

EXAMINING THE FINTECH LANDSCAPE

HEARING
BEFORE THE
COMMITTEE ON
BANKING, HOUSING, AND URBAN AFFAIRS
UNITED STATES SENATE
ONE HUNDRED FIFTEENTH CONGRESS
FIRST SESSION
ON
EXAMINING THE INNOVATIVE TECHNOLOGIES BEING USED TO CHANGE
THE WAY FINANCIAL SERVICES ARE PROVIDED AND THE WAY THE
FINANCIAL SYSTEM OPERATES

SEPTEMBER 12, 2017

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C O N T E N T S

TUESDAY, SEPTEMBER 12, 2017

	Page
Opening statement of Chairman Crapo	1
Opening statements, comments, or prepared statements of:	
Senator Brown	2
WITNESSES	
Lawrance L. Evans, Director, Financial Markets and Community Investment, Government Accountability Office	4
Prepared statement	30
Responses to written questions of:	
Senator Menendez	82
Eric W. Turner, Financial Technology Research Analyst, S&P Global Market Intelligence	6
Prepared statement	48
Responses to written questions of:	
Senator Menendez	83
Frank Pasquale, Professor of Law, University of Maryland Francis King Carey School of Law	7
Prepared statement	66
Responses to written questions of:	
Senator Brown	87
Senator Menendez	90
ADDITIONAL MATERIAL SUPPLIED FOR THE RECORD	
Statement submitted by the Independent Community Bankers of America	95
Letter submitted by the Electronic Privacy Information Center	97
Letter submitted by the Milken Institute Center for Financial Markets	100

EXAMINING THE FINTECH LANDSCAPE

TUESDAY, SEPTEMBER 12, 2017

U.S. SENATE,
COMMITTEE ON BANKING, HOUSING, AND URBAN AFFAIRS,
Washington, DC.

The Committee met at 10:02 a.m., in room SD-538, Dirksen Senate Office Building, Hon. Mike Crapo, Chairman of the Committee, presiding.

OPENING STATEMENT OF CHAIRMAN MIKE CRAPO

Chairman CRAPO. The Committee will come to order.

Before we proceed with the hearing today, I wanted to just indicate that last night the Senate passed six securities bills that we marked up earlier this year, bills that will improve economic growth and investor protections. And I want to thank you, Senator Brown, for working with me to get these bills through the Committee, and thanks to all of the Committee for your work in getting these pieces of legislation through the Senate.

These bills were introduced in past Congresses with broad bipartisan support, with the House most recently passing similar bills last spring. And I want to thank our colleagues on the House Financial Services Committee for their work on this as well. I look forward to seeing these bills signed into law.

Senator BROWN. Could I say a word now?

Chairman CRAPO. Yes.

Senator BROWN. Thank you, Mr. Chairman, for your partnership on these bills to improve the securities markets and investor protections. I am pleased they passed the Senate last night as well. I thank the members of this Committee and others in the Senate especially for their work on this bill, Senators Heller and Peters, off the Committee; Senators Heitkamp, who is here, and Toomey on the Committee, and Donnelly, also on the Committee, Menendez, Hatch, Warner, and Tillis, and others on this Committee for moving the bill forward.

Thank you, Mr. Chairman.

Chairman CRAPO. Thank you.

This morning, we will receive testimony on the growing financial technology, or fintech, industry. Fintech is providing new and innovative products and services in areas such as marketplace lending, digital payments and currencies, wealth management, insurance, and more.

Technological innovation has brought about improvements in virtually every sector of the economy, and the financial sector is no exception. Technology advances are nothing new to the financial

world; inventions such as the ATM and the credit card led to significant improvements in consumer welfare.

Today new innovations by fintech companies have similar potential to make financial services faster, cheaper, and more accessible. For example, marketplace lending has the potential to expand the availability of credit to consumers and small businesses at lower costs.

In particular, with the use of alternative data and technology, the business models of marketplace lenders may enable them to reach underbanked populations. Innovations in the payments space can offer enhanced speed, convenience, and efficiency in transactions.

Fintech startups are not the only ones embracing this opportunity and responding to changing consumer demand. Traditional banks and other established financial institutions are increasingly participating in the fintech space through partnerships, incubators, investments, and more.

Fintech firms may also reap the mutual benefits of partnering with banks who have well-established operations and comparative advantages in certain areas. But with all the potential for fintech to improve the financial services sector, the industry is still relatively new.

Uncertainty remains around questions like data security and the proper regulatory treatment to ensure that consumers and the financial system are safeguarded. The recent Equifax data breach reminds us of the critical need to ensure that areas like cyber and data security are given the proper attention.

The tremendous growth in this sector over the past few years has gained the attention of market participants, regulators, and other stakeholders. The OCC, for example, has a proposal to provide special purpose national bank charters for fintech companies.

Other Governments are exploring options such as a regulatory sandbox approach that encourages innovation by allowing firms to test products and services in a supervised environment.

In response to this Committee's call for economic growth proposals, we received a number of fintech-related submissions that will also help us as we think about these issues.

Today I look forward to learning more about the opportunities fintech may bring, the various ways fintech is interacting with and impacting the financial system, and the current regulatory supervision of the fintech industry.

Senator Brown.

STATEMENT OF SENATOR SHERROD BROWN

Senator BROWN. Thank you, Mr. Chairman. I appreciate your holding this hearing on financial technology. It has been too long since our Committee considered this important topic. I do not think any of us knew how timely this hearing would be until we got news of the Equifax data breach, apparently after some executives at Equifax also knew, although they deny that was the case.

While financial technology covers many different activities, all of those activities rely on the responsible use and careful protection of data.

In the case of Equifax, that did not happen. Americans are now forced to worry whether the information that hackers stole will have lasting impacts, from outright theft to damaged credit. We just cannot cancel a credit card to fix this problem. Equifax has let criminals get their hands on the most private and valuable pieces of millions of Americans' financial identities.

Credit reports also include other deeply personal information. A history of our medical debt can reveal information we do not share with anyone but our doctors and families.

More and more, new financial technologies rely on the collection of vast troves of data no longer limited to our financial transactions. Data aggregators collect information regarding our associates, what kind of products we buy, and maybe even how often we check Facebook.

The collection and use of this alternative data may promise some benefits by providing access to credit for people in communities that traditional lenders overlook. But as recent data breaches have shown, the risks are clear and substantial.

It will take us a long time to assess the impact of the Equifax data breach on 143 million Americans. Businesses, consumers, and Government watchdogs will have to be even more vigilant about identifying fraud, possibly making it harder for Americans to get access to credit.

It is bad enough that the Equifax breach included important personally identifiable information—names, dates of birth, Social Security numbers, addresses, and credit card numbers—the building blocks for your financial identity. Future breaches at firms that use alternative data might include far more personal information with far-reaching consequences.

Today I want to hear how we can improve Federal oversight of data collection and data security to protect working American families. I hope we can work together to make sure companies that use our private data are held accountable for its protection.

If a college student in Columbus misses a credit card payment or a family in Toledo is forced into bankruptcy because of medical debt, Equifax would undoubtedly ding their credit scores. So now that this breach has left millions of people vulnerable to criminals, what should be done to hold Equifax accountable?

At a minimum, customers should have the right to use the court system to help make them whole. That is why I appreciate, under apparently some public pressure, Equifax answered my call, and that of others on the Committee, to remove forced arbitration clauses from its free credit monitoring product.

This is a step in the right direction, but customers cannot be sure their rights are truly protected until Equifax makes this policy clear for all products and on all of its websites.

One year of credit monitoring cannot be expected to undo the damage of this breach. After the 2015 breach of the Office of Personnel Management put information of Government employees at risk, this body passed 10 years of free credit monitoring. We cannot accept any less for the people we serve.

Today's hearing is focused on new products and markets. I am interested in how Congress can encourage fintech innovation to make it easier for community banks to serve their customers, to

comply with important safety and soundness and anti-money-laundering rules.

If we can encourage banks to partner with each other or innovative startups, we may be able to cut down on red tape without exposing consumers or the financial system to additional risk.

I am also interested in how these new technologies can help Americans who are currently underserved by the traditional banking system. We have already seen how mobile payments have expanded access for many to the financial system, both at home and abroad. But we need to fully understand the risks and ensure that oversight gaps do not exist for bad actors to exploit American customers.

I thank the witnesses for joining us.

Chairman CRAPO. Thank you, Senator Brown. We will now move to our witnesses.

First we will hear testimony from Mr. Lawrance Evans, Director of Financial Markets at the U.S. Government Accountability Office.

Then we will hear testimony from Mr. Eric Turner, research analyst at S&P Global Market Intelligence.

And then, finally, we will hear testimony from Mr. Frank Pasquale, professor of law at the University of Maryland Francis King Carey School of Law.

I would remind each of our witnesses that your full testimony has been made a part of the record. We ask you to limit your presentation orally to 5 minutes. There will be plenty of opportunity for further follow-up with questions from the Committee.

With that, Mr. Evans.

STATEMENT OF LAWRENCE L. EVANS, DIRECTOR, FINANCIAL MARKETS AND COMMUNITY INVESTMENT, GOVERNMENT ACCOUNTABILITY OFFICE

Mr. EVANS. Thank you very much, Mr. Chairman. I am pleased to appear before you, Ranking Member Brown, and the other Members of the Committee to discuss the fintech landscape, which currently finds a number of potentially disruptive and foundational technologies, and innovative firms that are transforming the financial industry. Calling this hearing represents the type of forward thinking that is essential to effectively harnessing the opportunities these developments bring.

My testimony today is based on our April 2017 report produced as a partial response to a request from the Ranking Member and others. The report covers a high-level look at four commonly referenced fintech subsectors: marketplace lending, mobile payments, digital wealth management, and distributive ledger technology, which I will refer to as “DLT.” While this report is largely based on secondary sources, we are able to glean some useful findings and observations for consideration.

Considering the benefits, our sources suggest that technological innovation is occurring throughout the financial ecosystem, driven by large technology firms and smaller technology-driven new entrants known as “fintechs” or “fintech firms.” One of the primary potential benefits include expanded access to financial services.

For example, digital wealth platforms, which rely on data-driven algorithms and minimize human interaction, provide services to a

class of investors previously frozen out of traditional wealth management. Other potential benefits include convenience, speed, and lower costs across a range of financial services.

On the flip side, new technologies and new entrants into the financial services industry, while bringing much needed innovation, bring potential risk. For example, the data-driven algorithms marketplace lenders rely on to assess creditworthiness and underwrite loans raise concerns about the use of nontraditional data and the risk for potential fair lending violations. Moreover, data security and privacy risks may exist with these newer technologies.

It is important to note that these concerns are real, but they are not unique to these innovations. And there are also features in mobile payments in DLT that may produce benefits in the area of data security. Losing sight of the benefits and overreacting to risk could stifle financial inclusion and much needed innovation in the area of payments, value transfer, and recordkeeping. Therein lies the great challenge for policymakers and regulators. There is always a need to manage the risk-reward balance of innovation; that is, managing risk without stifling innovation, ensuring consistent regulation and a level playing field, and encouraging socially beneficial innovation without picking winners or losers.

On the one hand, advances in technology are occurring in a heavily regulated and mature financial ecosystem. On the other hand, the financial regulatory structure in the U.S. is complex, with responsibilities fragmented among multiple Federal and State agencies that have overlapping authorities. This has raised concerns about gaps in coverage, inconsistent regulation, compliance challenges for new and incumbent firms, and whether the existing regulatory framework might slow or otherwise harm innovation.

As you know, there are a number of issues being considered today that will impact the regulatory landscape going forward, such as the appropriate charter type for fintech firms conducting bank-like activities. It will be important to carefully sort through the various competing interests to settle on a regulatory framework that is truly in the public interest.

Putting the public first and developing a regulatory framework that is best positioned to achieve it is essential to getting the risk-reward balance of innovation correct. As one Federal Reserve official recently noted, “it would be a lost opportunity if instead of expanding access in a socially beneficial way, some fintech products merely provided a vehicle to market high-cost loans to the underserved, exacerbating rather than ameliorating financial access inequalities.”

Similarly, it would also be unfortunate if the regulatory framework served as a barrier to entry to innovative firms with socially beneficial products. GAO is currently undertaking work that will support congressional efforts to strike the appropriate balance in this area.

Chairman Crapo, Ranking Member Brown, and Members of the Committee, this concludes my prepared statement. I look forward to questions and further dialog.

Chairman CRAPO. Thank you, Mr. Evans.
Mr. Turner.

**STATEMENT OF ERIC W. TURNER, FINANCIAL TECHNOLOGY
RESEARCH ANALYST, S&P GLOBAL MARKET INTELLIGENCE**

Mr. TURNER. Thank you, Chairman Crapo, Ranking Member Brown, Members of the Committee. Good morning, and thank you for inviting me to testify today. My name is Eric Turner, and I am a research analyst with S&P Global Market Intelligence, where I cover financial technology.

S&P Global Market Intelligence is a division of S&P Global. We provide actionable intelligence on the global financial markets and the companies and industries that comprise those markets. We support economic growth by providing market- and sector-specific data, news, and research to help investors identify opportunities and manage risk when providing financing to businesses and job creators. S&P Global Market Intelligence closely follows the fintech sector, which we view as pivotal to economic growth and innovation.

Financial institutions have long used technology, but startups have broken new ground during the past decade. These companies have created what we know as fintech today. Leveraging advances in technology and the ubiquity of the Internet, these companies offer new and cutting-edge financial products. Expansive data sets, advanced analytics, and automation have made accessing financial services faster and less expensive for millions of people.

Incumbent institutions are increasingly looking to fintechs not as competitors but as partners for improving operations and reaching new consumers.

Through our research, we have identified five key areas that impact consumers in the financial industry today. These include digital lending, mobile payments, digital investment management, insurance technology, and distributed ledger technology, which includes blockchain. These innovations present enormous opportunities to consumers accompanied by unique challenges in implementation.

Digital lending has increased access to credit and made borrowing more efficient. Automation and a lack of physical offices allow digital lenders to reduce processing time and costs. This allows them to offer competitive rates, potentially saving borrowers thousands of dollars in interest, while small businesses seeking access to working capital are able to obtain funds much more quickly.

Mobile payments services are used by millions of consumers because they reduce transaction costs and frictions, while offering an enhanced user experience. For international transfers, specialized peer-to-peer apps charge low fees for the conversion and transfer of funds across borders and currencies. This benefits underbanked and immigrant communities.

Mobile wallets create more secure transactions by preventing fraudsters from skimming card data or stealing PIN information. Additional features, like biometric and two-factor authentication, have further enhanced security.

Digital investment management has given retail investors new access to professional investment services, and insurance technology has made it easier and more affordable to protect against risk. If implemented properly, distributed ledger technology, including blockchain, will revolutionize many parts of our financial sys-

tem, reducing costs and settlement times while enhancing transparency.

Despite the benefits discussed today, the industry is still young and challenges remain. Regulation has been unevenly applied to the sector, and in many ways the introduction of a clear regulatory framework could help boost innovation. This may require firms to define their stake in the financial system and could lead to technology-only platforms exiting certain lines of business like lending. Overall, this will lead to a more fair and defined playing field for startups and incumbents alike.

Issues such as cybersecurity, data ownership, and data privacy are important not just to fintechs but to the financial industry as a whole. Clear standards and regulation can provide clarity in these areas as well. Understanding the fintech landscape as well as the benefits and challenges presented by this growing industry can help shape a clear framework for responsible innovation.

Thank you again for inviting me to testify, and I would be happy to answer any questions for the Committee.

Chairman CRAPO. Thank you, Mr. Turner.

Mr. Pasquale.

STATEMENT OF FRANK PASQUALE, PROFESSOR OF LAW, UNIVERSITY OF MARYLAND FRANCIS KING CAREY SCHOOL OF LAW

Mr. PASQUALE. Chairman Crapo, Ranking Member Brown, and distinguished Members of this Committee, thank you for the opportunity to testify today. My name is Frank Pasquale, and I am a professor of law at the University of Maryland.

The financial technology, or fintech, landscape ranges from the very simple to the tremendously complex. Regulators at the OCC's Office of Innovation and the CFPB's Project Catalyst are energetically helping entrepreneurs to comply with existing consumer protections and other Federal mandates. Fintech may promote competition and create new options for consumers, but we should ensure that it is fair competition and that these options do not have hidden pitfalls.

In my research on the finance and Internet sectors over the past decade, I have explored patterns of regulatory arbitrage and opaque business practices that sparked the mortgage crisis of 2008. I am afraid I see some similar themes emerging today.

In the run-up to the crisis, Federal authorities preempted State law meant to protect consumer borrowers. Their stated aim was to ensure financial inclusion and innovation, but the unintended consequences were disastrous. Federal authorities were not adequately staffed to monitor, let alone deter or punish, widespread fraudulent practices. They also flattened diverse State policies into a one-size-fits-all, cookie-cutter approach. We all know the results. Millions of families lost their homes to foreclosure, and the economy suffered a permanent output gap.

That history should make us cautious about legislative or regulatory efforts to federally preempt State laws now applying to fintech. Why should consumers lose important protections provided by their own States simply because they engage with fintech firms? Think, for instance, of restrictions on payday lending. As the New

Economy Project and hundreds of community, labor, military, and veterans groups have argued earlier this year, 90 million Americans live in jurisdictions where payday lending is illegal. These State laws help consumers save billions of dollars each year in predatory payday loan fees that could trap people in long-term devastating cycles of debt. OCC should not strip these consumers of these protections.

Advocates for deregulation will likely argue that imposing a level playing field on fintech and non-fintech firms might harm innovation in the fintech sector. But innovation is not good in itself. The toxic assets at the core of the financial crisis were innovative in many ways, but ultimately posed unacceptable risks.

Promoters of fintech deregulation may claim that such worries are anecdotal. But many tech firms prevent more robust analysis as they obscure what we know about the sector. As I explain in my book “The Black Box Society”, aggressive assertion of trade secrecy claims—both about data collection and use, and the algorithms used to make judgments about us—keep regulators and legislators in the dark about the full range of risks in finance in general and fintech in particular.

A key message I hope to convey to the Committee today is to empower agencies like CFPB and OFR and to expand their funding as they try to come to grips with a rapidly financial landscape.

