FINTECH IN HOUSING FINANCE

REQUEST FOR INFORMATION

July 2022

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Introduction

The Federal Housing Finance Agency (FHFA), as conservator and regulator of Fannie Mae and Freddie Mac (together, "the Enterprises"), and regulator of the Federal Home Loan Banks (FHLBanks) (collectively, "FHFA-regulated entities"), has a keen interest in facilitating responsible innovation and the use of financial technology (fintech) that furthers the purposes enumerated in their congressional charters. FHFA has acted as conservator of Fannie Mae and Freddie Mac since the financial crisis of 2008. Acting as conservator, FHFA has worked to facilitate a number of innovations that have benefited housing finance markets as well as consumers and taxpayers. These include the standardization of mortgage-related forms and data, the digitization of this data, and the increased use of e-mortgages and e-closings. As both regulator and conservator, FHFA is concerned about possible risks associated with rapid technological change and monitors those risks through its supervisory programs.

To further FHFA's ability to understand technology-driven developments and the concomitant risks and to facilitate responsible innovation in housing finance, FHFA has established an Office of Financial Technology. In establishing this office, FHFA joins other financial regulators that have established similar offices, including the Office of the Comptroller of the Currency, Federal Deposit Insurance Corporation, Securities and Exchange Commission, Commodity Futures Trading Commission, and Consumer Financial Protection Bureau. The other financial regulators launched their offices to better understand fintech and its implications for the financial markets and entities they regulate, and to support responsible innovation, fair competition, and consumer access to financial products and services. In addition, in March 2022, President Biden issued an executive order focused on digital assets that broadly affirms the government's interest in responsible financial innovation that promotes greater and more cost-efficient access to financial products and services.[1]

In conjunction with the establishment of the Office of Financial Technology, FHFA is soliciting public input on the role of technology in housing finance, broadly seeking to understand the current landscape of potential innovations throughout the mortgage lifecycle and related processes, risks, and opportunities.[2] FHFA also seeks input on how the Agency can most constructively interact with other stakeholders to facilitate responsible innovation, including the

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[1] *See* Executive Order on Ensuring Responsible Development of Digital Assets *available at* https://www.whitehouse.gov/briefing-room/presidential-actions/2022/03/09/executive-order-on-ensuring-responsible-development-of-digital-assets/.

[2] This Request for Information is not a solicitation for products or services. FHFA is prohibited by law from implied or overt endorsement of specific entities or products.

identification of any barriers to or challenges in implementing fintech in the housing finance ecosystem, while also focusing on supporting equity in the housing finance landscape for both homeowners and renters.

Two key terms underlie this request: *responsible innovation* and *fintech*. FHFA views responsible innovation as balancing the value of new ideas, products, and operational approaches with the need for effective risk management and corporate governance. Further, FHFA understands responsible financial innovation to include consideration and mitigation of possible adverse effects of innovation on housing finance system stability, equitable access of consumers to affordable and sustainable mortgage credit, and the competitive environment of the primary or secondary mortgage markets.[3]

Fintech is derived from "financial technology" and refers to the application of new technologies to the production or provision of financial products and services. FHFA interprets fintech in the mortgage space to include, among others, the application of new technologies and digital processes to

- mortgage origination, underwriting, servicing, investment, and other associated business activities, also known as "mortgage tech;"
- researching, transacting, and managing real estate, also known as "proptech;" and
- regulation and compliance, also known as "regtech."

Technological change has long enabled innovation in housing finance, often leading to lower costs, faster and more consumer-friendly experiences, and enhanced risk management processes. In the housing finance system, fintech is changing the way households buy and sell homes, obtain and manage mortgage debt, and monetize housing wealth. Examples of housing finance fintech firms (fintechs) include both well-established firms and startups, which may or may not fall within the purview of a financial regulator. Fintechs have applied changes in computing, communications, data availability, and data processing to create such advances as data verification for income, assets, and employment; e-closings/e-mortgages; and workflow management, allowing for a more seamless consumer experience. Fintechs may leverage, for example, big data, data science, artificial intelligence, machine learning, intelligent capture, blockchain, smart contracts, or combinations of such technologies. These technologies are also being incorporated into credit risk modeling, with the potential for expanding access to credit for

