the product space.

Module 2: Financial Innovation and Payments

The keynote speaker for this module was Hyun Song Shin, economic adviser and head of research at the Bank for International Settlements (BIS). His address focused on the timely topic of CBDCs and the future monetary system. Shin began by discussing the recent turmoil in cryptocurrency (crypto) markets. He then pivoted to stablecoins — asset-backed digital currencies — noting that the prevalence of stablecoins in the crypto universe is a sign of the need for crypto to piggyback on the credibility of central bank money. Stablecoins play an important role as a point of contact between the conventional financial system and the crypto universe. He argued that limits in stablecoin design promote fragmentation, and this explains the existence of thousands of cryptocurrencies. Furthermore, crypto seems to necessitate the influx of new users to maintain or increase its value.

In Shin's view, the crypto universe offers lessons for the future monetary system. During the remainder of his keynote, he discussed a model of the future global monetary system in which CBDCs from different jurisdictions interact on a common platform and financial intermediaries interact with end consumers. Within this framework, the keynote delved into the themes of tokenization, decentralization, and permissioned platforms, including relevant examples of applications.

The keynote address was followed by a session that included two presentations at the frontier of innovations in real-time payments. In the first presentation, Andrew McCormack, head of BIS Innovation Hub Singapore Centre, introduced Project Nexus, a framework for the cross-border interlinking of payment systems. In the second presentation Johan Schmalholz, payment infrastructure advisor at Swedish Riksbank, shared the work of the Riksbank on its own CBDC project, the e-krona. McCormack noted that there are more than 60 instant payments systems (IPS) in the world that are either live or under development. He said that IPS offers significant advantages in terms of speed, cost, access, transparency, safety, and security. Bilateral connections across IPS have already started, but design differences across systems and regulations can create obstacles. Furthermore, bilateral IPS connections are complex to scale to many countries. Project Nexus aims to provide a standardized approach to connecting multiple IPS that addresses the shortcomings of bilateral connections. Under this approach, each IPS will integrate once to Nexus and can then route payments to any other country in the network.

Schmalholz reviewed the status of the e-krona project and discussed next steps. He illustrated the substantial decline over time in the use of cash in Sweden. A recent survey suggested that only about 8 percent of retail payment transactions were conducted in cash during 2021, a significant reduction from 2010, in which the share of cash payments was about 40 percent. This downturn in cash usage, coupled with the rapid uptake of instant payments, prompted the Riksbank to begin a multiphase investigation of CBDC in 2017.

Conceptually, the e-krona platform being tested is similar to the existing cash distribution model. Payment service providers order e-krona for further distribution to their customers, and end users hold digital wallets that enable purchase, storage, and payment services on the e-krona using payment instruments such as cards or mobile apps. Each transaction is approved by the Riksbank, which verifies the validity of the money used in any transaction.

Schmalholz provided examples of how e-krona would function with real transactions. He noted that the performance and scalability of smart contracts/programmable payments, offline payments, and cross-border payments are being investigated in the current phase. While their testing and analysis is ongoing, work done to date offers insight into the design and function of a Swedish CBDC. For example, if a CBDC is fully approved and implemented, the Riksbank would continue to provide physical central bank money to the public such that cash and CBDC would coexist as complementary payment instruments. In addition, only the Riksbank would be permitted to issue and redeem e-kronor, which would be subject to the requisite money-laundering controls. The Riksbank expects the results of a Parliamentary inquiry to be delivered in the first quarter of 2023, followed by a decision on whether Sweden will adopt a CBDC mandate.

The next session included presentations from representatives of two domestic real-time payments systems. Daniel Baum, senior vice president and head of payments product management for Federal Reserve Financial Services, introduced FedNow, an interbank settlement service for instant payments that is expected to launch in mid-2023. Baum's presentation was followed by Rusiru Gunasena, senior vice president of real-time payments product management and strategy for The Clearing House. Gunasena shared his thoughts on how his firm's real-time payments network was evolving to accommodate immediate cross-border payments with IXB, the Clearing House's cross-border payments pilot program.

Next, a panel of industry experts discussed topics related to the future of real-time payments, including the trade-off between privacy and security in digital currency design, fraud in real-time payments systems, new real-time payment systems and CBDC, and cross-border payments. Lauren Saunders, associate director at the National Consumer Law Center, talked about the key differences between cash and faster payment types that necessitate them being treated as separate and distinct payment instruments with inherently different privacy protections. In particular, the privacy of transactions on faster payment systems must be balanced against the need to protect consumers from payments fraud.

… the privacy of transactions on faster payment systems must be balanced against the need to protect consumers from payments fraud.