Data gathering is important because nearly every story of technologized “financial inclusion” can be countered with other stories of exclusion, via digital redlining. As Cathy O’Neil’s book “Weapons of Math Destruction” shows, consumers often are in the dark about what new algorithms are judging them and how they can respond if they think they have been treated unfairly. Regulators must more fully understand what firms are doing and how they are performing. Moreover, as the recent Equifax hack shows, concentration of information in almost any firm creates great risks to consumers. Improving financial cybersecurity should be an essential goal in fintech policy, and I applaud the GAO for highlighting security issues in its report, as well as proposals by Senator Reed to require cybersecurity expertise at large firms.

We should not have faith that accelerated deregulation will free the financial sector to solve important social problems. There is a difference between exploiting an existing problem in credit provision and addressing the root causes. For example, if fintechs can make hefty profits by refinancing student debts owed to the U.S. Government, perhaps that is less an indication of fintechs’ business prowess than it is evidence that the Government is overcharging students for loans. If consumers are desperate for marketplace lending to cover next month’s utility bills, maybe we need to ensure work pays more fairly. I am confident that a system of postal banking would do far more than the fintech sector to ensure financial inclusion to millions of Americans without adequate access to deposit accounts, as Mehrsa Baradaran has helped prove in her book “How the Other Half Banks”.

In conclusion, fintech should not be an excuse for stripping safeguards from consumers. We need far more information about how fintech firms are gathering, processing, and protecting data. And we should be wary about the ability of technology alone to solve

much larger social problems of financial inclusion, opportunity, and nondiscriminatory credit provision.

Thank you for the opportunity to testify today.

Chairman CRAPO. Thank you, Mr. Pasquale.

This is a question for the entire panel, so I would like to ask you to each be brief in your responses. But could each of you discuss, as we move forward, what are some of the most significant risks that we should evaluate? And in your response, if you have an opinion on whether there should be a specific charter for fintech companies separate from other types of charters that we deal with in a regulatory context, I would appreciate your thoughts on that.

Mr. Evans.

Mr. EVANS. So I think you see many of the risks that are commonly witnessed when you think about innovation, and there is, I think, a disconnect between the “move fast and break things” approach that you might see in the technology industry with the more conservative approach in the banking industry. And so I think there could be some significant compliance challenges going forward as they grapple with the various rules and regulations that are in place.

I will punt on the issue of a Federal or a State charter. I know it is a critical issue. There are pros and cons on both sides, and I think other witnesses might—

Chairman CRAPO. I figured you might pass on that part of it.

Mr. Turner.

Mr. TURNER. Thanks, Senator. I think as you mentioned, probably the biggest risk right now is a fractured regulatory system. I think when people look at fintech companies, they kind of assume that, you know, when you hear things like regulatory arbitrage and lack of regulation, that these companies are operating, you know, like it is the Wild West. And that is really not the case. These companies have looked for regulation wherever they can, and right now it seems that they are just trying to fit themselves into a system that was not made for them.

Chairman CRAPO. Thank you.

Mr. Pasquale.

Mr. PASQUALE. Yes, thank you, Senator. I would cite problems in three areas, one being an area of opaque algorithms being used to assess credit. I think that we are entering into a new world, and we do not quite understand fully how many different types of data sources could enter into, say, emerging credit decision making. And I give some examples in my written testimony of how fintech firms, say, outside of the U.S. have used some types of data that might be troubling, I think, to people, like political activity or other issues like that.

I would also say that with respect to looking at the 2016 Fed survey on small business credit, the Fed found that there were lots of small businesses that distrusted fintech firms more than they distrusted small banks, or even large banks. With respect to high interest rates, they felt they were being overcharged, and I think that that highlights some concerns about the potential overextension of credit into, say, marginal communities or into marginal business opportunities.

And I would finally highlight the cybersecurity concerns because I do think that as more and more—even Jamie Dimon and other folks were sort of concerned about consumers sharing too much of their data with unvetted apps.

Chairman CRAPO. Thank you very much.

Mr. Turner, in the United Kingdom, the Financial Conduct Authority has implemented a regulatory sandbox that allows firms to operate on a limited basis to test different ideas while under the FCA's supervision, but without needing to comply with the full regulatory enforcement regime. Could you just discuss your thoughts on whether that is a good idea or something that we should possibly pursue here?

Mr. TURNER. Yes. Thanks, Senator. So just a little background. Whenever I speak to somebody in the industry, you know, they do say that the U.S. is pretty far behind on this, and there are other countries with these regulatory sandboxes that are beating us in innovation. And I think as we look at some sort of specific regulatory framework, a sandbox not only will let fintechs continue to innovate, but it will also give regulators a way to actually test new ideas and learn a little bit more about the process.

Chairman CRAPO. Thank you.

Mr. Pasquale, do you have a thought on the sandbox approach?

Mr. PASQUALE. You know, I have written in the past in favor of pilot programs, and I think that they have proven their worth in some areas, for example, in health care policy. And I think that a very—we would have to do a very careful assessment of it, but there may be some promise there in terms of experimenting to learn more about exactly how this innovation might play out in certain contexts.

Chairman CRAPO. Thank you.

Mr. Evans, do you have anything to add?

Mr. EVANS. We have a report that will be released in the winter of 2018 that actually looks at various regulatory approaches to fintech. And, in fact, our teams have traveled to Singapore, U.K., and Hong Kong and will be reporting out on ones that we think are more applicable to the United States.

It is important to point out that the CFPB does have Project Catalyst, which allows fintech firms to pilot innovations that are deemed consumer-friendly.

Chairman CRAPO. Thank you.

Senator Brown.

Senator BROWN. Thank you, Mr. Chairman. Thank you to all three of you for joining us.

Professor Pasquale, the Equifax breach showed why CFPB's arbitration rule is so important. Had it not been for sharp-eyed consumer advocates and lots of public pressure, millions of scared consumers may have accidentally signed away their right to a day in court. But Americans should not have to go to court to defend themselves from companies that never got permission to collect their data. Big companies like Equifax got to hold Americans accountable for mistakes of every size. Now that this breach has left 143 million people around our country vulnerable to criminals, what should the Government do to hold them accountable at this point?

Mr. PASQUALE. So I think that this breach really ought to be a watershed and that we ought to really reconceive how we regulate this area. I think existing approaches are failing. I know that the Federal Trade Commission and the SEC are trying very hard with existing approaches, but I do not think they are really protecting people.

And what I like to analogize the situation to is if you have a doctor, for example, in a State that repeatedly commits malpractice, they lose their license. If you have a lawyer that, you know, shirks duties to clients, et cetera, they will lose their license. And I think we really have to think seriously about licensing certain entities, as we do at the corporate level, with respect to the consumer finance information because we have seen so many instances of failure here. And I think repeated instances of failure should lead to a revocation of such a license. But I know that is a long way off.

Senator BROWN. Thank you.

Mr. Turner, the Equifax breach exposed, as we have said repeatedly, 143 million Americans' financial data to potential fraudsters. Do you have an opinion as a market analyst on what its impact may be for the broader economy when this happens?

Mr. TURNER. I do not have an exact opinion related to this case. I think when you look at cybersecurity, you need to look at a few factors. You know, it is not only the technology that actually is in place to protect against a breach, but also a culture around compliance. So I think if we did have some sort of nationwide standard around cybersecurity, we could prevent instances like this in the future.

Senator BROWN. So because this has been so front and center in the Nation's media and people are increasingly concerned and in some cases have a pretty good belief that they were breached, does this make consumers less likely to give their data to new fintech platforms? Will established banks and financial firms think twice before partnering with a fintech and sharing their consumer data? Take that out and its impact on the economy that way, answer that directly, and then in a broader way, its impact on the economy through those portals, if you will.

Mr. TURNER. Yeah, so I think that fintech companies in general are pretty advanced when it comes to cybersecurity. I think if you look at, as I mentioned, culture, the cultures are all really based around the technology. People are very aware of the risks. And in many cases, these companies actually just use an API to get information from a bank that has created this data trail in the past.

So I think maybe a more important question needs to be when we create data, whether it is financial transactions, whatever it may be, who owns that data? Is it the consumer that owns that data or is it the institution that created it? And should consumers have the ability to own their data and only display it when it is actually needed?

Senator BROWN. So what happens if banks decide that they just do not want to partner with a fintech and share this data? Understanding what you just said, but what happens then?

Mr. TURNER. Yeah, I think that has actually been an area of concern because there has been some back and forth between large banks and fintechs. And I think that depending on the platform

and the implementation, you know, if you look at a company that needs your bank account information in order to process payments or needs access to, you know, your bank account, those companies will not exist and that innovation will go away if there is not some sort of agreement on how to share data.

Senator BROWN. OK. Mr. Evans, under Section 1033 of Dodd-Frank, the CFPB is ordered to create rules granting consumers more control over their financial data. The law specifically, as I think you know, exempts sharing data about algorithms or other methods companies use to create risk scores or make other predictions about a consumer's financial performance. Should these algorithms be exempt?

Mr. EVANS. That is a tough question because, on the one hand, these algorithms might represent proprietary information that gives institutions their advantage in whatever space they are operating.

On the other hand, these algorithms and the use of nontraditional data could be important in determining whether or not a person gets credit or not, and we do not have a lot of information about the algorithms.

I think one of the critical issues, though, is that this aggregation of information fuels some of the novel fintech approaches. For example, it is based on the aggregation of accounts across an individual's life to give a holistic picture of what the financial situation is.

If knowledge of the algorithm has a chilling effect on that, that could be problematic for some models. So it is tough, Senator Brown. It could go both ways.

Senator BROWN. But it is pretty hard to argue, in light of the data breach, that consumers should not know exactly how their data is being used.

Mr. EVANS. Absolutely.

Senator BROWN. All right. Thank you.

Chairman CRAPO. Senator Perdue.

Senator PERDUE. Mr. Evans, this is off point, but would you agree the same thing applies to the CFPB?

Mr. EVANS. Could you clarify, Senator?

Senator PERDUE. That the data that the CFPB is collecting should meet the same standards of the data that we are talking about here?

I will withdraw the question. I have got a more relevant question.

Mr. EVANS. OK. Thank you.

Senator PERDUE. We will talk offline about that.

Mr. EVANS. OK.

Senator PERDUE. I am concerned about the fact that this area has no borders. Forty-seven percent of all global online transactions, retail transactions, are made in China, are from China, and 40 percent of all Chinese consumers are using new payment systems like we are talking about today. They are talking about WeChat, Ant Financial, and others. This is a very rapidly growing sector over there, and I am very concerned that we have our regulatory environment here, but we have a lot of transactions going on around the world that come and go across borders.

What recommendations, given the global impact—and I would like all three of you to comment on it. What do you recommend that we—what should we be doing here to get ahead of this?

Mr. EVANS. Excellent question, and I think it goes back to something Eric pointed out before and we have pointed out in this report, that our regulatory system in the United States is quite fragmented. It could stifle innovation to some degree. And so that should be job number one for Congress and regulators, to make sure we have the right regulatory framework given these novel approaches being taken across the financial landscape.

Senator PERDUE. Mr. Turner.

Mr. TURNER. Thank you, Senator, and I think I just want to clarify something here. When you look at China, you know, in some ways we actually are at a disadvantage because we are so advanced in our financial system. They are coming into a time where they did not have a lot of the infrastructure we have, so if you look at—you mentioned WeChat and payment systems like that. It is because there was not a robust card network presence or an ACH system like we have. So if you look at what we have in terms of peer-to-peer payment systems, global payment systems, those for the most part actually still, you know, as you would say, ride the rails. They still process through the same systems of the large card networks or ACH. I think that, you know, that is going back to regulation because these payment companies know that they are doing—they are complying with the way things need to be done. They are using systems that are in place. So, you know, I think as everybody has mentioned, if we want to push that innovation forward and you want to see us on par with, you know, the innovation in China or something like that, there just needs to be more clarity on where fintechs can go. So if that is a regulatory sandbox or some sort of specific regulatory framework, I am not sure, but it is going to be something like that.

Senator PERDUE. Dr. Pasquale.

Mr. PASQUALE. Yes, I think you are absolutely right, Senator, to point to China as a place where there is a great deal of innovation here. It is very cutting edge. I remember Connie Chung's piece for *a16z* on WeChat and describing just how many things you can do within the app. And I am sure that consumers would find it extremely convenient. And global cooperation among regulators could enable similar types of apps to arise in the U.S.

My only caution would be that I think looking at some of the literature on the Chinese social credit scoring system, which I cite in my written testimony, I do have concerns that the integration of information across so many sectors into one app could raise both concerns about competition and about privacy. So I think we should work with global regulators, but we should be cognizant of some of the risks.

Senator PERDUE. Mr. Turner, in the time remaining, talk to us about tokenization. Is this a way of the future relative to EMV chips and PIN efforts right now in terms of privatization and security of data?

Mr. TURNER. Yeah, I think we are seeing—you know, again, this is kind of an area where the U.S. is catching up on a lot of this. If you look at the U.K., the most popular form of payment is

contactless card payments. So, you know, we are just getting to the point where we are upgrading to EMV systems, and there is no doubt that those are more secure than what we had with magnetic strips.

I think that, you know, if we continue to see growth in payments being moved outside of the traditional network, so as we see cards go away, as we see cash go away, you know, tokenization will be how everything is processed, and that will either be with our mobile wallets, if we are doing some sort of contactless transaction in a store, or if we are sending payments person to person.

Senator PERDUE. Do you see this as a rising capability that makes some of—well, let us just say the terrorist network in terms of shadow banking and so forth. I mean, we have heard testimony here in other committees about that. Do you have any insights into that?

Mr. TURNER. Really, I think that as we continue to have growth in digital payments, a lot of people do not realize that is probably good for controlling things like AML, anti-money-laundering. I think that it creates an audit trail, and as we see things like blockchain technology start to take off, you know, those transactions are recorded in an immutable ledger. You cannot go back and change them. You can trace them, and you can actually do AML compliance in real time. So I think the way that we are moving in digital payments in the future is actually going to be a lot easier for companies to control these compliance costs.

Senator PERDUE. Thank you.

Thank you, Mr. Chairman.

Chairman CRAPO. Senator Reed.

Senator REED. Well, thank you very much, Mr. Chairman. And thank you, gentlemen, for your testimony.

Professor Pasquale, thank you for citing my proposed legislation along with Senator Warren and Senator Collins. It is a response really to all of what we are seeing in terms of the Equifax breaches and everything else. And the underlying principle is it is a disclosure bill. I think shareholders should be aware of what their investment—or their company is doing in terms of cybersecurity. And it leads to the question that I think a lot of people are asking now: Are companies at the proper level focusing proactively on avoiding major and costly cybersecurity attacks? So I will ask you, in your opinion, are most companies doing that now, or is it the exception?

Mr. PASQUALE. Thank you, Senator. I do think it is the exception. Based on the work of Kristin Johnson on managing cyber risks, I think she has done some very interesting analysis of how the problem is that when these types of cyber risks arise, there can be a huge leak of data, but the full consequences may not be known for years or even decades afterward. And the problem is, as your bill anticipates, how do you sort of front-load awareness of these problems and try to engage the board so that we are thinking about it not after the fact, not requiring disclosure after something bad has happened, but actually requiring something that happened beforehand.

So, yes, I do think that it is an area that needs much more attention from corporate boards.

Senator REED. Let me ask you, Mr. Turner, your experience too in terms of looking across the spectrum of both private and publicly held companies. Is suitable attention being paid to cybersecurity issues, in your view?

Mr. TURNER. I think if we are looking at the fintech sector in particular, as I mentioned before, cybersecurity is a big focus. But, you know, as you start to take a step back and look at the economy as a whole, especially just the financial system we have today, cybersecurity is definitely a big focus. But I think a lot of the problems lie in the fact that our banking system really is a product of decades' worth of consolidation. There are a lot of, you know, fractured technology systems, physical servers, and things where, you know, it is hard to comply and keep an eye on cybersecurity when you are really just trying to keep these old systems running on a day-to-day basis. And I think we see some of the more innovative institutions moving toward things like cloud storage and cloud computing. And as we start to get there, I think it will be easier for firms to take a good look at cybersecurity and put some good measures in place.

Senator REED. But it would seem appropriate to have the Securities and Exchange Commission lead that effort to try to get them to that position. That is fair?

Mr. TURNER. Yeah, again, I mean, you know, an actual cybersecurity law or regulatory framework is really up to Congress and the regulators. But I do think, you know, it is not only that but just a—you know, if you had some sort of national standardization even in what these terms mean, you know, if NIST or someone like that could come out as well, I think those are all good steps in the right direction.

Senator REED. You actually raised a very profound question, and the best parts of these hearings are not the answers but the questions that we have to think about, like who owns the data, which has to be done on an international basis, obviously, since it flows so freely across the globe. But that is an issue that we have to confront, I think, in Congress, at least for the United States. I think there are other questions like that. Are there data that should be off limits, you know, no one can have it or the person has to give an affirmative thumbs up or thumbs down? Should data be purged rapidly so that you do not accumulate this vast holding stretching back that is more transactional than archaeological, if that is a term? And I think there is a whole series of questions that you have raised which I find very, very helpful, so thank you very much.

Mr. Evans, thank you and your colleagues at GAO. Just a final point. I have just a few seconds. Your response to the perception of how well prepared or well versed most companies are with respect to cyber, is it—

Mr. EVANS. Yes, so my team did not look at that as part of this work.

Senator REED. Yes, sir.

Mr. EVANS. But it is something that we are considering, and we do have folks that have given great thought to cybersecurity and the innovative technologies that might lead to improvements in

this space. But, unfortunately, I have nothing to add to that question.

Senator REED. Thank you very much. Thank you, gentlemen.

Chairman CRAPO. Senator Cotton.

Senator COTTON. Thank you, gentleman, for your appearance and your testimony this morning on this important topic.

Estimates from a 2015 FDIC survey indicated that 7 percent of households in our country are unbanked; another 20 percent were underbanked, which means they have access to a bank but also used products outside the traditional banking sector. So that is over a quarter of our fellow citizens who do not have the kind of traditional banking relationships that the rest of Americans do.

Mister—is it “Pascal”?

Mr. PASQUALE. Pasquale. Thank you.

Senator COTTON. I apologize. “Pascal” is how we pronounce it in Arkansas.

[Laughter.]