[3] The OCC defines responsible innovation to mean "The use of new or improved financial products, services, and processes to meet the evolving needs of consumers, businesses, and communities in a manner that is consistent with sound risk management and is aligned with the bank's overall business strategy." *See* Supporting Responsible Innovation in the Federal Banking System: An OCC Perspective *at* https://www.occ.gov/publications-and-resources/publications/banker-education/files/supporting-responsible-innovation-fed-banking-system.html.

some prospective borrowers. The Enterprises are partnering with fintechs in a variety of ways to improve their existing suites of tools and to address equitable access to housing finance. The FHLBanks may also seek to partner with fintechs to develop technology solutions for business and risk management activities.

FHFA also has an interest in understanding how technology can be applied to automate and increase the efficiency and effectiveness of compliance and regulatory processes, which is referred to broadly as regtech. Regtech provides an opportunity to enhance transparency, consistency, and standardization of those processes, while reducing compliance costs.

Technologies That Are Changing Housing Finance

- *Big Data* refers to large or complex data sets, typically including structured and unstructured data, that are difficult to manage and analyze with traditional data-processing application software.
- *Data Science* uses scientific methods, processes, algorithms, and systems to extract and apply knowledge and insights from large and complex datasets.
- *Artificial Intelligence and Machine Learning* are computational tools and algorithms that optimize automatically through experience, with limited to no human intervention, and can be used to analyze large and changing data sets by identifying and adjusting to patterns they discover.
- *Intelligent Capture* refers to an automated process of identifying and extracting critical information from paper and electronic documents without manual intervention.
- *Distributed Ledger Technology* refers to databases that maintain information across a network of computers in a decentralized manner that is designed to ensure data integrity and data congruity.
- *Blockchain* is a data storage technology typically used in distributed ledgers.
- *Smart Contracts* are computer programs or transaction protocols that automatically execute, control, or document legally relevant events and actions according to the terms of a contract or agreement.

Background

The dramatic growth of fintech in recent years has led to rapid changes in financial markets, including in both the primary and secondary mortgage markets. Relative to other consumer finance markets, many mortgage market processes remain largely complicated, manual, and confusing, making them ripe for further innovation. Fintechs are changing how housing finance firms originate, underwrite, process, close, service mortgages, and perform loan quality control. Fintech can affect every phase of these mortgage processes, including how firms identify potential borrowers, verify data, appraise properties, and verify title, as well as how firms interact with each other, with customers, and with regulators.[4] Fintech innovations may also affect how credit risk is assessed, the loan terms borrowers are offered, and how credit risk is managed after a mortgage is closed. The use of advances in fintech presents the possibilities of making these processes both more efficient, by reducing time and resource requirements, and more equitable. These potential benefits must be understood in the context of potential costs, including the possibilities of increased or unrecognized risk that may accompany rapid change and of adverse consequences for consumers, investors, and underserved markets and populations.

FHFA is interested in learning about the role of fintech in both the primary and secondary mortgage markets. The primary mortgage market links mortgage originators to borrowers and creates the single-family and multifamily residential mortgages that are the primary input for the secondary mortgage market, where FHFA-regulated entities acquire mortgages for investment or securitization, sell mortgage-backed securities (MBS), or accept MBS as collateral. While FHFA-regulated entities act in the secondary market, practices in the primary mortgage market help determine both the credit and prepayment characteristics of mortgages in the secondary market. There is considerable interplay between the primary and secondary mortgage markets. Primary mortgage market practices are often designed to meet standards set by the Enterprises, while mortgage characteristics or servicer practices may affect risk management at, and the financial strength of, FHFA-regulated entities. Primary mortgage market practices also affect the conduct of Enterprise and FHLBank activities to promote access to mortgage credit in underserved markets and by underserved populations.

The subsections below focus on areas of particular interest to FHFA:

- the role of fintech in the ecosystem in which residential mortgages are originated;[5]
- the role of fintech in the secondary mortgage market;
- the associated risks with the use of fintech; and
- the application of fintech to compliance and regulatory activities.