Jesse McWaters, senior vice president Regulatory Advocacy at Mastercard, suggested that the General Data Protection Regulation (GDPR) the European Union has been using since 2018 offered a model for thinking about the trade-offs among security, privacy, and

protecting state interests. Jonathan Olin, chief regulatory counsel at Capital One, explained that banks are required to protect the privacy of financial information and suggested that one way to combat fraudulent activity outside the regulated financial system was to extend that framework to all firms engaged in financial services.

Olin noted that, given the progress that the U.S. and other countries have made with real-time payments, it was not clear to him what value a CBDC would add to the payments system. On the topic of cross-border payments, McWaters explained that the technology required to implement cross-border, real-time payments was a smaller issue compared with the effort required to achieve operational and regulatory harmonization, both of which often exist outside the control of payments systems. According to McWaters, harmonization would need to be addressed before advancing to an interoperable real-time payments network with low risk and high rates of liquidity. He highlighted recent efforts at the national level to impose localization requirements on data. Such requirements prevent the free flow of data and may impede payments networks' ability to investigate fraud, execute payments requiring manual reconciliation, and resolve errors.

Shamina Singh, founder and president of the Mastercard Center for Inclusive Growth, delivered the end-of-day keynote address about the promise of inclusive growth in a dynamic and digital world. Singh highlighted the innovations currently taking place that are driving the future of payments. She also shared some of her experiences working at the intersection of technology, finance, and social impact. Singh emphasized the importance of inclusion along with innovation for achieving sustainable progress. Financial inclusion is a prerequisite for social stability and growth. She also emphasized the importance of joining the efforts of government, academia, nonprofit organizations, and industry to promote financial inclusion.

… financial inclusion needs to be a national economic priority because it is a national economic necessity …

Singh introduced Mastercard's Inclusive Growth Score, a tool that uses a variety of public and proprietary data to gauge a community's economic potential. Her keynote also provided examples of successful interventions to promote progress and inclusion. Singh noted that financial inclusion needs to be a national economic priority because it is a national economic necessity and advocated for a national commission to stablish a financial inclusion strategy.

Larry Cordell, senior vice president and director of the RADAR Group at the Philadelphia Fed, delivered the end-of-day reception remarks. Cordell highlighted some of the major themes discussed during the first day of the workshop. He emphasized the importance of payments innovation and the importance of combining data and technical innovation to promote financial inclusion and access. Cordell also highlighted the complexities of lending and counseled for a balanced approach where sensible lending is accompanied by stable funding.

Module 3: ML/AI Innovations in Consumer Finance

Kareem Saleh, founder and CEO of FairPlay AI, gave the final keynote address. Saleh first examined fairness in the mortgage market, explaining that for many individuals belonging to minority racial and ethnic groups, mortgage fairness is no better today than it was in 1990. He suggested that differences in fairness across groups could be attributed to bias embedded in conventional credit scores and credit decision processes. For example, Saleh explained that variables that appear neutral — in the sense that they are uncorrelated with membership in a protected class as defined by the Equal Credit Opportunity Act (ECOA) or the Fair Housing Act (FHA) — are often not neutral. In his experience, supposedly neutral credit decisioning variables including county, state, loan amount, and the number of times an applicant was delinquent in past 12 months all may be predictive of protected class membership.

Moreover, Saleh explained that dropping the most biased variables from credit scores and credit-decisioning processes does not eliminate the problem because other seemingly neutral variables interact with each other in ways that encode protected status information. He introduced the concept of *fairness through awareness*, in which a credit score model is exposed to information on protected class membership during model training. In this way, credit score models can be jointly optimized to minimize credit risk as well as maximize fairness between protected and nonprotected credit applicants.

The next session included two papers on machine learning and fairness authored by researchers at the Federal Reserve Bank of Philadelphia. First, Vitaly Meursault, machine learning economist, noted that the growing adoption of complex ML models in lending decisions involved a tension between the value of better default predictions and a concern that individuals in protected groups might not reap the same benefits as their nonprotected counterparts.[4] His research confirms the findings of recent academic papers, suggesting that better models improve overall predictive power but do little to improve fairness; however, this also takes that research a step farther.

Meursault explained that model builders who explicitly consider fairness during the model development process can achieve both greater fairness and modest increases in profit. Reminiscent of Kareem Saleh's proposal to intentionally use protected class membership as a way of achieving greater lending fairness, Meursault and his coauthors explored the explicit use of applicant geography in lending decisions in combination with improvements in default prediction from ML models.

Next, Minchul Shin, economic advisor and ML economist at the Federal Reserve Bank of Philadelphia, shared an update on his research into measuring fairness in the U.S. mortgage market. Shin and his coauthors compare existing measures of fairness with a new marginal

[4] See Vitaly Meursault, Daniel Moulton, Larry Santucci, and Nathan Schor, "One Threshold Doesn't Fit All: Tailoring Machine Learning Predictions of Consumer Default for Lower-Income Areas," Federal Reserve Bank of Philadelphia Working Paper 22-39, November 2022.

outcome test made possible by the presence of denied applications in Home Mortgage Disclosure Act data. Marginal outcome tests help researchers overcome the presence of unobservable credit variables that affect other statistical measures of fairness.