Senator COTTON. Along with other innovative pronunciations of different words. Do you think that the growing fintech market has the potential to help these unbanked and underbanked Arkansans access the digital economy and achieve greater financial security? And if so, please elaborate on how exactly.

Mr. PASQUALE. You know, I do think that when we look around the world, we have seen fintech used as a tool of financial inclusion. For example, with M-Pesa in Kenya and some other areas around the world, you see an effort there. And I do think that that is—you know, there could be some inspiring opportunities in order to sort of create that sort of tier of opportunity.

But I think one of the very difficult questions for Senators and for the regulators now is: Do you want to create sort of a two-track system, sort of a system that, say, is maybe a higher tier, that has higher levels of protection and regulatory standards, and then a lower level? Or to what extent do we want to maintain sort of a more unitary set of protections?

So I do think that, yes, there are definitely global examples of inclusion, but I am also cautious about, you know, what we might be giving up in order to bring them to the U.S.

Senator COTTON. What, if anything, is inherent in fintech that would lead to that kind of two-tier system that we should have on our minds as we craft policy?

Mr. PASQUALE. I think that one of the things is that if you have, for example, fintech firms wanting to avoid, say, consolidated supervision or other sorts of requirements that go along with some of the benefits of, say, certain forms of regulation, that could be one aspect of the problem. But I think the other aspect is that I think sometimes fintech is confused because—the term itself leads to confusion because a lot of the technology ideally would be sort of an adjunct to existing banks that might be required to do what we want them to do in terms of serving the underbanked as opposed to itself providing those services.

Senator COTTON. OK. Mr. Evans, you look like you might have something to add on that point?

Mr. EVANS. Yes, so I was just thinking through some of what Dr. Pasquale was discussing. Certainly I think there are great possi-

bilities in this particular area, and of course, great risks that we detailed in the report. And it is almost too soon to know. We have not seen a full credit cycle. And we have seen, you know, earlier episodes where we have seen spikes in homeownership rates that were not sustainable. And so we want responsible, sustainable access to credit, and so those are some of the things we need to shake through when we think about marketplace lending.

Senator COTTON. Mr. Turner, would you like to round out these thoughts?

Mr. TURNER. Yeah, I think it is important to note when we are talking about, you know, the unbanked and the underbanked, and when we say fintech can promote inclusion, you know, there are really two parts to that. There is the idea just of access, you know, as we continue to see bank branches closing, it is harder for people to actually have that local bank that they can go to and get financial services. So if we have, you know, mobile applications where people can bank on their phone, I think that is access.

And then I think the second part of that is the inclusion that comes with, you know, expanded services that might use alternative data or something like that to make a decision on a loan that a FICO score might show a borrower is, you know, a risk, where if you include some additional data, you can get a better picture, and that person actually can get credit.

So I think there is a lot to consider, and I think that, you know, as we move forward and we look at regulation, it is important to remember and it is important to make sure that fintechs kind of have a framework where, you know, they need to decide are they going to be deposit-taking institutions and be like a real bank or are they going to continue as they are now and then need some sort of defined regulatory structure specific to fintechs.

Senator COTTON. Thank you.

Mr. Pasquale, I would like to look at fintech from another perspective now. We were looking at it from the customer's perspective, now from the perspective of jobs and investors. A CEO of a London-based company called "TransferWise" recently said that he was recruited by Silicon Valley venture capitalists, but he chose the U.K. because of their regulatory structure. That is disappointing from the standpoint of American jobs. What, if anything, can we do to prevent future companies from making that decision and seeing the United States is the best, most favorable climate in which to start their companies and create new jobs?

Mr. PASQUALE. You know, I do think that the problem of is the U.S. sort of falling behind sort of the awareness of other countries like the U.K., that is a key problem. I also would note, though, in terms of the work involved, I think that we do have such a great advantage in terms of some of our sources of strength in Silicon Valley and in New York in terms of the funding of institutions there of education and other areas that sort of led to a big advantage there.

So I guess my thought would be that I would not necessarily want to see the U.S. regulatory infrastructure be rapidly chipped away at to sort of keep up with this, with, say, what is going on other countries. But I do think that we should keep in mind that if there is a certain level of divergence, maybe that should lead to

some more international cooperation to lead to more convergence, as we were talking earlier with Senator Perdue with some of the Chinese apps.

Senator COTTON. Thank you.

Mr. Turner and Mr. Evans, I regret my time has expired. We would welcome your comments on that question for the record, though. Thank you.

Chairman CRAPO. Thank you.

Senator Cortez Masto.

Senator CORTEZ MASTO. Thank you, Mr. Chair, and thank you, gentlemen. This is an important discussion we are having, so I appreciate your comments today.

Mr. Pasquale, let me start with you because Chairman Crapo had asked you, all of you, what the risks are, and one of the things that you talked about was the opaque algorithms to assess credit, and that was one of my questions. Can you elaborate on that a little bit, please?

Mr. PASQUALE. Sure. So one of the big problems in the U.S. credit industry is that there are lots of people who either have no file or a thin file, and so they are very hard for a bank to extend credit to because it sees them not having adequate—we do not have adequate background information on them. And so the answer from a lot of fintech firms is to say, “Well, why don’t we look at other sources of data?” And there was a think tank called “UpTurn” that divided these into traditional, alternative, and fringe sources of data. So alternative data could be like your utility bill or rent bill, how often you pay your rent, et cetera. That seems pretty legitimate to me. But some of the fringe data could be things like how do you fill out a form online. Did you look at it for too long?

In the others, reports of lenders saying if they see political activity on someone’s Twitter account, they say, “Oh, wow, well, maybe we should not lend to them. Maybe they are getting mixed up in things that we do not want to be involved in.” And sometimes even the content of someone’s smartphone, like the deal might be offered, just let us download everything on your smartphone and maybe we will give you a loan.

And I think that these sort of business models could lead to what I call “big data proxies.” So the problem is that the companies involved may not necessarily be looking to intentionally discriminate against individuals, but as we know from ACOA, that is not the touchstone of liability there. The really key issue is: Could you use that sort of data like locational, other aspects of data to discriminate against people?

And a final version of this could be that, for example, you might have very sophisticated algorithms that could from someone’s face, say, tell their age or tell different medical conditions from them. This sort of face recognition software is already being used, say, to infer criminality from faces. And so the level of advances in AI means that there are so many different data sources, and the opacity of these is really a challenge to fair lending.

Senator CORTEZ MASTO. Thank you. And I know you have written extensively on data brokers, and I think that is important. I think it is important for all of us to understand there is so much data out there and the concern when it comes to credit or how we

determine somebody's creditworthiness, if we are going to take all of that data into consideration, might at times create some sort of bias unintentionally because of the data we are collecting. Is that what you are saying?

Mr. PASQUALE. Absolutely, and I think Federal Trade Commissioner Edith Ramirez was a real intellectual leader here in terms of pointing this out as an issue, getting the FTC to write some good reports on it, and the White House big data report from last year.

Senator CORTEZ MASTO. OK. Thank you.

Mr. Turner—and this is for Mr. Pasquale as well—how should policymakers think about balancing both the innovation provided by fintech companies and also ensuring that the same rules of the road that apply to traditional lenders also apply in this space?

Mr. TURNER. Yeah, I think that is actually a very important question right now, and I think, you know, things like the OCC charter are a step in the right direction. If you look at these lenders and, you know, if their primary business is lending, they should be treated like other lenders. And right now, you know, there are about three different ways that digital lenders operate. You know, they are either partnering with the federally regulated bank, they are going State by State and getting licensed, or they are doing, you know, kind of a mix of both. So I think that if you want to talk about a fair and level playing field, you know, while continuing to promote innovation, it needs to be something where both the incumbent financial institutions and the lenders feel like they are getting a fair deal. And I think, you know, something that has been mentioned before that is important is as we start to have some sort of regulatory framework for these digital lenders, you know, it is important to make sure that you do not have a very high interest rate lender just setting up a website and calling themselves a digital lender. I think it is important that you probably define what those lenders actually are first.

Senator CORTEZ MASTO. And then can you also address—and I will open it up to Mr. Pasquale as well—State preemption. Obviously, the crisis that we just came through—and I was working in the State of Nevada as Attorney General—the Federal regulators I think failed us to some extent. And so I am always concerned about some sort of State preemption in this space. And along with that—let me put my law enforcement hat on—fraud and money laundering when it comes to fintech companies and FinCEN and how that interaction should be involved with this process as well. So let me just throw that outcome there.

Mr. PASQUALE. I completely agree with your concerns about preemption, and in my written testimony, I have talked a bit about some of the critiques of the potential for OCC to preempt some of the relevant State laws, including usury laws, because there are already some worries in exactly that area. And we saw even the Supreme Court reconsidering its embrace of preemption in *Watters v. Wachovia* in the later case *Cuomo*. And I think that that sort of signal from the Supreme Court should be a signal to regulators and to Congress in terms of exactly the type of concerns that you are raising.

Senator CORTEZ MASTO. OK. Thank you. I notice my time is up. Thank you, gentleman. I appreciate the comments.

Chairman CRAPO. Thank you.

Senator TILLIS.

Senator TILLIS. Thank you, Mr. Chair. Gentlemen, thank you for being here.

I want to go back. I have got a couple of things I hope I have time to ask about, but, Mr. Evans, I think you mentioned in response to the Chair's questions about the sandboxes some of the other countries are experimenting with that, you know, you want to be in an environment where you can move fast and break things, but maybe do it with the right rails in place.

Number one, you said that you are going to do a report that is due out in the winter of next year.

Mr. EVANS. That is right.

Senator TILLIS. That is about a dog year in technical terms. So one question I have is: What can we do now to potentially look at this with the right kind of safeguards and not wait 2 or 3 years where a lot of things will be different, as they were 2 or 3 years ago?

Mr. EVANS. Very good question. I think you are going to see some competing interests on both sides of the issue when you think about what the appropriate regulatory approach is in the U.S. and what we can actually glean from other economies.

Senator TILLIS. And do you think the current regs make it difficult for a large traditional bank to even really get into this mode of where they could move fast and break things? Or are they at a decided disadvantage until we have some sort of rationalization?

Mr. EVANS. Yes, and I do not think that that is the appropriate model in the financial services space because we are not talking about apps. We are talking about access to credit. And so the more appropriate model is maybe move fast, be careful, think through what the landscape looks like.

Senator TILLIS. Yeah, and I meant it actually in a more positive light, I think, in innovation. What you are trying to do is innovate, particularly for our U.S.-based entities and innovators to be globally competitive. So I am trying to find a sweet spot where you do that but it does not become disruptive.

Mr. EVANS. Right.

Senator TILLIS. I hope that if—the report takes as long as a report takes, but I hope that we have other information that is instructive to Congress so that, to the extent that regulatory or legislative action is required, we are able to move more quickly than a dog year in technology.

Mr. EVANS. Yes, sir, and this will be early—

Senator TILLIS. Early winter?

Mr. EVANS. Early 2018.

Senator TILLIS. Oh, OK. Good. There are two winters in 2018, so you are talking about the early part.

Mr. EVANS. That is right.

Senator TILLIS. Good. One question I have is whether or not we have got a bubble with respect to cryptocurrencies, and, you know, you have got a thousand different cryptocurrencies out there. Can you talk a little bit about the need for regulation and watching how the industry is moving? We will start with you, Mr. Pasquale, and just go down the line.

Mr. PASQUALE. Yes, Senator Tillis, I think that is a really powerful concern right now. I have seen stories, for example, of people trying to puff a certain cryptocurrency by saying, "I am a taxi driver. I took my money out of the bank. I put it into the cryptocurrency and now I am rich." And I think that when you look particularly at the diversity of the initial coin offerings and how they are proliferating, even boosters of the cryptocurrency industry like CoinDesk have published articles saying here are massive governance deficits with respect to how these ICOs work and how some of the cryptocurrencies work.

So I do hope that—I think that our regulators are trying to catch up with it, but I think it is going to take a lot more coordinated, concentrated effort to do so.

Senator TILLIS. I have got limited time. If you want to briefly comment.

Mr. TURNER. So I think that when you look at cryptocurrencies, you need to realize, you know, the entire market is only a little more than \$100 billion, and this is globally. So, you know, you cannot really call a bubble or anything like that, but it is not that much compared to other asset classes. I think that as Dr. Pasquale mentioned, you know, there needs to be some sort of regulation around initial coin offerings or token offerings, and whether that involves, you know, offering them only to accredited investors or setting up some sort of governance agency or having a current regulator look at them, I do not know. But there definitely needs to be something.

Senator TILLIS. I am sorry, Mr. Evans. I want to get to a final question, and it relates to some of your opening comments, Mr. Pasquale, or maybe I inferred incorrectly from it. But with respect to the algorithms that are being used by some of the players and the concern with maybe the risk of predatory lending practices, is there any information out there that would suggest that the rates on the whole that are being charged by people that are in the fintech space or there are substantial outliers based on the underlying risk using maybe factors that have not traditionally been used in the underwriting model? In other words, is there a real clear base of evidence that suggests that they are engaged in any kind of unfair lending practices? I infer that maybe you thought there was or there was a potential for it, so I was curious. That will be my final question.

Mr. PASQUALE. I would put it more on the potential side right now, Senator. I think that the issue in terms of—I briefly cited this 2016 Federal credit survey—or a credit survey by the Fed of some small businesses, and there was also an interesting story cited in my written testimony by David Lazarus about certain people had used the fintech platform and then later found out that the Small Business Administration had suggested—or someone from the SBA had suggested that if they have used certain lenders vetted by the SBA, they could have gotten a much better deal. But I would say that it is very—we are still in early days.

Senator TILLIS. More of a risk than a measured reality.

Mr. Evans, and then I will finish.

Mr. EVANS. Certainly if you look at some of the enforcement actions—and there have only been a few—there was one case where

the entity was a bit more aspirational than they should have been, and they promised benefits that did not actually pan out, and they were cited by the CFPB. But in terms of widespread evidence, I will say no, and in some cases you do see lower rates relative to some other higher-cost alternatives like payday lending.

Senator TILLIS. Thank you.

Chairman CRAPO. Senator Warren.

Senator WARREN. Thank you, Mr. Chairman.

So we are here talking about innovative new financial services companies, and in that context, I want to ask some questions about the data on the cost of financial advice.

Dr. Evans, you are the Director of the Financial Markets Group at the Government Accountability Office and an expert on all things financial markets, and you look at a whole lot of the data in this area. Is it your sense that it is now harder or easier for middle-income savers to access investment advice?

Mr. EVANS. So I would say easier, and that is a qualitative assessment and is based on consensus, because if you look at traditional wealth management, it takes \$250,000 to get in the game; whereas, the digital wealth platforms require no minimum or a small amount, say \$500. And some of these are automated platforms that do things like automatically rebalance the portfolio, which means lower fees. Examples of these include Betterment and Wealthfront.

Senator WARREN. Good, so getting easier. And, Mr. Turner, you are a research analyst at S&P Global Market Intelligence. You are also an expert on all things financial markets. In your expert opinion, is financial advice getting more expensive or less expensive for investors?

Mr. TURNER. Thanks, Senator. I think just echoing those—you know, as you continue to see the growth in digital advisors, you know, with much lower fees, consensus seems to be that advice is getting less expensive.

Senator WARREN. So here you are; you are both independent experts. I appreciate your opinions. They reflect the data. They reflect the facts as best we know them. But the National Chamber of Commerce apparently disagrees with you, and they think they have bought some facts to back them up.

Last week, they hosted a meeting to complain about a new Department of Labor rule that prevents Americans who are saving for retirement from being cheated by their investment advisors. It is called the fiduciary rule. I know you are all familiar with it. And it requires investment advisors to offer advice that is good for the customers, not advice that makes more money for the investment advisor.

Now, the Chamber was hyping a new study which they had bought and paid for claiming to show that the new rule made financial services more expensive for families.

Now, my first guess when I saw this is that they were pushing around this so-called study because under the new fiduciary rule, financial advisors are hurting for profits.

So, Mr. Turner, this is your area of expertise. With the new fiduciary rule in place, are investments shrinking and are financial advisors hurting for profits?

Mr. TURNER. Yes, so that is an interesting question. I think if you actually look in what I submitted for my written testimony, we predict by 2021 there will be \$450 billion in digital advisors. That is a fourfold increase from where it was at the end of last year, and a lot of that growth is actually being driven by incumbent investment advisors who are looking toward these new technologies. So no longer is it the startups, but it is actually the larger firms that are offering these products.

Senator WARREN. So this is really interesting. So startups are doing well. That is part of what we are learning here. And the CEOs for the large financial firms like UBS and Charles Schwab actually have now told their shareholders in earnings calls that their profits are great and going up with the fiduciary rule in place. So the new rule is obviously lowering prices for consumers. It is shutting down cheating. It is letting investors access new markets. It is great for new financial startups like Betterment. It is good for big guys like UBS. And yet the Chamber of Commerce is running around like a chicken with its head cutoff trying to kill the rule.

I get it. There are some investment advisors who built their profit models on kickbacks and on tricking their customers. But the fiduciary rule is good for consumers. It is good for markets. It is good for competition. It is good for startups. And it is even good for some of the biggest investment companies.

Even so, the lobbyists and the trade associations like the National Chamber of Commerce are sucking down billions of dollars every year in this town, and those dollars do not keep flowing unless there is a fight somewhere. So the lobbyists and the trade associations keep right on fighting, whether it makes any sense or not.

If I ran one of these companies, I would take a long, hard look at all of the shareholder money that is wasted on trade associations and membership in the National Chamber of Commerce. I think they are being taken for a ride.

Chairman CRAPO. Senator Van Hollen.

Senator VAN HOLLEN. Thank you, Mr. Chairman, and I thank all of you for your testimony.

Mr. Pasquale, we are very proud to have you at the University of Maryland, and let me start with a question for you, because in your written testimony you have a section entitled “The Problems of Extant Data Collectors are a Reason for More Scrutiny of Fintech, Not Less”, and you talk about different kinds of problems with a lot of the data that is being collected, accuracy, relevancy, and some other provisions.

I just want to focus on accuracy for a moment because in this fintech world—and then I am going to ask you about the existing rule that is already more regulated. It seems that the burden is always on the consumer from inaccurate data, and the question is if a consumer is being harmed because of inaccurate information about them, why should they be paying the penalty? Why not the provider of bad information?