Throughout each of these focus areas, fintech has the potential to increase opportunities, reduce unnecessary barriers and obstacles, and make the mortgage finance system fairer.

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[4] *See, for example,* Choi et al (2019), Fintech Innovation in the Home Purchase and Financing Market *available at* https://www.urban.org/research/publication/fintech-innovation-home-purchase-and-financing-market.

[5] While the discussion here focuses on single-family mortgage ecosystem, FHFA has a similar interest in the multifamily ecosystem, and the Office of Financial Technology will be pursuing similar activities in both areas.

The Primary Mortgage Market Ecosystem

Technology has facilitated or driven significant changes in the mortgage ecosystem in recent years, with important contributions from FHFA-regulated entities. Examples of such changes are listed in Table 1.

Table 1: Examples of Fintech in the Primary Mortgage Market Ecosystem

2012:	Point-of-Sale (PoS) software emerges to simplify and digitize the consumer-facing part of the mortgage process
2015:	Electronic closings (e-Closings) implemented at scale
2016:	Introduction of Data Validation Services to confirm borrower's employment, income, and assets through third-party vendor data
2020:	E-Notes accepted as collateral by Ginnie Mae
2021:	Increased incorporation of alternative data such as rent payment history in underwriting

Driven by consumer demand, investments in fintech startups in the digital mortgage space increased from approximately $0.4 billion to $1.7 billion from 2017 to 2021.[6] A number of trends have created an environment conducive to further fintech-led changes. Such trends include the evolution of consumer preferences toward lower-cost, digital, and internet-based options; mergers and acquisitions that change how technology is controlled and applied; and venture capital investment in startups that intensify competition, especially for established firms relying on older technologies. The broad array of fintechs active in various facets of housing and housing finance includes both well-established firms adapting their existing processes and business strategies to new technologies as well as an increasing number of startups. These firms seek to gain market share through the introduction or acquisition of new technologies designed to appeal to consumers or business partners and potentially disrupt markets.

Despite the array of fintech activity to date, the process for a consumer to obtain a single-family mortgage remains fertile ground for improvement. Overall timelines to originate and close remain long for many borrowers. In addition, origination costs have increased. Full production costs per loan totaled almost $9,500 in the fourth quarter of 2021, up from a little over $7,500 five years earlier.[7] For the average borrower, the process takes 46 days from application to closing, with over 30 interactions between prospective borrowers and sales representatives, loan

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[6] CBInsights, "55+ Startups Transforming The Global Mortgage Industry," Research Briefs, December 8, 2021, *available at* https://www.cbinsights.com/research/mortgage-tech-startup-market-map/

[7] Mortgage Bankers Association, 2022 Q1 Quarterly mortgage Bankers Performance Report *available for a fee at* https://www.mba.org/home/product/2022-q1-quarterly-mortgage-bankers-performance-report-75734.

officers, loan processors, underwriters, and closing agents.[8] These costs and timelines are not equitably distributed. Underserved populations are often most cost and time-burdened due to historical and ongoing structural and systemic barriers. Some experts estimate that a reengineered, digitalized mortgage origination process could reduce costs by 10 percent, reduce timelines by 15 to 40 percent, and reduce interactions with borrowers by 15 to 40 percent.[9] Fintech innovations could address consumer pain points – specific problems current or prospective customers face – in each step of the process, as discussed below.

Loan Origination and Underwriting

Fintechs have been most active in the loan origination and underwriting space, as indicated by the number of fintech entrants.[10] Lenders are increasingly partnering with fintechs to attract borrowers who prefer a transparent, fast, and simple mortgage experience, which is offered through online, point of sale (POS) software. Lenders are also adding online financial planning tools to their websites to engage borrowers as early as the budget planning stage. Fintechs have enabled, for example, direct collection of underwriting data through POS software, the use of data validation services and enhanced data analytics, and early assessment by lenders of the eligibility of a loan for sale to an Enterprise.