Rayid Ghani, distinguished career professor at Carnegie Mellon University, led the next session. Ghani noted that a common refrain in ML is that there is a trade-off between accuracy and fairness. He explained that, while theoretically there are many reasons why this may be the case, such a trade-off need not exist in practice. In his work developing and implementing ML models across a wide variety of settings, Ghani has indeed found that some ML models are unfair, but that fairness can be enhanced outside of the model. Ghani concluded that, "[W]e may not have to sacrifice accuracy to get fairness, but we do have to deliberately and explicitly design our ML/AI systems for equity and fairness."

> *"We may not have to sacrifice accuracy to get fairness, but we do have to deliberately and explicitly design our ML/AI systems for equity and fairness."*
>
> – Rayid Ghani, Carnegie Mellon University

Patrick Hall, principal scientist at BNH.AI, then explored the potential societal harm that can be caused by bias in AI used to detect a *deepfake,* a concept that broadly includes the computer generation of synthetic persons or the combination of one person with another in video or other digital media. Hall noted that deepfake detection models are often better at detecting deepfakes from certain races than others, often because the data the models are trained on are not representative of the myriad combinations of facial features and skin tones. As a result, a state adversary could circumvent detection by creating deepfakes with individuals from certain racial and ethnic groups.

Hall provided practical advice for remediating bias in such systems. More broadly, Hall suggested that firms engaged in bias detection and remediation review Special Publication 1270 from the National Institute of Standards and Technology (NIST), which recommends a comprehensive AI risk management framework that balances many competing considerations (e.g., performance, reliability, robustness, security, privacy, safety, and transparency) with fairness. He also recommended that firms focus their governance structures on the humans that build, maintain, and manage AI systems rather than the models themselves.

The conference concluded with a panel discussion on emerging ML/AI topics in consumer credit. Carol Evans, deputy fair lending director at the Consumer Financial Protection Bureau, expressed concern that new data and modeling techniques used by lenders in their advertising, targeting, lending, and other decisions could combine to create a complex system in which bias and unfairness may go undetected because of the sheer complexity of the system.

John Morgan, managing vice president and assistant chief model risk officer at Capital One, echoed Evans' concern regarding data and ML/AI tools, noting that risk is present both in

established banks, where it is managed through laws and regulations, as well as less regulated fintechs that may not have model risk management functions or be subject to fair lending laws. Morgan recommended the regulatory perimeter be expanded to include firms engaged in banking-like business.

P-R Stark, director of ML research at FinRegLab, framed the increased use of ML/AI in lending as an opportunity to take greater control of business decisions. She noted that the responsible design, development, and use of ML forces firms to make many more decisions, each of which is made by a human and thus subject to review. Stark advised that each decision and review was an opportunity for enhanced oversight by independent second lines within the business as well as regulatory agencies. Stark shared the results of FinRegLab's recent evaluation of tools that lenders have today to understand and manage ML underwriting models.

Stark noted that tools such as joint optimization and adversarial debiasing reduced model bias better than the practice of eliminating biased model variables and at a lower cost in terms of model accuracy. She noted that lenders lack regulatory guidance in deciding how to make fairness/accuracy trade-offs.

The panelists discussed how lenders might benefit from having more feedback from regulators on the responsible use of protected class information in lending decisions. Morgan likened statutorily mandated class-blind lending to the classical omitted variable bias problem and noted the growing evidence that including protected class data in the model development process could lead to more fair outcomes in the U.S. mortgage market. Echoing earlier presentations by Meursault, Ghani, and Saleh, Morgan suggested that both fairness and performance could be improved by incorporating protected class information but noted that lenders would need explicit cooperation with regulators to achieve those outcomes. Evans noted that the principles governing consumer protection in lending codified in the ECOA and the FHA have the benefit of being independent of specific modeling tools and technologies. Regarding the use of protected class information, Evans urged caution, suggesting that some fairness through awareness techniques might produce very similar results to the existing fair lending framework, without the additional risk that would accompany the collection of class information.

The panelists discussed how lenders might benefit from having more feedback from regulators on the responsible use of protected class information in lending decisions.

Sharing some optimism, session chair Hall noted that lenders have at their disposal some effective bias mitigation tools and implementable bias mitigation frameworks. He also noted that the potential benefits of fairness through awareness must be balanced against any potential risks.

This summary offered highlights of keynote speakers, academic paper presentations, and discussion panels. More information on all of these sessions is available on the conference website which includes links to session recordings and presentation materials.