So let me ask you, first, in the fintech world, is it still the Wild West? Do we need to have some provisions that say that those people who provide bad information that causes harm to consumers

should have to pay some penalty rather than the burden on the consumer?

Mr. PASQUALE. I think that is an excellent proposal, and it really would rebalance things, because one of the things that I think is so tragic about the Equifax data breach or several data breaches is the amount of lost time, I mean people having to spend time haggling over the phone just trying to reestablish the basics of their identity to protect it from being exploited. And I think trying to rebalance the playing field—I mean, I know in Europe they have talked about a data levy, because the idea is that data—you know, we have often heard data is the new oil. But we also know that oil has some wonderful sides and has some terrible sides. And we try to deal with the environment consequences of oil.

I think very similarly, when we have these large quantities of data that can create such harms once they are released, we need to sort of be storing up some level of reserve for regulatory efforts that would put the burden and the cost on the person that causes the accident, not the victims of it.

Senator VAN HOLLEN. All right. So let me follow up with Equifax, because most of the focus understandably right now is on breach of privacy, everyone's very personal information being exposed to the public and people who may want to do bad things with it. But you raised the issue that I hear constantly from our consumers, even before the data breach, which is that they get a question on—you know, they are denied a loan or their bank tells them there is a problem or whatever it may be. You mentioned an Arkansas woman in here who was denied a job.

So even under those more regulated systems like Equifax, you have these problems today where consumers are stuck with the costs of bad information. Do you have any suggestions about how we can deal with that? Because if we can get it right with Equifax and the already more regulated entities, those sort of models could also be applied to fintech. I do not want to suppress the benefits of fintech. I just want to make sure it is not the consumers who are paying the costs for inaccurate information about them.

Mr. PASQUALE. Right, and I think one idea that I have explored in past work is requiring certain push notifications to consumers if they are put in a certain suspect category. And some of those suspect categories could be, for example, as I discuss in the written testimony, lists of people with certain illnesses. There are lists of people with diabetes, with AIDS, HIV-positive, mentally ill, et cetera. If you are on one of these lists, perhaps you should have to get a push notification so you could dispute it or at least you could understand what was happening. And also, I think there should be further regulatory effort on the use of the data, so not only putting the burden on the consumer but also restricting certain usages of data that may have, say, illicit provenance or have not sufficiently been vetted by, say, outside auditors or others.

So I think that those would be two options, you know, both a consumer-facing option and an option of restrictions on use without proper vetting and auditing.

Senator VAN HOLLEN. All right. I look forward to working with you on it. There are two issues. One is the relevancy of the data, right? I mean, is a health condition relevant to whether you get a

loan or something? The other is the accuracy. And they are both important, but it does drive me crazy when something that is just dead wrong gets on a credit report and the credit rating agency, whoever it may be, does not pay any penalty other than the fact that after months and months of work, they may say, “Oh, yeah, we were wrong,” even though it has created incredible economic and other kind of pain to consumers. So I look forward to working with you on that.

Just a quick question you can answer for the record, if you want. With respect to bank loans, for example, we have FDIC protection. We have got this great new area in fintech where people have, you know, a lot of their—you know, not a lot of wealth but they have money stored in these areas that are not really insured.

For the record, Mr. Chairman, any thoughts any of you have about how we deal with that issue? If I have money in my bank account and it is lost, I have the FDIC. What is the recourse for a consumer who uses fintech and their money is lost? So I would appreciate any answers you have for the record since it looks like my time is out.

Chairman CRAPO. Senator Schatz.

Senator SCHATZ. Thank you, Mr. Chairman. Thank you to the witnesses for this important hearing.

This is a question for all the witnesses. We hope that financial innovation breaks down barriers and increases financial inclusion and ultimately does good, but sort of pursuant to Senator Tillis’ line of questions and what the panel has been talking about, the risks are real. There are security issues. As we saw with Equifax, our most sensitive personal information can be vulnerable, and there is the risk of creating a platform for predatory actors entrenching social and racial biases. And so innovation is disruptive, but it can be disruptive in positive and negative ways.

I think we have an opportunity here. We can choose to lift up innovation that creates economic opportunity. We can make consumer protection a core value of what we do in fintech. When someone asks for regulatory flexibility, we can ask how is this innovation going to actually help people.

As a starting point, I think it would be helpful to have a dedicated Innovation Office that is thinking comprehensively about these questions. This could be a one-stop shop in the Government for fintech businesses to figure out which regulations apply to them and a mechanism for coordinating among the regulators. It will be a Wild West without some attempt to coordinate.

You already have regulators with varying degrees of aggressiveness in this space and enthusiasm for this space. But we need someone who is thinking around a few corners rather than just sort of narrow questions of compliance for particular companies.

I would like to get each one of the panelists’ views on the potential for an Innovation Office and a one-stop shop, starting with Mr. Evans.

Mr. EVANS. I will just quickly say that it is something that should strongly be considered. It is envisioned in the bill that is before the House. The regulators have talked about these type of initiatives, and it is worth full consideration.

Mr. TURNER. I think it is a great idea. I think as we start to look at potential regulation for the industry, having some sort of Innovation Office, having some sort of sandbox program in place could help fintechs and regulators really figure out, you know, what they are working toward. And I think if you look at large banks today, they all have Innovation Offices.

Mr. PASQUALE. Yes, and I would agree. I think that the problem of interagency cooperation is a really profound one, and the Dodd-Frank Act took certain steps in that direction with respect to the Financial Stability Oversight Council. And we see also in terms of data sharing and the governance of data sharing and the intelligence apparatus there are some efforts to sort of understand exactly what is going on in the overall ecosystem. And I think you are absolutely right that that is going to be the big agenda item, I think, over the next decade, is how you can get these agencies to cooperate around something like an Office of Innovation.

Senator SCHATZ. Let me just ask another question not on my prepared list of questions. You know, the challenge, I think, with this Committee, at least to a certain extent, is that the public's eyes glaze over, even though all of these issues impact them directly. It is hard to describe why this panel and this topic matters to folks that we all represent, and yet it does.

So could you just describe as concisely as you can, each one of you, the best opportunity when it comes to fintech and sort of the worst of a parade of horrors when it comes to fintech?

Mr. EVANS. So I think that the best opportunity, of course, is enhanced and sustained financial inclusion. The horror story is fintech companies being used as a platform to market high-cost loans to individuals that further undermine access to credit.

Senator SCHATZ. Mr. Turner.

Mr. TURNER. I pretty much echo that. I think fintech really offers access. It offers ease of use. It offers reduced frictions. It offers reduced costs. And the only downside I could see in the future is bad actors parading as fintechs and trying to get fit into regulation that might be formed.

Senator SCHATZ. Just as a quick follow-up, do we have a statutory framework that prevents those bad actors? Or are we just hoping they will not take advantage of this new aperture?

Mr. TURNER. I think if there is to be any sort of fintech-specific regulation, you will need to define what a digital lender is, what a peer-to-peer payment company is. It needs to be—you know, this is probably step one in doing that.

Senator SCHATZ. And this becomes hard because banks are going to be in this space already.

Mr. TURNER. I think it could be difficult, but I think it is definitely necessary.

Senator SCHATZ. OK. Mr. Pasquale.

Mr. PASQUALE. Yes, I think, you know, on the bright side, I do think when I look—I listen to a lot of podcasts on fintech, like the Wharton Fintech or Fintech Insider, and you often hear on these podcasts very interesting entrepreneurs who are bringing to people, say, the opportunity to buy insurance for an hour if they want to borrow their friend's car or something. And those sorts of things, like insurer tech, those sorts of things, are really, I think, filling

a gap for consumers and might ultimately, if the market is structured correctly, lead to much better competition for financial services if options are transparent and understandable.

For the downside, I would just reference there is a British science fiction series called “Black Mirror”, and it has a terrific episode where someone finds that their score—they keep having negative social interactions, and their score, which also acts as a credit score, keeps going down and ruins their life.

Senator SCHATZ. For the record, can I find that on Netflix or—
Mr. PASQUALE. Yes.

[Laughter.]

Chairman CRAPO. Senator Warner.

Senator WARNER. Thank you, Mr. Chairman. I will tell you, Dr. Pasquale, I listen to a lot of podcasts as well. I am not sure Wharton Insider has been on my list recently. But let me compliment my friend Senator Schatz. I think the idea of this Innovation Office, this kind of one-stop shop makes an enormous amount of sense. I would love to help you on the—I do not—to try to accomplish that since we think about FSOC and other efforts. This notion of having some single point of reference in this area is a great idea. How we implement it is going to be a real challenge because I think, as Mr. Turner talked about a little bit, my old business used to be mobile telephony. I mean, mobile payments are a part of the fintech world. This is going to continue to grow in a number of ways, but I think it is a great idea.

I want to come back to—I am going to try to get in two items. One, on the whole question of what Senator Reed raised in terms of trying to elevate this whole question around data protection at a higher level, I would simply point out I think we have got like 9,000 public companies. Even Yahoo, when it had its massive data breach, did not really view that as a material fact in terms of how do you not have a billion users hacked into and that not be material. Now, we whacked Yahoo, but the fact is I think less than 100 companies in the last decade have ever reported on a data breach in an SEC filing. So some of the things that Senator Reed has suggested are very important.

Another piece I think is very important is—and this is not one that is a partisan issue. We have been working for 3½ years trying to get a common standard around data breach. We have got 49 different State laws now on data breach. So the fact that Equifax took 6 weeks before they notified consumers was a reflection of the fact that we do not have a single standard around data breach. And the problem has not been actually lack of need for a standard. It has been individual industries, and in many cases my old industry, telecom wanted to try to exempt themselves from the requirements of notification.

I know this is a little bit off topic, but because Equifax is kind of in the news and as we think about fintech being a brave new world, do you guys have a sense about the need—and I know, Dr. Pasquale, you had some concerns about Federal preemption. But in the case of the data breach, I strongly believe that we need a single national standard here. Do you have a view on any of that?

Mr. PASQUALE. I guess I would say that there are certainly—it is a very tough question because I do think that I want to preserve

the ability of certain States to be on the cutting edge in terms of expansive requirements, and I think that, you know, California to some extent has had a very forward-thinking privacy office there in the Office of the Attorney General. But I also do see your point that it could become very costly for companies to comply with all the different standards, try to understand them all.

And I think that, you know, I would have to study it further to know whether the benefit of uniformity—

Senator WARNER. I would love to get some—because we are very close. The challenge has not been trying to get a standard or the standard has to evolve. It also has notification requirements. But I think the challenge in a lot of data breaches is everybody blames somebody else. You know, is it the institution? Is it the financial institution? Is it the telecom companies? Is it some other player? And we end up now having these circumstances where, again, in the Equifax case we wait 6 weeks before the public is notified.

Mr. Turner and Mr. Evans, quickly, because I have got one other area I want to raise.

Mr. TURNER. Yeah, I just want to point out that I think, as you mentioned, just a national standard is probably step one. So I do not know if it is going to be specific Federal regulation or harmonized State regulation. But if everybody is on the same page, you know, at least it can start down that path.

Senator WARNER. Mr. Evans.

Mr. EVANS. And I would just echo those sentiments. What you want is consistent treatment.

Senator WARNER. One area that I have been intrigued with—and, again, there is a little poor guy who had all these other great, very specific fintech questions who is going to be upset I am not asking them, but this is another area. I think there is a real opportunity in fintech. One of the things I have looked at over the last 2 years is the transformation in the nature of work and the transformation in the notion of employment. You know, back in the 1990s, about 90 percent of Americans worked full-time in a W-2 type environment, yet we are the only industrial country in the world that makes all of our social insurance dependent upon your labor status. So that social contract that said if you work full-time, you get unemployment, health care, workmen's comp, disability, retirement, that world is changing. A third of the workforce right now is not in traditional work. They are in contingent work. You know, they are part-time, they are temp workers, they are 1099 independent contractors, the kind of sexy areas, the gig workers. All of that workforce, a third of the American workforce—the estimates are it is going to go to half—have no social insurance at all.

One of the things we have looked at is the notion of portable benefits, and I think fintech offers an enormous opportunity, as long as it is properly regulated, to have the ability to have that portable benefit system that would allow you to move from firm to firm and carry those benefits with you.

Any quick comments on that, right down the path, recognizing I am already out of time?

Mr. EVANS. I will pass.

Mr. TURNER. I think technology will be a great enabler of anything that does happen in that area.

Mr. PASQUALE. And I would agree with you. I follow some of the work on platform cooperativism, which are a lot of groups that are trying to create fairer forums of platform—

Senator WARNER. Stride Health and others, et cetera.

Mr. PASQUALE. Yeah, and I think that the portable benefits via some of these fintech firms could help them—could help individuals to get out of job lock, which I think is really a big drain on entrepreneurialism.

Senator WARNER. I would only say, Mr. Chairman—I know my time is up—that, you know, I do not think we are going to be able to force an economy back into a 20th century model where everybody works for the same company for 38 years the way my Dad did. But we are going to have to recognize that we need a social insurance platform or new social contract that meets the workforce where they are at and, again, as Dr. Pasquale said, allows people to move from job to job, and part of that means portability of benefits. So I think fintech offers a great opportunity here.

Thank you, Mr. Chairman.

Chairman CRAPO. Thank you, Senator Warner. And that concludes our questions. We have finished the hearing with 2 minutes to spare, so I thank our witnesses for being concise in your testimony and also for your testimony. You will probably get additional questions from Senators, and the Senators should note that they have until Tuesday, September 19th, to submit questions. I urge our witnesses to respond to those questions, if you receive them, as quickly as you can.

This is a very critical issue, and your testimony has been very helpful to us. We will probably look forward to working with you in the future to get further help from you.

With that, the hearing is adjourned.

[Whereupon, at 11:28 a.m., the hearing was adjourned.]

[Prepared statements, responses to written questions, and additional material supplied for the record follow:]

PREPARED STATEMENT OF LAWRENCE L. EVANS
DIRECTOR, FINANCIAL MARKETS AND COMMUNITY INVESTMENT, GOVERNMENT
ACCOUNTABILITY OFFICE
SEPTEMBER 12, 2017



United States Government Accountability Office

Testimony
Before the Committee on Banking,
Housing, and Urban Affairs, Senate

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**FINANCIAL
TECHNOLOGY**

**Information on Subsectors
and Regulatory Oversight**

Statement of Lawrence L. Evans, Director,
Financial Markets and Community Investment

Chairman Crapo, Ranking Member Brown, and Members of the Committee

Thank you for the opportunity to be here today to discuss the financial technology (fintech) landscape. Advances in technology and the widespread use of the Internet and mobile communication devices have helped fuel the growth in fintech products and services. Consumer access to these new technologies has resulted in changes in their preferences and expectations regarding how they conduct financial transactions, such as using their smartphones to make payments or purchases. Fintech products and services include small business financing, education refinancing, mobile wallets, virtual currencies, and platforms to connect investors and start-ups.

My remarks are based on our April 2017 report on the fintech industry.¹ Specifically, in our report we provided information on four commonly referenced subsectors of the fintech industry, including what it is and how it works; potential benefits and risks; industry trends; and regulation and oversight. The four commonly referenced subsectors of fintech described in the report were marketplace lending; mobile payments; digital wealth management; and distributed ledger technology.

For our April 2017 report, we conducted background research and a literature search of publications from various sources including regulators, industry groups, and other knowledgeable parties. We also reviewed prior GAO reports on person-to-person lending, virtual currencies, and financial regulation.² We conducted interviews with agencies, industry groups, and other knowledgeable parties to identify information for each subsector and to obtain information on fintech oversight and regulation at the federal and state levels. We reviewed guidance, final rulemakings, initiatives, and enforcement actions from agencies. We also attended and summarized fintech-related forums held by federal agencies and others.

¹GAO, *Financial Technology: Information on Subsectors and Regulatory Oversight*, GAO-17-361 (Washington, D.C.: April 19, 2017).

²See GAO, *Person-to-Person Lending: New Regulatory Challenges Could Emerge as the Industry Grows*, GAO-11-613 (Washington, D.C.: July 7, 2011); and *Virtual Currencies: Emerging Regulatory, Law Enforcement, and Consumer Protection Challenges*, GAO-14-496 (Washington, D.C.: May 29, 2014); GAO, *Financial Regulation: Complex and Fragmented Structure Could be Streamlined to Improve Effectiveness*, GAO-16-175 (Washington, D.C.: Feb. 25, 2016).

Commonly
Referenced Fintech
Subsectors are
Marketplace Lending,
Mobile Payments,
Digital Wealth
Management, and
Distributed Ledger
Technology

Marketplace lending. Marketplace lenders connect consumers and small businesses seeking online and timelier access to credit with individuals and institutions seeking profitable lending opportunities. In addition to traditional credit data, such as credit scores or debt repayment history, marketplace lenders may also use less traditional (alternative) data, such as monthly cash flow or online customer reviews, and credit algorithms to underwrite consumer loans, small business loans, lines of credit, and other loan products. Although a number of marketplace lending models exist, publications we reviewed highlighted two common models: direct lenders and platform lenders.³ Direct lenders, also known as balance sheet lenders, use capital obtained from outside sources to fund loans and often hold loans on their balance sheet. Platform lenders partner with depository institutions to originate loans that are then purchased by the lender or by an investor through the platform.

Mobile payments. Mobile payments allow consumers to use their smartphones or other mobile devices to make purchases and transfer money instead of relying on the physical use of cash, checks, or credit and debit cards. There are different ways to make mobile payments, including the use of a mobile wallet. Using a mobile wallet, consumers can store payment card information and other information on their mobile devices that is often needed to complete a payment for later use.⁴ Consumers may use mobile wallets to make payments to other consumers, referred to as person-to-person payments, or to businesses, referred to as person-to-business payments, either in mobile applications, through mobile browsers, or in person at a store's point-of-sale terminal. In addition, some mobile payment providers allow individuals to create accounts to receive and make payments.

Digital wealth management. Digital wealth management platforms, including robo-advisors, use algorithms based on consumers' data and risk preferences to provide digital services, including investment and

³Congressional Research Service, *Marketplace Lending: Fintech in Consumer and Small-Business Lending*, September 6, 2016; Department of the Treasury, *Opportunities and Challenges in Online Marketplace Lending*, May 10, 2016; Alan McQuinn, Weining Guo, and Daniel Castro, *Policy Principles for Fintech*, Information Technology & Innovation Foundation, October 2016; S&P Global Market Intelligence, *An Introduction to Fintech: Key Sectors and Trends*, October 2016; and S&P Global Market Intelligence, *2016 U.S. Digital Lending Landscape* (Charlottesville, Va.: December 2016).