In addition to potential efficiency gains, the application of fintech to mortgage underwriting may improve access to credit for underserved markets or populations through, for example, incorporation of cash flow insights and rental payment data to better predict an applicant's credit behavior. In addition, new techniques can be applied to fair lending testing to identify less discriminatory alternatives and ensure that proxies for protected class status are not included within a model. However, the complex and opaque nature of artificial intelligence and machine learning models has raised concerns that they may perpetuate or worsen access to mortgage credit. Recently, the Consumer Financial Protection Bureau (CFPB) published a circular affirming that creditors must provide statements of specific reasons for denying credit or taking

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[8] McKinsey & Company, "How digital collaboration helps banks serve customers better," *available at* https://www.mckinsey.com/industries/financial-services/our-insights/banking-matters/how-digital-collaboration-helps-banks-serve-customers-better.
[9] McKinsey & Company, *Op. cit.*
[10] Jung Choi, Karan Kaul, and Laurie Goodman, "FinTech Innovation in the Home Purchase and Financing Market," Urban Institute, July 2019 *available at* https://www.urban.org/research/publication/fintech-innovation-home-purchase-and-financing-market.

other adverse actions to applicants even when those decisions are based on complex algorithms that make it difficult to accurately identify the specific reasons for a decision.[11]

Loan Processing and Closing

Loan processing has also seen meaningful fintech innovation that leverages automation and seamlessly accesses a variety of data. For example, fintechs have helped automate income, asset, and employment verification, improving speed and accuracy and eliminating the need for borrowers to provide documentation. Paperless platforms that provide e-closing, e-signature, and e-delivery services allow borrowers to conduct loan settlement steps through digital, internet-based applications, including obtaining the title, closing on the loan, and buying title insurance. Advances in property value and condition verification, widely adopted during the pandemic, helped reduce the need for an appraiser to be on site and have remained popular. Fintechs are also exploring how to provide alternatives to traditional title insurance, for example, through the application of blockchain technology.

Pre- and Post-Purchase Innovations

Fintechs have introduced innovations that enable homebuyers to compare mortgage rates and products online or connect with a wide network of lenders by submitting a single online loan application. Some fintechs provide similar services for homeowners seeking home improvement loans or to cash out home equity.[12] Some fintechs use their platforms to offer alternative products that allow homebuyers to reduce down payments in exchange for sharing a portion of future home price appreciation. These products are especially attractive in areas with affordability challenges or high median house prices, often above the maximum "conforming limit" on Enterprise loans. Such products, however, carry risks for borrowers and for holders of mortgage credit risk, such as the Enterprises. For borrowers, shared appreciation mortgages reduce the rate at which they build equity and may leave them more vulnerable should home prices fall. Fintech lenders may not inform consumers of these risks.[13] For holders of mortgage credit risk, shared appreciation mortgages may reduce the borrower's incentive to maintain or improve the property, increasing the holder's exposure to credit risk.

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[11] CFPB, "Consumer Financial Protection Circular 2022-03: Adverse action notification requirements in connection with credit decisions based on complex algorithms," May 2022 *available at* *https://files.consumerfinance.gov/f/documents/cfpb_2022-03_circular_2022-05.pdf*.

[12] Choi *et al*. *Op. cit*.

[13] *See* "Bad Credit? No Savings? Unconventional (Maybe Risky) Ways to Buy a Home" New York Times, Feb. 18, 2022, *available at* https://www.nytimes.com/2022/02/18/realestate/home-buyer-risks-bad-credit-savings.html.

Servicing is an area where the use of fintech has been limited but could drive efficiency gains. For example, fintech applications could simplify compliance with complicated and manual processes or regulatory requirements, allow for payment tracking to reduce duplicative processes, or create predictive analytics to improve loss mitigation. Fintech applications could also be used to better serve Limited English Proficiency borrowers, or borrowers who have preferred languages other than English. Servicers must be careful, however, to ensure that innovation does not penalize or otherwise treat borrowers differently due to predictive analytics, especially if variables used in these models are correlated with protected class status.

The Secondary Mortgage Market

Fintechs have also affected the secondary market, including through product and pricing engines (PPEs) and hedge advisory services. PPEs automate the determination pricing, lender rate sheet generation, and rate lock processes. Hedge advisors provide pipeline risk management, best execution, hedging, whole loan and MBS sales, and valuations of mortgage servicing rights (MSRs). These services are integrated into the Enterprises' suite of tools used by mortgage originators. Such tools link the primary and secondary mortgage markets by helping lenders know whether a mortgage is eligible for purchase by an Enterprise and the price at which it can be sold on the secondary market.