⁴In a mobile wallet, consumers can enter payment information from debit and credit cards, gift cards, and prepaid cards. Consumers can also store other information often needed to complete a payment, such as shipping address, e-mail, and phone number.

financial advice, directly to consumers. Digital wealth management platforms provide services including portfolio selection, asset allocation, account aggregation, and online risk assessments.⁵ Digital wealth management firms incorporate technologies into their portfolio management platforms primarily through the use of algorithms designed to optimize wealth management services. Fully automated platforms have features that let investors manage their portfolios without direct human interaction. Digital wealth management platforms typically collect information on a customer using online questionnaires, help customers select a risk profile, and suggest investment strategies. Adviser-assisted digital wealth management platforms combine a digital client portal and investment automation with a virtual financial adviser typically conducting simple financial planning and periodic reviews over the phone.

Distributed ledger technology. Distributed ledger technology was introduced to facilitate the recording and transferring of virtual currencies, specifically using a type of distributed ledger technology, known as blockchain.⁶ Distributed ledger technology has the potential to be a secure way of conducting transfers of digital assets in a near real-time basis potentially without the need for an intermediary.⁷ Distributed ledger technology involves a distributed database maintained over a network of computers connected on a peer-to-peer basis, such that network participants can share and retain identical, cryptographically secured

⁵BlackRock, *Digital Investment Advice: Robo Advisors Come of Age*, September 2016, <https://www.blackrock.com/corporate/ellen-ad/literature/whitepaper/viewpoint-digital-investment-advice-september-2016.pdf>, Financial Industry Regulatory Authority, *Report on Digital Investment Advice*, March 2016, <http://www.finra.org/sites/default/files/digital-investment-advice-report.pdf>; Gauthier Vincent, Rohit Gera, Deloitte, *Digital Disruption in Wealth Management Why Established Firms Should Pay Attention To Emerging Digital Business Models For Retail Investors*, 2014.

⁶See GAO, *Virtual Currencies: Emerging Regulatory, Law Enforcement, and Consumer Protection Challenges*, GAO-14-496 (Washington, D.C.: May 29, 2014).

⁷An intermediary can include financial institutions (such as banks, broker/dealers, and other institutions that interact with the end-users of a financial transaction) and infrastructures (such as payment, clearing, and settlement systems for funds, securities, and derivatives). See David Mills, Kathy Wang, Brendan Malone, Anjana Ravi, Jeff Marquardt, Clinton Chen, Anton Badev, Timothy Brezinski, Linda Fahy, Kimberley Liao, Vanessa Kargenian, Max Ellithorpe, Wendy Ng, and Maria Baird (2016), "Distributed ledger technology in payments, clearing, and settlement," Finance and Economics Discussion Series 2016-095, Washington: Board of Governors of the Federal Reserve System, <https://doi.org/10.17016/FEDS.2016.095>; Board of Governors of the Federal Reserve System, *Consumer Compliance Outlook, Fintech Special Edition*, 3rd ed. (Philadelphia, Pa.: 2016).

records in a decentralized manner.⁸ A network can consist of individuals, businesses, or financial entities. An important feature of distributed ledger technology is that transactions added to a ledger are validated by network participants through a process referred to as a consensus mechanism.⁹ Consensus mechanisms incorporate security features such as cryptography and digital signatures. Stakeholders have identified potential uses for distributed ledger technology in the financial service industry through the clearing and settlement of financial transactions, including international money transfers, private trades in the equity market, and insurance claims processing and management.¹⁰

⁸Financial Industry Regulatory Authority, *Distributed Ledger Technology: Implications of Blockchain for the Securities Industry*, January 2017.

⁹A consensus mechanism is the way in which a majority or all network members agree on the value of a proposed transaction, which is then updated to the ledger. There are different mechanisms that can build consensus using algorithms.

¹⁰David Mills, Kathy Wang, Brendan Malone, Anjana Ravi, Jeff Marquardt, Clinton Chen, Anton Badev, Timothy Brezinski, Linda Fahy, Kimberley Liao, Vanessa Kargenian, Max Ellithorpe, Wendy Ng, and Maria Baird (2016), "Distributed ledger technology in payments, clearing, and settlement," Finance and Economics Discussion Series 2016-095, Washington: Board of Governors of the Federal Reserve System, <https://doi.org/10.17016/FEDS.2016.095>; Financial Industry Regulatory Authority, *Distributed Ledger Technology: Implications of Blockchain for the Securities Industry*, January 2017; Financial Stability Oversight Council *2016 Annual Report* (Washington, D.C.: June 21, 2016); Alan McQuinn, Weining Guo, and Daniel Castro, *Policy Principles for Fintech*, Information Technology & Innovation Foundation, October 2016; United Kingdom Government Office for Science, *Distributed Ledger Technology: beyond blockchain*, December 2015; United States Postal Service, Office of Inspector General, *Blockchain Technology: Possibilities for the U.S. Postal Service*, Report No. RARC-WP-16-011, May 23, 2016; World Economic Forum, *The Future of Financial Infrastructure: An ambitious look at how blockchain can reshape financial services*, August 2016, accessed January 11, 2017, <https://www.weforum.org/reports/the-future-of-financial-infrastructure-an-ambitious-look-at-how-blockchain-can-reshape-financial-services>.

Fintech Products and Services Offer Potential Benefits and Pose Potential Risks to Consumers

Potential benefits

Increased access to financial services. Digital wealth management platforms and marketplace lending providers may offer increased access to financial services to previously underserved populations. Digital wealth management platforms may expand access to underserved segments such as customers with smaller asset amounts than those of traditional consumers of wealth management services.¹¹ Traditional wealth management firms may require minimum investment amounts of \$250,000, whereas some digital platforms require a minimum of approximately \$500 or no minimum at all.¹² Similarly, marketplace lending may expand credit access to underserved populations that may not meet traditional lending requirements or that seek smaller loans than those that banks traditionally offer.

Lower costs. Marketplace lending providers and digital wealth management platforms may offer consumers access to lower cost products. Marketplace lenders' online structure may reduce overhead costs because not all firms have brick-and-mortar locations. In addition, the algorithms used by marketplace lenders to underwrite credit decisions may result in lower underwriting costs when compared to banks' underwriting costs. Also, digital wealth management platforms may

¹¹Deloitte, *Robo Advisors: Capitalizing on a growing opportunity*, 2015; EY, *Advice Goes Virtual: How new Digital Investment Services Are Changing The Wealth Management Landscape*, 2015; Accenture, *The Rise of Robo-Advice: Changing the Concept of Wealth Management*, 2015; BlackRock, *Digital Investment Advice: Robo Advisors Come of Age*, September 2016.

¹²Bloomberg QuickTake, *Robo-advisors: They Invest by Algorithm But Don't Return Calls*, June 7, 2016, accessed December 14, 2016, <https://www.bloomberg.com/quicktake/robo-advisers>.

charge lower fees for services such as investment trade fees than traditional wealth management firms.¹³

Speed. Marketplace lending, mobile payments, and distributed ledger technology may offer consumers access to faster services. According to an SBA publication, some marketplace lenders can provide loans in as little as 24 hours.¹⁴ An industry organization we spoke with said that faster service is beneficial to small businesses that may need quick access to credit in an emergency, such as a restaurant that needs its oven or refrigerator repaired to continue operations. Mobile payments can also streamline the checkout time for consumers. For example, consumers can wave their smartphone in front of an in-store terminal to make a purchase, which can be faster than swiping a credit or debit card. Distributed ledger technology may also offer increased service speed as it has the potential to reduce settlement times for securities transactions by facilitating the exchange of digital assets during the same period of time as the execution of a trade.¹⁵

Convenience. Mobile payments and digital wealth management platforms offer convenience to consumers. Mobile wallets offer consumers the convenience of instant transactions without having to enter credit card information, PIN numbers, and shipping addresses each time they make a purchase.¹⁶ Digital wealth management platforms also offer convenience since regardless of location or the time of day, investors with a smartphone, tablet, or computer can make changes to their data and

¹³Securities and Exchange Commission Office of Investor Education and Advocacy, *Investor Bulletin: Robo-Advisers*, February 23, 2017, https://www.sec.gov/oiaa/investor-alerts-bulletins/ib_robo-advisers.html; Qplum, *What is Robo-Advising* (Jersey City, NJ: May 5, 2016).

¹⁴Miriam Segal, Small Business Administration Office of Advocacy, *Peer-to-Peer Lending: A Financing Alternative for Small Businesses*, Issue Brief Number 10 (Washington, D.C.: Sept. 10, 2015).

¹⁵Financial Industry Regulatory Authority, *Distributed Ledger Technology: Implications of Blockchain for the Securities Industry*, January 2017; S&P Global Market Intelligence, *An introduction to fintech: Key Sectors and trends*, October 2016.

¹⁶Board of Governors of the Federal Reserve System, *Consumers and Mobile Financial Services 2014*, March 2014; Alan McQuinn, Weining Guo, and Daniel Castro, *Policy Principles for Fintech*, Information Technology & Innovation Foundation, October 2016; and Krista Becker, *Mobile Phone: The New Way to Pay?* Federal Reserve Bank of Boston Emerging Payments Industry Briefing, February 2007.

preference inputs, send instructions, access their portfolios, and receive updated digital advice.¹⁷

Potential risks

Data security and privacy risks. Data security and privacy risks may exist in the mobile payments, distributed ledger technology, and digital wealth management sectors. Mobile payment technologies pose potential data security risks which include the possibility of payment and personal data being lost or vulnerable to theft because of consumers' reliance on the use of smartphones or other mobile communication devices. Distributed ledger technology also poses potential security risk. According to a Financial Industry Regulatory Authority report, given that distributed ledger technology involves sharing of information over a network, it poses security-related risks.¹⁸ The Financial Stability Oversight Council (FSOC) also noted that market participants have limited experience working with distributed ledger systems, and it is possible that operational vulnerabilities associated with such systems may not become apparent until they are deployed at scale.¹⁹ Digital wealth management platforms pose potential privacy risk since their use requires customers to enter personal information. According to an investor alert issued by the Securities and Exchange Commission (SEC) and Financial Industry Regulatory Authority staff, digital wealth management platforms may be collecting and sharing personal information for purposes unrelated to the platform. The alert cautions customers to safeguard personal information.²⁰

Use of alternative data in credit decisions. Use of alternative data in credit decisions may carry the risk of potential fair lending violations. Unlike traditional lending companies that look at a person's credit reports, some marketplace lenders also take into account or have considered using

¹⁷According to Securities and Exchange Commission (SEC) staff, the instructions inputted into the platform may not be carried out until the relevant markets open. BlackRock, *Digital Investment Advice: Robo Advisors Come of Age*, September 2016.

¹⁸Financial Industry Regulatory Authority, *Distributed Ledger Technology: Implications of Blockchain for the Securities Industry*, January 2017.

¹⁹Financial Stability Oversight Council, *2016 Annual Report* (Washington, D.C.: June 21, 2016).

²⁰Securities and Exchange Commission Office of Investor Education and Advocacy and Financial Industry Regulatory Authority, *Investor Alert: Automated Investment Tools*, May 8, 2015.

alternative data, such as utilities, rent, telephone bills, and educational history, during the underwriting process.²¹ According to Treasury, data-driven algorithms used by marketplace lenders, that incorporate the use of alternative data, carry the risk for potential fair lending violations.²² According to staff from the Federal Trade Commission (FTC), marketplace lenders must ensure that their practices meet fair lending and credit reporting laws.²³ The use of alternative data also introduces the risk that the data used are inaccurate and concerns that consumers may not have sufficient recourse if the information being used is incorrect.

Human error and confusion. According to publications we reviewed, mobile payment methods can create operational risk for human error.²⁴ For example, consumers can deposit or send money to the wrong person when using person-to-person payments, if, for example, they type in the wrong phone number. Mobile payment methods can also increase consumer confusion regarding protections based on the underlying funding source. According to the Federal Deposit Insurance Commission (FDIC), consumers may not understand which regulators supervise the parties providing mobile payments and may be unsure which consumer protections apply.²⁵

Insufficient or incomplete information from customers. In the case of digital wealth management, a lack of human interaction could result in investment decisions based on insufficient or incomplete customer information. A traditional wealth manager is able to ask and clarify questions and request follow-up information to capture a customer's full finances and goals. However, automated responses may not allow a

²¹Consumer Financial Protection Bureau, Request for Information Regarding Use of Alternative Data and Modeling Techniques in the Credit Process, http://files.consumerfinance.gov/f/documents/20170214_cfpb_Alt-Data-RFI.pdf.

²²Department of the Treasury, *Opportunities and Challenges in Online Marketplace Lending*, May 10, 2016.

²³Federal Trade Commission, *Fintech Forum: A closer look at marketplace lending*, <https://www.ftc.gov/news-events/blogs/business-blog/2016/08/fintech-forum-closer-look-marketplace-lending>.

²⁴Federal Deposit Insurance Corporation, Supervisory Insights, *Mobile Payments: An Evolving Landscape*, Winter 2012; Professor Mark E. Budnitz, *Pew Charitable Trusts, The Legal Framework Of Mobile Payments: Gaps, Ambiguities, and Overlap*, February 10, 2016.

²⁵Federal Deposit Insurance Corporation, Supervisory Insights, *Mobile Payments: An Evolving Landscape*, Winter 2012.

digital wealth management platform to capture a full picture of the customer's circumstances or short-term goals, for example, whether the customer may need investment money to buy a new home. If the customer does not understand a question, or does not answer it completely, the platform may not assess customers' full financial circumstances; for example, if a customer provides conflicting information on his or her finances, the digital wealth management platform may not have a full picture of the client's financial condition or a customer may end up with an undesired portfolio.²⁶

Trends Have Emerged in the Fintech Landscape, Some of Which Cut Across Multiple Sectors

Partnerships. Partnerships have started to form between traditional financial institutions and fintech providers. According to Treasury, some marketplace lenders have sought partnerships with traditional banks and community development financial institutions (CDFI) in various models.²⁷ According to a Congressional Research Service report, in a white label partnership, a traditional bank sets underwriting standards, originates the loan, and holds the loan once issued.²⁸ The bank can integrate a marketplace lending firm's technology services to originate the loan. In referral partnerships, banks refer customers who do not meet a bank's underwriting standards, or who are seeking products the bank does not offer, to a marketplace lender. Partnerships have also formed in the mobile payments space. Some industry stakeholders we spoke with said that the relationship between banks and mobile payment firms has evolved into more partnerships because banks and mobile payment firms recognize mutual benefits. For example, mobile payment firms can benefit from banks' experience with regulatory compliance and banks can remain competitive by meeting the needs of their customers. Distributed ledger technology related partnerships have developed in which financial

²⁶Securities and Exchange Commission Office of Investor Education and Advocacy and Financial Industry Regulatory Authority, *Investor Alert: Automated Investment Tools*, May 8, 2015, accessed January 3, 2017, <https://www.sec.gov/oiea/investor-alerts-bulletins/autolistingttoolshtrm.html>; Financial Regulatory Authority, *Report on Digital Investment Advice*, March 2016.

²⁷CDFI certifications are issued by Treasury to financial institutions serving economically distressed communities and low-income people across the country. CDFI certification allows financial institutions to apply for technical assistance and financial assistance awards, as well as training provided by the CDFI Fund.

²⁸Congressional Research Service, *Marketplace Lending: Fintech in Consumer and Small-Business Lending*, September 6, 2016.

institutions have joined a multiparty consortium or announced partnerships to examine the technology's potential.

Hybrid services. Hybrid services have formed in the digital wealth management and marketplace lending sectors. Hybrid services have evolved that combine traditional wealth management and digital wealth management. For example, in 2015 one large traditional investment firm implemented a service that offers investors an option of consulting with a human advisory representative in addition to its automated investment platform. Traditional wealth management firms also offer digital wealth management services. For example, in 2015, one large wealth management firm developed a product, available to customers with \$5,000 in savings, and a large bank launched a robo-advisor within its online investment platform. Hybrid models have also emerged in marketplace lending. For example, some direct lenders have developed hybrid models, selling some whole loans to institutional investors while retaining servicing responsibilities.

Self-regulatory efforts. A number of self-regulatory marketplace lending efforts were established with the intent of developing responsible innovation and mitigating and reporting risks to potential borrowers seeking marketplace lending products. For example, the Marketplace Lending Association was established in 2016 with one of its goal being to support responsible growth in the marketplace lending sector. However, limited information is available on the impact of these efforts.

Regulatory Oversight of Commonly Referenced Fintech Subsectors Is Complex and Spread among Federal and State Entities

Regulation of the commonly referenced subsectors depends on the extent to which the firms provide a regulated service and the format in which the services are provided, with responsibilities fragmented among multiple entities that have overlapping authorities.²⁹ Federal oversight authorities that apply to regulated activities generally include risk management oversight related to services provided to federally regulated depository institutions, consumer protection oversight, and securities and derivatives markets oversight. State licensing laws and oversight mechanisms, including consumer protection, vary by state.

Some agencies have taken a number of steps to understand and monitor the fintech industry. They have published papers for industry comment,

²⁹For additional information on the U.S. financial regulatory structure, see GAO, *Financial Regulation: Complex and Fragmented Structure Could Be Streamlined to Improve Effectiveness*, GAO-16-175 (Washington D.C.: Feb. 25, 2016).

established agency offices to perform outreach with fintech firms, organized forums, clarified authority for considering a special-purpose national bank charter for fintech firms, issued guidance, and formed working groups, among other activities. Specifically, in October 2016, the Consumer Financial Protection Bureau (CFPB) released its first report on Project Catalyst, the project to encourage consumer-friendly innovation in markets for consumer financial products and services.³⁰ In December 2016, the Office of the Comptroller of the Currency (OCC) published a paper discussing issues related to chartering special-purpose national banks and solicited public comment to help inform its path moving forward.³¹

Officials from the Conference of State Bank Supervisors we spoke with noted that the states are working on developing tools that can facilitate compliance with state-by-state licensing mechanisms, such as the Nationwide Mortgage Licensing and Registry System (NMLS). NMLS is intended to enable firms to complete one record to apply for state licensing that fulfills the requirements of each state, for states that participate in the system.³² As mentioned previously, a number of self-regulatory efforts have emerged with the intent of developing responsible innovation and mitigating and reporting risks to potential borrowers seeking marketplace lending products.

Marketplace Lending. Regulation of marketplace lenders is largely determined by the lenders' business model and the borrower or loan type. Marketplace lenders may be subject to federal and state regulations related to bank supervision and securities regulation. The depository

³⁰Consumer Financial Protection Bureau, *Project Catalyst report: Promoting consumer-friendly innovation* (Washington, D.C.: Oct. 2016).

³¹Office of the Comptroller of the Currency, *Exploring Special Purpose National Bank Charters for Fintech Companies* (Washington, D.C.: Dec. 2016). The OCC issued a summary of comments and explanatory statement regarding the Special Purpose National Bank charters for financial companies in March 2017. Office of the Comptroller of the Currency, *OCC Summary of Comments and Explanatory Statement: Special Purpose National Bank Charters for Financial Technology Companies* (Washington, D.C.: Mar. 2017).

³²NMLS was originally developed as a voluntary system for state licensing and then became mandatory for mortgage licensing in the Secure and Fair Enforcement for Mortgage Licensing Act of 2008, which was part of the Housing and Economic Recovery Act of 2008. Pub. L. No. 110-289, Title V, 122 Stat. 2654, 2810 (2008).

institution regulators other than the National Credit Union Administration (NCUA) have authority to regulate and examine certain services provided by third parties.³³ Marketplace lenders that provide services through an arrangement with federally regulated depository institutions may be subject to examination by the depository institution's regulator in connection with the performance of those services. The depository institution regulators also provide third-party guidance or vendor risk management guidance that depository institutions should adhere to.³⁴ Some marketplace lenders that originate loans directly to consumers or businesses (e.g., a direct marketplace lender) are generally required to obtain licenses and register in each state in which they provide lending services.³⁵ According to officials from CSBS, state regulators then have the ability to supervise these lenders, ensuring that the lender is complying with state and federal lending laws. Marketplace lenders may be subject to federal consumer protection laws enforced by CFPB and the Federal Trade Commission (FTC). Certain regulations generally apply to consumer loans but may not apply to small business or other commercial loans, though, FTC does have the authority under Section 5 of the Federal Trade Commission Act to protect, among others, small businesses that are consumers of marketplace lending products or services from unfair or deceptive acts or practices. Lastly, SEC regulates

³³NCUA does not have formal authority over fintech firms that partner with federally insured credit unions. The Bank Service Company Act—to examine and regulate certain services provided by third parties to insured depository institutions to the same extent as if the activities were performed by the financial institution itself—does not apply to NCUA. In addition, the Federal Credit Union Act does not provide comparable authority. Previously, we have asked Congress to consider granting NCUA with this authority, but no actions have been taken to date. NCUA's ability to influence compliance is limited to working with credit unions engaging with fintech payment providers to ensure that the institutions monitor the risks of these relationships. See GAO, *Cybersecurity: Bank and Other Depository Regulators Need Better Data Analytics and Depository Institutions Want More Usable Threat Information*, GAO-15-509 (Washington, D.C.: July 2, 2015).

³⁴For example, OCC's *Third Party Relationships Risk Management Guidance* says that a bank should adopt risk management processes commensurate with the level of risk and complexity of its third-party relations, and ensure comprehensive risk management and oversight of third-party relationships involving critical activities, and through the life-cycle of the relationship. FDIC's *Guidance for Managing Third-Party Risk* provides four main elements of an effective third-party risk management process: (1) risk assessment, (2) due diligence in selecting a third party, (3) contract structuring and review, and (4) oversight. Office of the Comptroller of the Currency, *Third-Party Relationships*, OCC Bulletin 2013-29 (Washington, D.C.: Oct. 30, 2013). FDIC Financial Institution Letters 44-2008, *Guidance For Managing Third Party Risk* (Washington, D.C.: June 6, 2008).

³⁵Department of the Treasury, *Opportunities and Challenges in Online Marketplace Lending*, May 10, 2016.

public offerings of securities by the marketplace lenders, unless an exemption from registration applies.³⁶

Mobile Payments. The regulatory and oversight framework for mobile payments consists of a variety of federal and state regulation and oversight. Determining which laws apply to mobile payments is complicated by several factors, including agency jurisdiction, mobile payment providers' relationship to depository institutions, and the type of account used by a consumer to make a mobile payment. Three of the federal depository institution regulators—Federal Reserve, FDIC, and OCC—are authorized to examine and regulate the provision of certain services provided by mobile payment providers to federally insured banks and thrifts.³⁷ CFPB has consumer protection authority over certain nonbank institutions and enforcement jurisdiction over entities that offer or provide consumer financial products or services. Nonbank providers of financial products and services, including mobile payment providers and prepaid card providers, may be subject to FTC consumer protection enforcement actions. Additionally, state regulators oversee mobile payment providers licensed in each state in which they operate as a money service business.

Digital Wealth Management. SEC regulates investment advisers, which generally includes firms that provide digital wealth management platforms. SEC subjects digital wealth management firms to the same regulations as traditional investment advisers and requires digital wealth management firms that manage over \$110 million in assets to register as investment advisers.³⁸ SEC's supervision of investment advisers includes evaluating their compliance with federal securities laws by conducting examinations, including reviewing disclosures made to customers. It also investigates and imposes sanctions for violations of securities laws. State securities regulators generally have registration and oversight responsibilities for investment adviser firms that manage less than \$100 million in client assets, if they are not registered with SEC, and can bring enforcement action against firms with assets of any amount for violations

³⁶At the state level, state securities regulators are generally responsible for registering certain securities products and, along with SEC, investigating securities fraud.

³⁷As mentioned above, NCUA does not have formal authority over fintech firms that partner with federally insured credit unions.

³⁸SEC Rule 203A-2(e) permits internet investment advisers to register with SEC if the adviser provides investment advice to all of its clients exclusively through the adviser's interactive website, except that the investment adviser may provide investment advice to fewer than 15 clients through other means during the preceding 12 months.

of state fraud laws. The FINRA also has regulatory authority over broker-dealers that use digital investment advice tools to provide investment services to clients. The Commodities Futures Trading Commission has oversight authority over commodity trading advisers, of which CFTC officials stated that digital wealth management firms that meet the statutory definition would be subject to the same oversight and compliance obligations of other traditional commodity trading advisers. Digital wealth management firms are subject to consumer protection laws that are enforced by FTC.

Distributed ledger technology. Continued development of DLT is needed to understand how DLT and its components will be regulated by the existing legal and regulatory system.³⁹ Additionally, it is unclear whether new regulation will need to be created because a distributed ledger technology network can present new and unique challenges. According to FSOC, financial regulators should monitor and evaluate how a distributed ledger technology network can affect regulated entities and their operations.⁴⁰ We have previously reported on the regulatory oversight of virtual currencies that use distributed ledger technology.⁴¹ With respect to virtual currencies, which use distributed ledger technology, federal and state regulators have taken varied approaches to regulation and oversight.⁴² Representatives of financial regulators have noted the importance of implementing distributed ledger technology in a manner that is transparent and satisfies regulatory requirements.

³⁹David Mills, Kathy Wang, Brendan Malone, Anjana Ravi, Jeff Marquardt, Clinton Chen, Anton Badev, Timothy Brezinski, Linda Fahy, Kimberley Liao, Vanessa Kargenian, Max Ellithorpe, Wendy Ng, and Maria Baird (2016), "Distributed ledger technology in payments, clearing, and settlement," Finance and Economics Discussion Series 2016-095, Washington: Board of Governors of the Federal Reserve System, <https://doi.org/10.17016/FEDS.2016.095>; Financial Stability Oversight Council, 2016 Annual Report (Washington, D.C.: June 21, 2016).

⁴⁰The Financial Stability Oversight Council was created by the Dodd-Frank Wall Street Reform and Consumer Protection Act in 2010 as a body designed to identify risks and respond to emerging threats to the United States' financial stability. Pub. L. No. 111-203, § 112, 124 Stat. 1376, 1394-1398 (2010).

⁴¹GAO-14-496.

⁴²This testimony does not cover all applicable regulatory requirements and oversight activities related to virtual currencies. For more information see GAO-14-496.

Chairmen Crapo, Ranking Member Brown, and members of the Committee, this completes my prepared statement. I would be pleased to respond to any questions that you may have at this time.

Contacts and Acknowledgments

If you or your staff have any questions about this testimony, please contact Lawrence Evans, Jr. at (202) 512-8678 or evansl@gao.gov. Contact points for our Offices of Public Affairs and Congressional Relations may be found on the last page of this report. GAO staff who made key contributions to this testimony include Harry Medina (Assistant Director), Christopher Ross (Analyst in Charge), Namita Bhatia-Sabharwal, Chloe Brown, Lauren Comeau, Pamela Davidson, Janet Eackloff, Cody Goebel, Davis Judson, Erika Navarro, Silvia Porres, Tovah Rom, Jessica Sandler, and Jena Sinkfield.



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PREPARED STATEMENT OF ERIC W. TURNER
FINANCIAL TECHNOLOGY RESEARCH ANALYST, S&P GLOBAL MARKET INTELLIGENCE
SEPTEMBER 12, 2017

Chairman Crapo, Ranking Member Brown, and members of the Committee,

Good morning, and thank you for inviting me to testify today. My name is Eric Turner, and I am a Research Analyst with S&P Global Market Intelligence, where I cover financial technology.

S&P Global is a leading provider of ratings, benchmarks, analytics and data to the capital and commodities markets worldwide. S&P Global's insights and commitment to transparency, integrity, and superior analytics have been at the forefront of U.S. economic growth since the company's founding over 150 years ago. Beginning with the expansion of our nation's railroad system, to the rise of the world's most liquid and resilient capital markets, to the growth of digital information and technology, S&P Global's essential intelligence has remained independent and has guided important decisions throughout U.S. history.

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Today I hope to provide the Committee with an overview of some key areas in the growing financial technology sector as well as the benefits and challenges presented. My comments represent insights gained through our research and are not necessarily the views of S&P Global.

Industry Background

Financial technology, more commonly known as fintech, is one of the fastest growing industries in the U.S. Close to \$13 billion was invested in U.S.-based fintech companies in 2016 alone.¹

Building on the increased ubiquity of the internet and connected devices, fintech companies leverage advanced technology to provide innovative financial products to consumers.

Defining all areas of fintech is a difficult, if not impossible task. Technology has long enabled innovation by financial institutions, and in many ways fintech is a new name for old ideas. But it is useful to define emerging subsectors of the space that have the most potential to provide benefits to consumers and the financial industry as a whole.

Some key segments of the fintech landscape are digital lending, mobile payments, digital investment management, insurance technology, and distributed ledger technology.

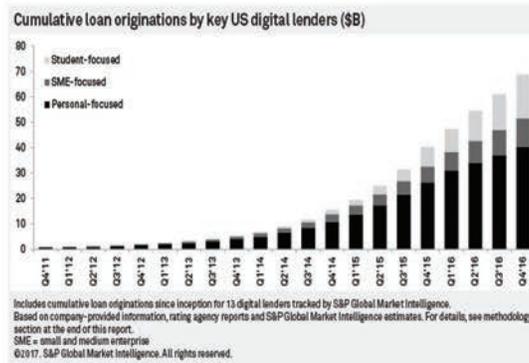
¹ KPMG, "U.S. Fintech Funding And Deal Volume Drop Significantly In 2016: KPMG Q4'16 Pulse Of Fintech Report" <https://home.kpmg.com/us/en/home/insights/2017/02/us-fintech-funding-and-deal-volume-drop-significantly-in-2016-kpmg-q4-16-pulse-of-fintech-report.html>

Digital Lending

Overview

Digital lenders primarily operate as non-bank lenders offering loans through web and mobile platforms. They rely on robust analytics and alternative data sets to create proprietary credit scoring models. Alternative data is information not contained within a traditional credit report that can better show a borrower's capacity to repay a loan. Many of these lenders have also integrated advanced technologies reliant on big data, machine learning, and artificial intelligence in order to enhance underwriting.

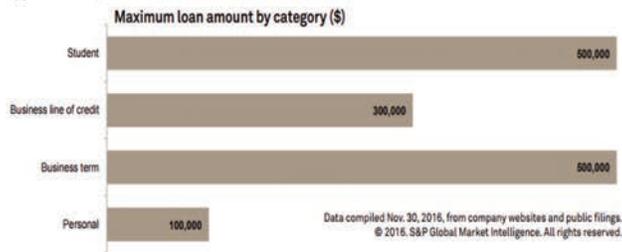
Our estimates show that thirteen of the largest digital lenders in the U.S. together originated \$28.39 billion in loans last year. Through the end of 2016, they had originated a cumulative \$68.75 billion since their respective inceptions.²



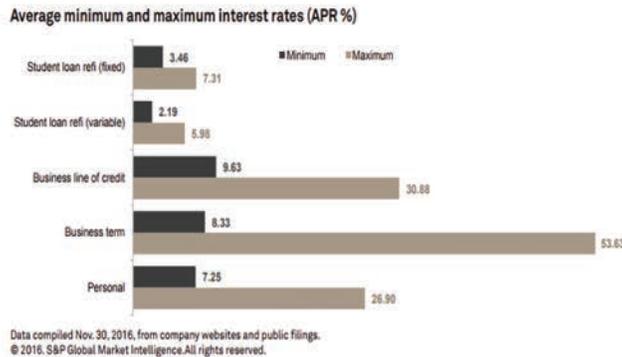
Borrowers include individuals looking to refinance high interest credit card debt, small and medium sized enterprises (SMEs) in need of working capital, and people consolidating student debt at lower rates. Mortgage and auto loan refinance are also emerging areas of digital lending.

² S&P Global Market Intelligence, "Q4'16 Loan Originations Fall YOY For Digital Lenders, Capping Off A Rocky Year" <https://marketintelligence.spglobal.com/our-thinking/ideas/q4-16-loan-originations-fall-yoy-for-digital-lenders-capping-off-a-rocky-year> Origination volumes are based on company-provided data from LendingClub (all periods), OnDeck (all periods), SoFi (Q4'11, Q3'12-Q4'16), Prosper (all periods), Kabbage (Q1'14 and Q2'16), Upstart (all periods), Credibly (Q3'16), Earnest (Q3'16), Square Capital (Q2'15-Q4'16), CommonBond (Q2'15), and LendingPoint (Q4'15). This includes information from company contacts, press releases, SEC filings and websites. Upstart originations have been updated for all historical periods as of March 27, 2017, to reflect company-provided numbers. BestEgg originations were updated for Q3'16 based on a Kroll Bond Rating Agency pre-sale report dated March 23, 2017.

Although most lenders offer term loans, SME-focused lenders also offer line of credit products. Individuals can borrow up to \$100,000 on some platforms, while SME loans can go up to \$500,000. Student loan refinancing depends on outstanding balance, with loan amounts generally capped at \$500,000.



Digital lenders charge interest rates that are comparable to those charged by banks or credit card companies, with variance based on a borrower's credit grade, the loan size, and the term of the loan. We have observed an average APR range of 7.3% to 26.9% for personal-focused lenders, 8.3% to 53.6% for business term loans, and 3.5% to 7.3% for fixed-rate student loan refinancing.³



Digital lending platforms provide instant credit decisions, allowing for visibility into the rate borrowers will pay, the amount they can borrow, and the total amount they will pay back. Because these platforms rely on automated credit models and electronic documents, loans can be funded in as little as a day. By contrast, many traditional lenders can take days or weeks to fund loans.

³ S&P Global Market Intelligence, "2016 U.S. Digital Lending Landscape"
<https://www.snl.com/web/client?auth=inherit#news/document?KeyProductLinkType=2&id=38632470>

Marketplace lenders and direct lenders are two categories of digital lenders. Loans are funded by groups of individual or institutional investors in the case of marketplace lenders and by internal capital for direct lenders.

Marketplace lenders generate revenue from origination and servicing fees and do not retain credit risk in most cases. The risk and corresponding return are instead passed on to investors. Banks and other institutions generally purchase whole loans, while individuals typically invest in fractional shares of loans.

Direct lenders rely on balance sheet capital or lines of credit held at commercial banks. These lenders hold loans until maturity and generate revenue through interest payments from borrowers. At their core, these businesses make money the way any lender does, by collecting a spread between interest income and their cost of borrowing.

As the market has matured, many digital lenders have also entered the securitization market. This market, which neared \$8 billion in 2016⁴, has become an important source of capital for digital lenders, which often find that demand for loans outstrips available capital.

Benefits

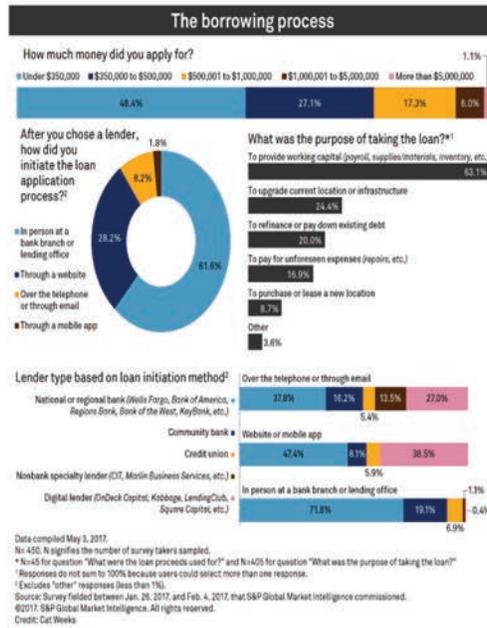
Digital lending started as a way for consumers to consolidate high interest credit card debt into lower rate term loans. This remains a focus of personal lenders today, with the service now also extended to recent graduates with student debt. Automation and a lack of physical offices allow digital lenders to offer competitive rates, potentially saving borrowers thousands of dollars in interest.

Speedy funding is especially important for small businesses needing access to working capital. A survey fielded by S&P Global Market Intelligence earlier this year shows that 63% of small businesses that took a loan in 2016 did so to obtain funding for payroll, supplies, materials, or inventory.⁵ Working capital is the lifeblood of any small business.