Fintech in capital and derivative markets may also affect FHFA-regulated entities. Algorithmic trading systems, automated settlement and payment confirmation processes, and automated hedging systems may affect the trading of mortgages and mortgage-backed securities and the nature and management of certain mortgage-related risks.

Fintech Risks

Fintech use in the primary and secondary mortgage markets offers opportunities but also raises concerns. Relatively little is known about the effects of fintech on the performance of the housing finance system or the well-being of consumers. A variety of risks have been identified with rapid innovation generally and with specific technologies associated with fintech. Historically, innovation and rapid growth have at times been associated with increased risks to the safety and soundness of financial institutions and to financial system stability. The financial crisis of 2008 offers one example. That crisis occurred after a period of significant private sector innovations, including the development of complex securitized products backed by subprime mortgage collateral credit models that predicted credit risk and probability of default based on insufficient loan documentation, and the expansion of non-agency mortgage securitizations.[14]

In the context of housing finance, such risks could result in adverse impacts to the FHFA-regulated entities' operations, reputation, and assets, and could harm individuals or other organizations.

Examples of risks associated with fintech include:

- inadequate regulation of the fintech sector;
- cybersecurity vulnerabilities introduced through complex, poorly understood, or poorly managed innovations;
- threats to consumer privacy;
- potential for violating fair lending requirements;
- increased exposures to legal, compliance, and reputational risk;
- the possibility that artificial intelligence and machine learning algorithms may have differential and negative impacts on minorities or underserved markets; and
- new products offered through fintech platforms may come with undisclosed or poorly explained risks that could, for example, erode the accumulated wealth of individuals and firms participating in those fintech platforms.

Specific technologies raise particular concerns around cyber, data, model, reputational, and legal risks. Such risks may be more complex if the technologies are acquired from third-party providers. If not well managed, these risks can exacerbate credit and market risks faced by FHFA-regulated entities. Because the integration of various data and computing resources is a key feature of fintech, cyber risk looms large. FHFA has issued a number of Advisory Bulletins that provide guidance to FHFA-regulated entities on certain technologies or risks related to fintech that have raised supervisory concerns.[15]

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[14] *See, for example,* The Financial Crisis Inquiry Commission, Financial Crisis Inquiry Report: Final Report of the National Commission on the Causes of the Financial and Economic Crisis in the United States, January 2011, *available at* https://fcic-static.law.stanford.edu/cdn_media/fcic-reports/fcic_final_report_full.pdf.

[15] *See, for example Advisory Bulletins on* Artificial Intelligence/Machine Learning Risk Management, Enterprise Fair Lending and Fair Housing Compliance, Business Resiliency Management, Oversight of Third-Party Provider Relationships, and Cloud Computing Risk Management *available at* https://www.fhfa.gov/SupervisionRegulation/AdvisoryBulletins?k=ContentType%3AFHFA%2DAdvisory%20Bulletins%20AND%20FHFAPublishedDateOWSDATE%3D01%2F01%2F2022%2E%2E12%2F31%2F2022.

Regtech

"Regtech," the application of technology to regulation and compliance, offers another set of opportunities on which the Office of Financial Technology intends to focus. Regtech may offer opportunities to automate and improve the efficiency of compliance, quality control, and review processes. It also has the potential to improve regulatory outcomes. For example, regtech might be used to verify and validate the consistency of information gathered by a loan originator in the loan manufacturing process and enhance overall processes for compliance with regulatory or Enterprise requirements. Through the application of artificial intelligence, machine learning, and other technologies, regtech offers the potential to improve and reduce the cost of compliance. Ideally, such quality control could be embedded in loan manufacturing processes to catch errors in real time before the loan has been closed. The automation of compliance rules can look at the subset of data used to make eligibility, pricing, and pooling decisions, verify, and validate that information, and enable supervisors to confirm compliance with specific requirements. Such automation should also reduce resource requirements associated with compliance and risk management. Advances in technology and strategic fintech partnerships may allow the FHFA-regulated entities to develop new risk mitigation methods that could significantly reduce applicable risks. However, "regtech" must overcome a variety of concerns to achieve these benefits, including difficulties associated with the integration of new and legacy technologies, the continued use of paper documentation, and the potential for data contamination or corruption from multiple participants or manual processes.