⁴ PeerIQ, "Marketplace Lending Securitization Tracker: 4Q2016"

[http://www.peeriq.com/assets/PeerIQ%20MPL%20Securitization%20Tracker%20\(4Q2016\).pdf](http://www.peeriq.com/assets/PeerIQ%20MPL%20Securitization%20Tracker%20(4Q2016).pdf)

⁵ S&P Global Market Intelligence, "2017 small business survey shows importance of branches, relationship lending" <https://www.snl.com/web/client?auth=inherit#news/article?id=40682569&KeyProductLinkType=2>



Alternative data sets and unique credit scoring models also allow digital lenders to provide credit to the underbanked. These individuals or businesses may lack the robust credit history needed for an accurate credit score from credit bureaus. While many digital lenders use at least the basic details provided in a standard credit report, these inputs are augmented with potentially hundreds of other data points and fed into proprietary scoring systems. In the case of a small business, for example, lenders can look at accounting statements, user reviews on social media sites, and even shipping volumes in and out of facilities.

Opportunities

Banks started to take notice of digital lenders as the latter experienced years of rapid loan origination growth. While many financial institutions initially considered these companies a threat, partnerships have increased between startups and incumbents. Many digital lenders now offer access to their technology to help banks create branded lending platforms.

Through these partnerships, banks benefit from access to customers that had previously been out of reach due to geography or acquisition cost. Digital lenders capture new revenue streams and further promote awareness of their offering. And the overall economy benefits from increased financial inclusion and access to credit.

Challenges

Questions around the underlying credit quality of loans originated by digital lenders began to emerge early last year. Some previous vintages of loans started to underperform expectations, leading many lenders to reassess their underwriting models. Further pressure has come from legal challenges, state regulators, and industry groups.

The largest looming challenge for digital lenders today is regulation, since they have no clear regulatory framework. Many lenders rely on regulated banks to issue loans on their behalf. Other lenders have sought state-level licensing for their businesses, but this can be an expensive and time-consuming process and make it difficult for lenders to offer consistent rates to their borrowers. Some lenders have attempted to find regulation through industrial loan company (ILC) charters, which has already elicited pushback from incumbents.

Fintech companies themselves have increasingly called for regulation. Many digital lenders crave a clear framework in which they can operate. This will involve addressing distinctive characteristics of their business models such as a lack of physical locations, no access to insured deposits, and differing sources of capital. This is one area where the proposal of a limited bank charter from the OCC could be helpful, although it remains to be seen what implementation would look like.

The digital lending industry is still young. Lenders are constantly improving their credit models and the algorithms that drive them. This has led to periods of higher than expected losses for certain lenders. Many lenders have found it difficult to reach a steady level of profitability due to these issues, and investors are less enthusiastic about the space than they were a few years back.

Maintaining a high and consistent level of credit quality is imperative for the success of the industry. This is also important as individuals and institutions increasingly invest in these loans, both directly and through securitizations.

Losses can also come from borrowers who stack loans or do not use loan proceeds for their stated purpose. Loan stacking, which is usually considered fraudulent, happens when borrowers take loans from multiple lenders in a short period of time. Automated processing, a delay in credit reporting, and digital lenders' online-only presence have made this easier.

Some other borrowers take loans for the purpose of repaying other debt and but actually use the funds for something else or max out balances soon after paying down debt. This is hard to track as lending platforms do not require borrowers to use a loan for its stated purpose.

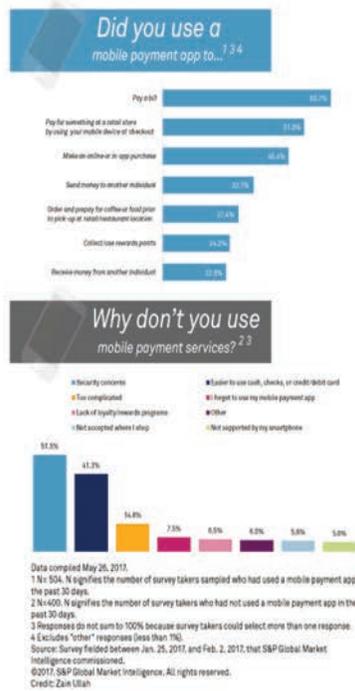
The industry has taken steps to enhance transparency when it comes to borrower habits and to prevent issues like loan stacking. Even so, the potential for fraud will remain an issue for lenders in the space.

Mobile Payments

Overview

Mobile payments encompass a wide range of services. The most popular mobile payment activities include paying bills, making purchases in a retail store or online, and making peer-to-peer payments.⁶ Users access payment platforms through mobile devices such as phones, tablets, and smartwatches.

Millennials, or people under 35 years of age, tend to be the most active mobile payment users, according to our survey results. More than 60% of users we surveyed have an annual income of less than \$75,000 per year, with more than 20% making less than \$35,000.⁷



⁶ S&P Global Market Intelligence, "2017 US mobile payment survey shows PayPal dominates diverse channels" <https://www.snl.com/web/client?auth=inherit#news/article?id=40854598&KeyProductLinkType=2>
⁷ Ibid.

Many of these services started as standalone applications but have become increasingly integrated into apps from financial institutions, retailers, and hardware providers. Access to mobile bill pay, for example, comes primarily through a bank or credit card app and has become a feature that consumers expect from these apps.

Retail payment options have grown over the past five years as mobile wallets became a standard feature in new smartphones. People use these wallets, which digitize bank or credit card information, by scanning or tapping their mobile devices at payment terminals. Alongside these built-in wallets, retailers have started to offer their own branded apps for purchases. These apps store user payment information and include additional features such as transaction history and rewards balances.

Standalone payment apps run by fintech companies represent the most popular peer-to-peer payment platforms. These services allow users to send small amounts of money to friends or family for free. Such transfers are usually instantaneous, allowing users to see their balances in real time. Apps increasingly allow users to immediately transfer funds to a bank account or hold a balance for future use.

Benefits

Millions of consumers use mobile payment services because they reduce transaction costs and frictions while offering an enhanced user experience. Paying a bill with the tap of a button will always be easier than filling out and mailing a check. Splitting a dinner bill with friends can be completed just as easily.

Most functionality in peer-to-peer payment apps is free. For international transfers, specialized peer-to-peer apps charge low fees for the conversion and transfer of funds across borders and currencies. This benefits underbanked and immigrant communities.

Mobile wallets in particular help to create more secure transactions. Transactions involve the transmission of just token data through a payment terminal, with the actual approval happening through internal servers. Each transaction is unique. This prevents fraudsters from skimming card data or stealing PIN information. Additional features like biometric and two-factor authentication have further enhanced user security.

Challenges

Much like digital lenders, many mobile payment providers lack clear regulation at a federal level. Startups instead must register with every state in which they plan to operate. This process can be onerous and take years to complete, which for a young company can be too long.

Security is a significant issue for mobile payment providers. More than half of our survey respondents who did not use mobile payments cited security concerns as the primary reason. Mobile payment platforms offer access to bank accounts, debit cards, or other forms of payment.

Peer-to-peer payments are subject to fraud or identity theft that can lead to irrevocable spending in client accounts. This problem becomes more pronounced as platforms speed up settlement times and allow users to withdraw funds instantly.

This places a heavy burden on mobile payment providers to ensure secure storage of user data. These issues are further compounded by applications that access user data held at other financial institutions. There are also questions about data ownership. Many have argued that this data is owned by the individuals who created it, and not the institutions that store it. European legislators have addressed these issues through the recent Revised Payment Services Directive (PSD2).⁸

Despite sleek new interfaces and ways to complete payment transactions, these platforms rely on existing infrastructure like card networks and the ACH system. Merchants still have to pay processing fees, as they would with any traditional card payment, for retail purchases. Mobile payment platforms absorb costs in the case of peer-to-peer services but must eventually monetize these offerings.

These applications also lack a degree of transparency when it comes to the storage of user funds. If a user has a balance in a peer-to-peer app, that money is not in an insured deposit account. Instead, the payment company invests it in low-risk assets such as U.S. Treasuries or agency debt. Payment platforms retain the returns from these investments and do not pass the gains on to customers in the form of interest.⁹

⁸ https://ec.europa.eu/info/law/payment-services-psd-2-directive-eu-2015-2366_en

⁹ *Fast Company*, "The Sneaky Psychology Of Apple Pay—And How It Could Cost You"

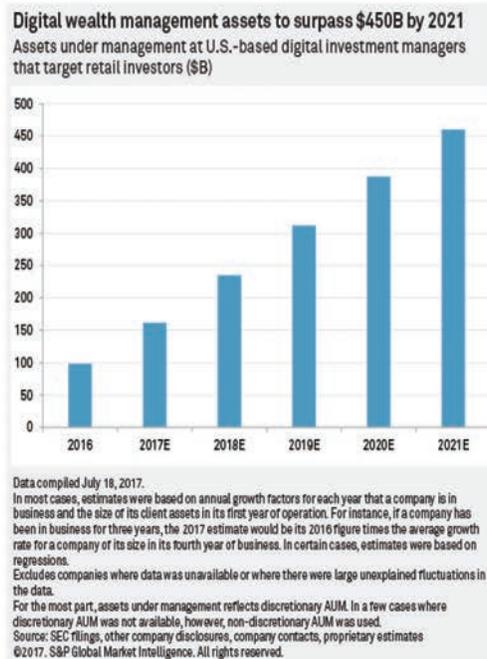
<https://www.fastcodesign.com/90128304/the-subtle-psychology-of-apple-pay-and-how-it-could-cost-you>

Digital Investment Management

Overview

Digital advisors, sometimes referred to as robo-advisors, are automated investment management platforms primarily focused on retail investors. Users can create diversified portfolios of exchange-traded funds by answering simple questionnaires about investment goals and risk tolerance. Features like automatic rebalancing and tax loss harvesting allow a hands-off approach to investing with minimal input needed from users. Fees for these platforms are usually much lower than what an investor would pay a traditional financial advisor.

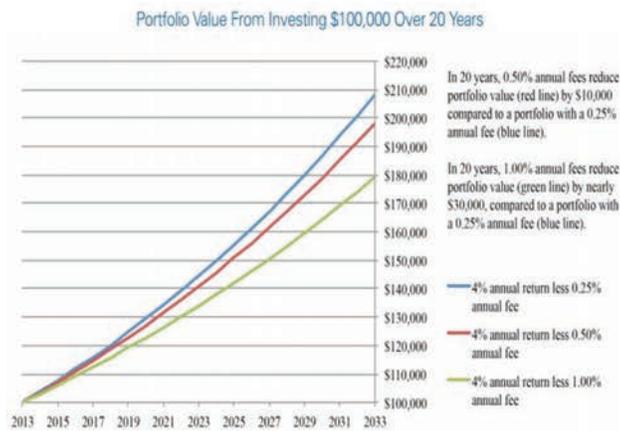
We estimate that these advisors will manage more than \$450 billion by 2021, a fourfold increase from where the industry stood in 2016.¹⁰ This growth is due largely to the entry of incumbent asset managers into the space, with more companies planning to launch digital advisory services in the coming years.



¹⁰ S&P Global Market Intelligence, "U.S. Digital Adviser Forecast: AUM To Surpass \$450B By 2021"
<https://www.spglobal.com/our-insights/US-Digital-Adviser-Forecast-AUM-To-Surpass-450B-By-2021.html>

Benefits

According to the SEC, a 1% annual fee can reduce the value of a \$100,000 portfolio by \$30,000 over a 20-year period when compared to a fee of 0.25%.¹¹ Digital advisors charged annual fees ranging from 0.01% to 0.89% as of mid-2016.¹² Many investors do not understand the compounding effects of high fees over time. Overall fees can often end up higher after accounting for the underlying expenses of investment vehicles. The firms managing these vehicles often offer a commission to advisors who recommend them to clients.



Digital advisors also serve people who may not meet minimum investment thresholds at a traditional advisor. Minimums tend to be low or even non-existent on some platforms, allowing investors to receive portfolio advice they previously could not access.

Challenges

The use of model portfolios and a relatively hands-off approach provide benefits but also present potential issues. As digital advisors continue to grow their assets under management, incorrect assumptions in a model portfolio or overconcentration in an investment that goes bad could lead to substantial investor losses. Many incumbents have pointed out that these newer advisors have come into favor during a bull market and have yet to weather a substantial economic event like a recession or crisis.

¹¹ Securities and Exchange Commission, "Investor Bulletin: How Fees and Expenses Affect Your Investment Portfolio" https://www.sec.gov/investor/alerts/ib_fees_expenses.pdf

¹² S&P Global Market Intelligence, "An introduction to fintech: Key sectors and trends" <https://marketintelligence.spglobal.com/documents/our-thinking/research/an-introduction-to-fintech-key-sectors-and-trends.pdf>

This could create problems when outside shocks impact markets, something an algorithm might not recognize. Questions have been raised about a digital advisor's ability to act in a client's best interest during times of market turmoil, or the extent to which a digital advisor is even required to adhere to a fiduciary standard.

The role of the modern financial advisor is as much about education as it is about portfolio management. Investment managers are often trained to ascertain a client's willingness and ability to take certain risks based not only on their statements but also contextual clues.

Digital advisors, while often providing multiple portfolio options, still rely on investors' answers to questions about investment goals and risk tolerance. Computers lack the opportunity to gain other clues from investors that are available through in-person interactions or a long-standing relationship. This could lead to issues with investment suitability. Some digital advisors have made human representatives available by phone to help overcome some of these issues.

Insurance Technology

Overview

Insurance technology, more commonly known as insurtech, is an emerging area of fintech targeting the property and casualty, life, and health insurance sectors. The goals of startups in these areas include reducing inefficiencies in existing systems, offering a more customer-friendly experience, and collecting data and analytics to improve services and profitability.

Some insurtech companies offer web and mobile platforms for users to purchase coverage, track their policies, and file claims. Much like with digital lenders, algorithms underlying these insurtech platforms make quick coverage and pricing decisions based on a variety of data points supplied by the applicant and readily accessible through other channels. These companies benefit from decreased overhead related to human-driven sales, underwriting, and claims adjustment processes.

Various insurers have adopted tools like telematics technology and the internet of things. This allows them to better track the underlying behaviors such as driving habits and physical activity that help quantify risk related to insured individuals.

Benefits

Insurtech allows for faster, more customized, and potentially less expensive access to insurance. Many platforms offer the ability to obtain insurance in only minutes with simple questionnaires and automated assistants to guide applicants. Some insurers offer on-demand policies that can be turned on or off via a mobile app to allow for savings when insurance is not needed.

Such innovations make it easier and more appealing to switch providers for necessary coverage such as auto and homeowners insurance. They may also encourage more consumers to apply for and follow through on purchasing more discretionary coverage such as term life insurance.

Telematics and other connected devices offer the ability for users to receive customized rates, allowing for potential savings on premiums. Insurers benefit from increased understanding of their risk pools and faster pricing adjustments.

Challenges

Insurance is a heavily regulated industry, and startup carriers in the space must find ways to comply with these regulations, which vary by state.

Insurtech startups are operating in a crowded market. Incumbent insurers have been adopting new technology, to varying degrees, for many years, and direct-to-consumer platforms are not new to the industry. As in other areas of fintech, partnerships have emerged that pair insurtech companies' technological innovations with established carriers' capital resources and market knowledge. So far, many insurtech startups have acted primarily as platforms for customer

acquisition and rely on established insurers to underwrite policies.¹³ For insurtech companies that write their own business, profitability has been a challenge.¹⁴ But they have been writing business for a relatively short time, and the property and casualty insurance industry as a whole produced net underwriting losses in the latest quarter.

Underwriting arrangements of select startups focused on homeowners, renters and condominium insurance markets

Company	Underwriting partner(s)
Bungalow	American Family Insurance Group, Chubb Ltd., Travelers Cos. Inc., WT Holdings Inc.
Hippo	Topa Insurance Co.
Jetty	State National Cos. Inc. ¹
Lemonade	Lemonade Insurance Co.
Quilt	Security First Insurance Co., WT Holdings Inc.
Sure	AmTrust Financial Services Inc., Chubb Ltd., Nationwide Mutual Group, OBE Insurance Group Ltd.

Data compiled May 26, 2017.
 Based on a best-efforts collection of information from company and state regulatory websites, company contacts, press releases and product filings.
 Limited to primary underwriters for which information could be obtained. Top-tier entities shown.
¹ State National acts as a fronting company for Jetty. Munich Re assumes the actual risk.
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As insurers increasingly rely on data from connected devices, data privacy issues can emerge. Telematics and connected devices like fitness trackers are already allowing insurers to track driving habits and user health. This data is important to users, and it should be clearly defined how it will be used. Insurtech companies may also encounter challenges from regulators and consumer groups to the use of certain alternative data points in underwriting and pricing decisions.

¹³ S&P Global Market Intelligence, "Lemonade not the only tech startup eyeing homeowners insurance market" <https://www.snl.com/web/client?auth=inherit#news/article?id=40780313&KeyProductLinkType=2>

¹⁴ S&P Global Market Intelligence, "Profitability elusive for 3 insurtech startups" <https://www.snl.com/web/client?auth=inherit#news/article?id=41757792&KeyProductLinkType=2>

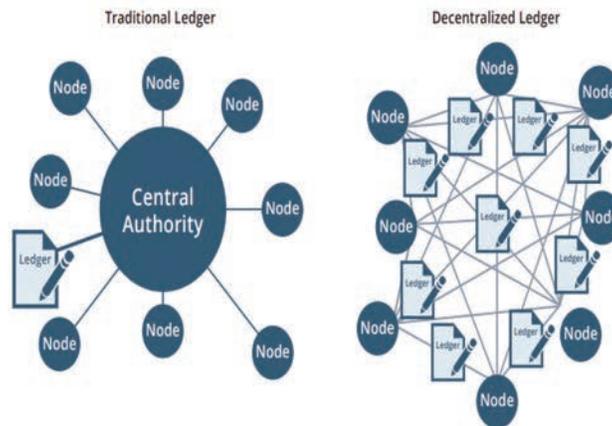
Distributed Ledger Technology

Overview

Distributed ledger technology, including blockchain technology, can best be described as a decentralized network of participants responsible for approving and recording transactions. In most implementations, network participants maintain nodes, with each holding a copy of a shared ledger. These nodes work together to verify and record transactions. Elements of cryptography such as public/private key pairs and digital signatures underpin most DLT solutions.