Public Input Instructions and Questions

FHFA invites interested parties to provide written input on the questions listed below within 90 days of the publication of this document, no later than approximately October 16, 2022. In responding to the questions below, FHFA invites interested parties to submit any studies, research, data, or other qualitative or quantitative information that supports an interested party's response. Additionally, FHFA invites interested parties to submit any such information that is otherwise relevant to the FHFA-regulated entities' use of fintech and their management of associated risks. Public input may be submitted electronically using the response form at https://www.fhfa.gov/AboutUs/Contact/Pages/Request-for-Information-Form.aspx (select "[Fintech Request for Input]" in the pull-down) or via mail to the Federal Housing Finance Agency, Office of Financial Technology, 400 7th Street SW, 5th Floor, Washington, D.C. 20219. FHFA encourages interested parties to provide meaningful and detailed responses to the Request for Information (RFI) and to make those responses public whenever possible to inform broader public discourse on these issues. Generally, all input received will be made public and posted without change to FHFA's website, including any personally identifiable information that they may contain. However, FHFA encourages interested parties to contact FHFA if they seek to provide confidential or proprietary information as part of their responses and wish to request that the information not be made public.

A. Fintech and Innovation

General Questions on Fintech and Innovation	
Question A.1	How do primary and secondary mortgage market participants define fintech in the housing finance sector? What key factors should be considered?
Question A.2	How could FHFA facilitate adoption of "responsible innovation"?
Question A.3	What factors currently inhibit the adoption of fintech and innovation in the primary and secondary housing finance sector? Are there specific challenges related to privacy laws, industry standards, or current practices?

B. Identifying Fintech Opportunities in the Housing Finance Ecosystem

To better understand the potential opportunities and risks presented by fintech and innovation in the housing finance ecosystem, FHFA is seeking information from market participants on existing and potential opportunities for fintech to improve efficiencies, lower costs, and increase access to sustainable credit in a safe and sound manner, especially for underserved markets and populations. FHFA is also seeking information on existing and potential challenges of adopting and implementing financial technologies within the current housing finance ecosystem.

The primary mortgage lifecycle described in the questions below generally includes origination, processing, underwriting, closing, and servicing activities and processes. The secondary mortgage lifecycle generally includes post-closing funding or selling to the Enterprises and capital markets activities and processes.

Questions on Fintech Opportunities	
Question B.1	What kind of fintech activities have the greatest potential to positively impact the housing finance sector? Describe several situations in which a product or service has been or could be used, the factors considered in determining importance, and associated impacts.
Question B.2	What are the typical time requirements of each process within the mortgage lifecycle? What are the "critical path" activities that drive the mortgage timeline and borrower expense? How could fintech be applied to improve efficiency, reduce costs, reduce time requirements, or facilitate equitable outcomes for borrowers?
Question B.3	What are the typical drivers of repetitive requests to borrowers or reevaluation of underwriting information by the lender in the mortgage process, and what opportunities exist to automate processes?
Question B.4	What are the existing data challenges that most prevent data-driven decision-making in the mortgage lifecycle?
Question B.5	What are the existing regulatory and policy barriers to adopting and implementing fintech within the mortgage lifecycle?

C. Equitable Access to Mortgage Credit

FHFA is committed to working with the Enterprises and FHLBanks on a comprehensive approach to responsibly reduce the racial and ethnic disparities in homeownership and wealth. In June 2022, FHFA announced the release of the Enterprises' Equitable Housing Finance Plans for 2022-2024 to identify and address barriers to sustainable housing opportunities.[16] The Enterprises also have a statutory Duty to Serve three underserved markets: manufactured housing, affordable housing preservation, and rural housing. That Duty to Serve is intended to increase the liquidity of mortgage investments and improve the distribution of investment capital available for mortgage financing in those markets. Fintech may also be used to address the

[16] FHFA Summary of Enterprise Equitable Housing Finance Plans, *available at* https://www.fhfa.gov/AboutUs/Reports/ReportDocuments/FHFA-Summary-of-Enterprise-Equitable-Housing-Finance-Plans.pdf.

unique challenges in Duty to Serve markets by simplifying, streamlining, and spurring efficiency in accessing financing.

FHFA's focus on equitable access to mortgage credit extends to its work on fintech and innovation. Research indicates that fintech does not inherently improve or degrade mortgage access – its effects are determined by how it is applied and managed. For example, several studies describe more consistent treatment across racial and ethnic groups by fintech lenders compared to traditional lenders, and that competition from fintech lenders reduces observed differences in treatment by traditional lenders.[17] Other literature focuses on how alternative data and more advanced analytics could improve credit risk measures and underwriting to enable lenders to extend credit to the unbanked and underbanked.[18] Advances in fair lending testing and analytics also holds tremendous promise for identifying less discriminatory alternatives that serve more borrowers without material degradation to accuracy.

The opaque nature of some fintech methods such as artificial intelligence and machine learning highlights the need to ensure appropriate compliance measures are taken to mitigate the risk of violating fair lending laws. For example, one study found that Black and Latino applicants may be less likely than white or Asian borrowers to be assessed as less risky borrowers when machine learning, rather than traditional, models are used to predict the creditworthiness of mortgage applicants, increasing disparities between those groups in the terms on mortgages they are offered.[19] Such methods involving complex algorithms must account for existing fair lending requirements related to adverse action notifications and explainability, as recently noted by CFPB.[20] The Department of Justice recently resolved a case that alleged algorithmic

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[17] *See* Bartlett, Robert, et al. "Consumer-Lending Discrimination in the FinTech Era," NBER Working Paper w25943, 2019, and Daniel Shoag, "The Impact of Fintech on Discrimination in Mortgage Lending," May 2021, *available at* https://ssrn.com/abstract=3840529 or http://dx.doi.org/10.2139/ssrn.3840529.

[18] Peter Carroll and Saba Rehmani, "Alternative Data and the Unbanked," Oliver Wyman Insights, 2017, *available at* https://www.oliverwyman.com/content/dam/oliver-wyman/v2/publications/2017/may/Oliver_Wyman_Alternative_Data.pdf; Penny Crosman, "Will Fintechs Kill the FICO Score?" American Banker June 14, 2016, *available at* https://www.americanbanker.com/news/will-fintechs-kill-the-fico-score; and Consumer Financial Protection Bureau, "CFPB Explores Impact of Alternative Data on Credit Access for Consumers Who Are Credit Invisible," 2017 *available at* https://www.consumerfinance.gov/about-us/newsroom/cfpb-explores-impact-alternative-data-credit-access-consumers-who-are-credit-invisible/.

[19] Andreas Fuster, Paul Goldsmith-Pinkham, Tarun Ramadorai, and Ansgar Walther, "Predictably Unequal? The Effects of Machine Learning on Credit Markets," in *The Journal of Finance*, February 2022, pp. 5-47 *available at* https://onlinelibrary.wiley.com/doi/abs/10.1111/jofi.13090.

[20] Consumer Financial Protection Bureau, Circular 2022-03, "Adverse action notification requirements in connection with credit decisions based on complex algorithms" (May 26, 2022), *available at* https://www.consumerfinance.gov/compliance/circulars/circular-2022-03-adverse-action-notification-requirements-in-connection-with-credit-decisions-based-on-complex-algorithms/.

discrimination under the Fair Housing Act based on the company's advertisement delivery system.[21]

Questions on Equitable Access	
Question C.1	What new fintech tools and techniques are emerging that could further equitable access to mortgage credit and sustainable homeownership? Which offer the most promise? What risks do the new technologies present?
Question C.2	What emerging techniques are available to facilitate or evaluate fintech compliance with fair lending laws? What documentation, archiving, and explainability requirements are needed to monitor compliance and to facilitate understanding of algorithmic decision-making?
Question C.3	Are there effective ways to identify and reduce the risk of discrimination, whether during development, validation, revision, and/or use fintech models or algorithms? Please provide examples if available.

D. Identifying and Mitigating Fintech Risks

Understanding and monitoring developments in fintech and innovation that directly affect regulatory concerns and objectives is part of the Office of Financial Technology's purview. The introduction of new financial products and services or changes in their availability that result in rapid growth could lead to increased risks to the safety and soundness of regulated financial institutions, to financial system stability, and to the well-being of consumers.

[21] Department of Justice, Press Release, "United States Attorney Resolves Groundbreaking Suit Against Meta Platforms, Inc., Formerly Known as Facebook, to Address Discriminatory Advertising for Housing" (June 21, 2022), *available at* https://www.justice.gov/usao-sdny/pr/united-states-attorney-resolves-groundbreaking-suit-against-meta-platforms-inc-formerly.

Questions on Fintech Risk	
Question D.1	What risks do fintech and fintech firms present to the economy and the financial sector? To the housing finance sector? To FHFA-regulated entities? To counterparties of FHFA-regulated entities and other third parties? To mortgage borrowers and consumers?
Question D.2	What risk management practices do industry participants use to address the risks posed by fintech and innovation in housing finance?
Question D.3	What particular risks to consumer privacy have been associated with fintech? What practices are being used to manage these risks?

E. Regtech

The use of "regtech" holds the opportunity of enhancing transparency, consistency, and standardization of compliance and regulatory processes and reducing compliance costs.

Questions on Regtech	
Question E.1	What are the most promising areas for applying technology to regulatory and compliance functions? Please describe opportunities for "regtech" to simplify or improve compliance with FHFA, Enterprise, or FHLBank requirements.

F. Office of Financial Technology Activities and Stakeholder Engagement

The recently launched FHFA Office of Financial Technology will serve as a principal point of contact on all matters involving the fintech community and as a centralized information clearinghouse within FHFA. The new office will support informed FHFA decision-making and advance mission priorities related to fintech. FHFA will continue to engage with both Enterprises through the conservatorship scorecard[22] process to identify opportunities to leverage

[22] *See* 2022 Scorecard for Fannie Mae, Freddie Mac, and Common Securitization Solutions *available at* https://www.fhfa.gov/AboutUs/Reports/ReportDocuments/2022-Scorecard.pdf.

fintech to improve efficiency, reduce cost, and serve underserved markets and populations within the housing finance ecosystem. FHFA will also engage with the FHLBanks, to which the Agency's conservatorship powers do not apply, through regular channels. FHFA will also seek to engage with market participants, industry, non-profits, consumer groups, and academia to understand current and best practices.

In preparation for the launch of the Office of Financial Technology, FHFA conducted discussions with peer regulatory agencies and industry groups. A key takeaway from those discussions is the value of consistent stakeholder engagement in helping to identify opportunities and challenges in the application of new technologies to the housing finance system.

A common engagement activity of peer regulatory agencies has been to use "tech sprints" to promote responsible innovations.[23] A tech sprint provides an environment for regulators, technology firms, consumer and academic groups, software developers, and other market participants to work collaboratively together to facilitate solutions, ideas, or products that address a predefined problem statement which has been developed through market research. A demonstration day at the end of the tech sprint allows sprint participants to showcase their solutions, ideas, or products.

Other engagement opportunities include hosting and participating in industry conferences or forums. These events tend to have broad attendance and engage market participants on a variety of fintech-related topics.

Regulatory agencies' innovation offices also use peer-to-peer meetings, sometimes called "office hours," to engage with market participants. These meetings are scheduled at the request of individual firms or stakeholder groups and can be tailored to their interests.

Questions on Stakeholder Engagement	
Question F.1	What forms of stakeholder engagement are most effective in facilitating open, timely, and continuous discussion on the challenges and opportunities presented by the application of fintech to housing finance?

[23] *For information about tech sprint programs at other federal financial regulators, see, for example,* https://www.fdic.gov/fditech/techsprints.html *and* https://www.consumerfinance.gov/rules-policy/competition-innovation/cfpb-tech-sprints/.

Question F.2	What are some topics for a housing finance-focused “tech sprint” and how could FHFA encourage participation?