These networks allow participants to transact directly with each other, removing the need to pass transactions through a trusted third party. Once recorded, transactions are immutable and permanently stored in the ledger.

Removing the central counterparty with decentralized ledger technology



As the technology evolves, it will enable new features such as smart contracts. These software applications are built into distributed ledgers and can automate processes based on certain conditions being met, such as the transfer of money or the title to other items of value.

Benefits

If implemented as planned, DLT will revolutionize many parts of our financial system. Efficiencies will emerge in payments and international remittances, reducing costs and settlement times. Enhanced transparency will allow users to track payments as they pass from sender to receiver. Securities settlement and issuance will see significant reductions in cost and

processing time while audit trails are created automatically. Compliance with Know Your Customer (KYC) and Anti-Money Laundering (AML) regulations will be easier for financial institutions, and individuals will be able to control their financial data.

Many of these benefits have yet to be realized as we have just started to see the launch of enterprise-level DLT solutions. What is notable compared to other areas of fintech is the mix of startups and incumbents exploring the technology. Many businesses across a range of industries have joined together to form consortia focused on DLT implementations

As new advances such as artificial intelligence and the internet of things develop, many in the industry believe DLT will play an active role in underpinning these technologies. DLT will become not only a tool to increase access and decrease costs in the financial system but to drive innovation as well.

Challenges

As with any emerging industry, much of this technology is still untested and very few live applications are running today. It is still unclear how participants will work together to create these networks. Compounding these problems are competing implementations of the technology that could end up lacking the compatibility necessary to realize true benefits.

The idea of a shared ledger has also raised concerns around data security. Because nodes need to work in tandem to approve transactions, private data could become exposed. As processing power evolves, current cryptographic standards could become weak.

DLT represents a dramatic shift from our current financial world. Transactions can be completed within minutes or seconds. The question remains whether that should be possible. Because ledgers are generally immutable and transactions instant, there is in most cases no way to reverse an incorrect input. Reversing a transaction involves creating an offsetting entry and must be agreed upon by both parties.

Conclusion

Fintech offers tremendous benefits including increased access to financial services, lower costs, and reduced frictions. Financial institutions have moved from seeing fintechs as a threat and have learned how to harness their technological advances. Consumers are already seeing benefits from technologies like digital lending, mobile payments, digital investment management, and insurance technology. We are on the cusp of seeing all of these sectors potentially impacted by DLT.

Regulation has been unevenly applied to the sector, and in many ways the introduction of a clear regulatory framework could help further boost innovation. This may require firms to define their stake in the financial system and could lead to technology-only platforms exiting certain lines of business like lending. Overall, this will lead to a more fair and defined playing field for startups and incumbents alike.

Issues like cybersecurity, data ownership, and data privacy are important not just to fintechs but to the financial industry as a whole. Clear standards and regulation can provide clarity in these areas as well.

Once again, thank you for the opportunity to testify. I hope the Committee finds our input useful.

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 LAW

SEPTEMBER 12, 2017

I. Introduction

The financial technology (“fintech”) landscape is complex and diverse. Fintech ranges from automation of office procedures once performed by workers, to some genuinely new approaches to storing and transferring value, and granting credit.¹ New services—like insurance sold by the hour—are emerging. Established and start-up firms are using emerging data sources and algorithms to assess credit risk. And even as financial institutions are adopting some distributed ledger technologies, some proponents of cryptocurrency claim that it “changes everything” and will lead to a “blockchain revolution.”

For purposes of this testimony, I will divide the fintech landscape into two spheres. One, incrementalist fintech, uses new data, algorithms, and software to perform classic work of existing financial institutions. This new technology does not change the underlying nature of underwriting, payment processing, lending, or other functions of the financial sector. Regulators should, accordingly, assure that long-standing principles of financial regulation persist here. I address these issues in Part II below.

Another sector, which I deem “futurist fintech,” claims to disrupt financial markets in ways that supersede regulation, or render it obsolete. For example, if you truly believe a blockchain memorializing transactions is “immutable,” you may not see the need for regulatory interventions to promote security to stop malicious hacking or modification of records. In my view, futurist fintech faces fundamental barriers to widespread realization and dissemination. I address these issues in Part III below.

II. Incrementalist Fintech

A. Big Data or Artificial Intelligence-based Underwriting

Many marketplace lenders are now using forms of data not traditionally used for credit underwriting, in order to offer consumer or small business loans. They may help correct some long-standing problems in US credit markets, including the problematic nature of contemporary credit scoring. However, as Mikella Hurley & Julius Adebayo have argued,

Credit-scoring tools that integrate thousands of data points, most of which are collected without consumer knowledge, create serious problems of transparency.

¹ The Government Accountability Office has described fintech as follows: “The financial technology (fintech) industry is generally described in terms of subsectors that have or are likely to have the greatest impact on financial services, such as credit and payments. Commonly referenced subsectors associated with fintech include marketplace lending, mobile payments, digital wealth management, and distributed ledger technology.” GAO, FINANCIAL TECHNOLOGY: INFORMATION ON SUBSECTORS AND REGULATORY OVERSIGHT (2017).

Consumers have limited ability to identify and contest unfair credit decisions, and little chance to understand what steps they should take to improve their credit. Recent studies have also questioned the accuracy of the data used by these tools, in some cases identifying serious flaws that have a substantial bearing on lending decisions.

Big-data tools may also risk creating a system of "creditworthiness by association" in which consumers' familial, religious, social, and other affiliations determine their eligibility for an affordable loan. These tools may furthermore obscure discriminatory and subjective lending policies behind a single "objective" score. Such discriminatory scoring may not be intentional; instead, sophisticated algorithms may combine facially neutral data points and treat them as proxies for immutable characteristics such as race or gender, thereby circumventing existing non-discrimination laws and systematically denying credit access to certain groups. Finally, big-data tools may allow online payday lenders to target the most vulnerable consumers and lure them into debt traps.²

The problem of "big data proxies" is a serious one recognized by leading privacy scholars.³ Regulators should do much more to assure that next-generation technology does not simply reproduce old biases.⁴ The alternative is a "scored society" where individuals lack basic information about how they have been treated in the credit granting context.⁵

These problems are troubling in the abstract. Their concrete implications are chilling, as a recent Privacy International Report revealed. Outside the United States, fintech firms have already scored creditworthiness based on the following factors:

- "If lenders see political activity on someone's Twitter account in India, they'll consider repayment more difficult and not lend to that individual."
- "The contents of a person's smartphone, including who and when you call and receive messages, what apps are on the device, location data, and more."
- "How you use a website and your location. [One firm] analyses the way you fill in a form (in addition to what you say in the form), and how you use a website, on what kind of device, and in what location."⁶

² Mikella Hurley & Julius Adebayo, *Credit Scoring the Era of Big Data*, 18 YALE J.L. & TECH. 148 (2017).

³ See, e.g., Nicolas Terry, *Big Data Proxies and Health Privacy Exceptionalism*, HEALTH MATRIX (2015).

⁴ For an up-to-the-minute overview of this and related problems, see Penny Crosman, *Is AI a threat to fair lending?*, at <https://www.americanbanker.com/news/is-artificial-intelligence-a-threat-to-fair-lending>.

⁵ Danielle Keats Citron & Frank Pasquale, *The Scored Society*, 89 WASH. L. REV. 1 (2014).

⁶ Privacy International, *Case Study: Fintech and the Financial Exploitation of Customer Data*, at

Moreover, machine learning systems are constantly developing even more invasive forms of assessing creditworthiness, or factors influencing it. A recently published paper claims to infer propensity to criminality merely from the features of persons' faces.⁷ Sexuality and health are also now being predicted by machine learning researchers entirely on the basis of a picture of a person's face—something relatively easy to gather via a Google image search, or Facebook search.⁸ Regulators need to be able to audit machine learning processes to understand, at a minimum, whether suspect sources of data like these are influencing fintech firms.⁹

1. Neither Machine Learning Nor Predictive Analytics are too Complex to Regulate

Some fintech firms which rely on artificial intelligence may counter that the computation involved in their decisionmaking now amounts to a form of cognition as hard to explain as that of a human decision-maker. Genetic algorithms may, for instance, themselves spawn, each second, dozens of ways of processing information, which are then evaluated on some metric, and Darwinianly given a chance to persist based on their performance. Iterative machine learning processes may be similarly complex and opaque. Their view is that, just as we can't map all the brain's neurons to connect a person's decision to eat a slice of cake to some set of synapses, we can't map or unravel the sequence of events that leads to a given algorithmic score or sorting.

I believe that we should be suspicious of the deregulatory impulse behind characterizations of machine learning as "infinitely complex," beyond the scope of human understanding. The artificial intelligence that commercial entities celebrate can just as easily evince artificial imbecility, or worse. Moreover, there are several practical steps we can take even if machine learning processes are extraordinarily complex.

<https://privacyinternational.org/node/1499?PageSpeed=noscript> (Aug. 30, 2017). See also Josh Chin & Gillian Wong, *China's New Tool for Social Control: A Credit Rating for Everything*, Wall St. J., Nov. 28, 2016, at <https://www.wsj.com/articles/chinas-new-tool-for-social-control-a-credit-rating-for-everything-1480351590>; Ian Bogost, *Cryptocurrency Might be a Path to Authoritarianism*, The Atlantic, May 30, 2017, at <https://www.theatlantic.com/technology/archive/2017/05/blockchain-of-command/528543/>.

⁷ Blaise Agüera y Arcas, Margaret Mitchell and Alexander Todorov, *Physiognomy's New Clothes*, at <https://medium.com/@blaisea/physiognomys-new-clothes-f2d4b59fdd6a> (May 6, 2017).

⁸ Sam Levin, LGBT groups denounce 'dangerous' AI that uses your face to guess sexuality, *The Guardian*, at <https://www.theguardian.com/world/2017/sep/08/ai-gay-gaydar-algorithm-facial-recognition-criticism-stanford>, Sept. 8, 2017; Barbara Marquand, *How Your Selfie Can Affect Health Insurance*, USA Today, at <https://www.usatoday.com/story/money/personalfinance/2017/04/25/how-your-selfie-could-affect-your-life-insurance/100716704/>.

⁹ To be clear, I am not alleging any particular fintech firm in the United States is using such approaches in the United States at present. I am just pointing out that the possibility exists, and must be monitored.

For example, we may still want to know what data was fed into the computational process. Presume as complex a credit scoring system as possible. Regulators could still demand to know the data sets fed into it, and, for example, forbid health data from being included in that set. We already know that at least one credit card company has paid attention to certain mental health events, like going to marriage counseling.¹⁰ When statistics imply that couples in counseling are more likely to divorce than couples who aren't, counseling becomes a "signal" that marital discord may be about to spill over into financial distress.¹¹ This is effectively a "marriage counseling penalty," and poses a dilemma for policy makers. Left unrevealed, it leaves cardholders in the dark about an important aspect of creditworthiness. Once disclosed, it could discourage a couple from seeking the counseling they need to save their relationship.

There doesn't have to be any established causal relationship between counseling and late payments; correlation is enough to drive action. That can be creepy in the case of objectively verifiable conditions, like pregnancy. And it can be devastating for those categorized as "lazy," "unreliable," "struggling," or worse. Runaway data can lead to *cascading disadvantages* as digital alchemy creates new analog realities.¹² Once one piece of software has inferred that a person is a bad credit risk, a shirking worker, or a marginal consumer, that attribute may appear with decision-making clout in other systems all over the economy. There is also little in current law to prevent companies from selling their profiles of consumers.¹³

2. *The Problems of Extant Data Collectors are a Reason for More Scrutiny of Fintech, Not Less*

Having eroded privacy for decades, shady, poorly regulated data miners, brokers and resellers have now taken creepy classification to a whole new level. They have created lists of victims of sexual assault, and lists of people with sexually transmitted diseases. Lists of people who have Alzheimer's, dementia and AIDS. Lists of the impotent and the depressed.

¹⁰ Charles Duhigg, "What Does Your Credit Card Company Know about You?" *New York Times*, May 17, 2009, <http://www.nytimes.com/2009/05/17/magazine/17credit-t.html?pagewanted=all>. For a compelling account for the crucial role that the FTC plays in regulating unfair consumer practices and establishing a common law of privacy, see Daniel J. Solove and Woodrow Hartzog, "The FTC and the New Common Law of Privacy," *Columbia Law Review* 114 (2014): 583-676.

¹¹ Charles Duhigg, "What Does Your Credit Card Company Know about You?", *N.Y. Times*, May 12, 2009.

¹² Cathy O'Neil, *Weapons of Math Destruction* (2016).

¹³ Kashmir Hill, "Could Target Sell Its 'Pregnancy Prediction Score'?" *Forbes*, February 16, 2012, <http://www.forbes.com/sites/kashmirhill/2012/02/16/could-target-sell-its-pregnancy-prediction-score/>.

There are lists of “impulse buyers.” Lists of suckers: gullible consumers who have shown that they are susceptible to “vulnerability-based marketing.” And lists of those deemed commercially undesirable because they live in or near trailer parks or nursing homes. Not to mention lists of people who have been accused of wrongdoing, even if they were not charged or convicted. Typically sold at a few cents per name, the lists don’t have to be particularly reliable to attract eager buyers. And there is increasing risk that your spouse, friends, boss, or acquaintances could buy such data.¹⁴

There are three problems with these lists. First, they are often inaccurate. For example, as The Washington Post reported, an Arkansas woman found her credit history and job prospects wrecked after she was mistakenly listed as a methamphetamine dealer. It took her years to clear her name and find a job.¹⁵ Second, even when the information is accurate, many of the lists have no business being in the hands of fintechs. Having a medical condition, or having been a victim of a crime, should not be part of credit decisions, since such data use generates risk of compounding, self-reinforcing disadvantage via digital stigma.

Third, people aren’t told they are on these lists, so they have no opportunity to correct bad information. The Arkansas woman found out about the inaccurate report only when she was denied a job. She was one of the rare ones. The market in personal information offers little incentive for accuracy; it matters little to list-buyers whether every entry is accurate — they need only a certain threshold percentage of “hits” to improve their targeting. But to individuals wrongly included on derogatory lists, the harm to their reputation is great.¹⁶

The World Privacy Forum, a research and advocacy organization, estimates that there are about 4,000 data brokers. They range from publicly traded companies to boutiques. Companies like these vacuum up data from just about any source imaginable: consumer health websites, payday lenders, online surveys, warranty registrations, Internet sweepstakes, loyalty-card data from retailers, charities’ donor lists, magazine subscription lists, and information from public records.

It’s unrealistic to expect individuals to inquire, broker by broker, about their files. Instead, we need to require brokers to make targeted disclosures to consumers. Uncovering

¹⁴ Theodore Rostow, *What Happens When an Acquaintance Buys Your Data?: A New Privacy Harm in the Age of Data Brokers*, 34 YALE JOURNAL ON REGULATION (2016).

¹⁵ Ylan Q. Mi, *Little-known firms tracking data used in credit scores*, WASH. POST, July 16, 2011, at https://www.washingtonpost.com/business/economy/little-known-firms-tracking-data-used-in-credit-scores/2011/05/24/gIQAxHcWII_story.html?utm_term=.db2a64e53efd.

¹⁶ Note that information generated for or within a credit context may spread outside it—and vice versa. Amy Traub, *Discredited: How Employment Credit Checks Keep Qualified Workers Out of a Job* (2012), <http://www.demos.org/discredited-how-employment-credit-checks-keep-qualified-workers-out-job>. Such data and inferences are very important

problems in Big Data (or decision models based on that data) should not be a burden we expect individuals to solve on their own.

Privacy protections in other areas of the law can and should be extended to cover the consumer data now fueling fintech underwriting. The Health Insurance Portability and Accountability Act, or HIPAA, obliges doctors and hospitals to give patients access to their records. The Fair Credit Reporting Act gives loan and job applicants, among others, a right to access, correct and annotate files maintained by credit reporting agencies.

It is time to modernize these laws by applying them to all companies that peddle sensitive personal information. If the laws cover only a narrow range of entities, they may as well be dead letters. For example, protections in HIPAA don't govern the "health profiles" that are compiled and traded by data brokers or fintech firms, which can learn a great deal about our health even without access to medical records.

Congress should require data brokers to register with the Federal Trade Commission, and allow individuals to request immediate notification once they have been placed on lists that contain sensitive data. Reputable data brokers will want to respond to good-faith complaints, to make their lists more accurate. Plaintiffs' lawyers could use defamation law to hold recalcitrant firms accountable.

We need regulation to help consumers recognize the perils of the new information landscape without being overwhelmed with data. The right to be notified about the use of one's data and the right to challenge and correct errors is fundamental. Without these protections, we'll continue to be judged by a big-data Star Chamber of unaccountable decision makers using questionable sources.

Policymakers are also free to restrict the scope of computational reasoning too complex to be understood in a conventional narrative or equations intelligible to humans. They may decide: if a bank can't give customers a narrative account of how it made a decision on their loan application, including the data consulted and algorithms used, then the bank can't be eligible for (some of) the array of governmental prerequisites or licenses so common in the financial field. They may even demand the use of public credit scoring models, or fund public options for credit. Finally, they should look to Europe's General Data Protection Regulation (GDPR), which provides several standards for algorithmic accountability.¹⁷

¹⁷ See, e.g., Bryce W. Goodman, *A Step Towards Accountable Algorithms?: Algorithmic Discrimination and the European Union General Data Protection*, at <http://www.mlandthelaw.org/papers/goodman1.pdf> ("If implemented properly, the algorithm audits supported by the GDPR could play a critical role in making algorithms less discriminatory and more accountable.")

B. Emerging Issues in Preemption and Regulatory Arbitrage

Some fintech advocates advocate radical deregulation of their services, to enable their rapid entry into traditional banking markets. However, there is a risk of the fintech label merely masking “old wine in new bottles.” The annals of financial innovation are long, but not entirely hallowed.¹⁸ When deregulatory measures accelerated in the late 1990s and early 2000s, their advocates argued that new technology would expertly spread and diversify risk. However, new quantitative approaches often failed to perform as billed. Most fundamentally, a technology is only one part of a broader ecosystem of financial intermediation.¹⁹

I do believe that some fintech may promote competition and create new options for consumers. But we should ensure that it is fair competition, and that these options don’t have hidden pitfalls. In my research on the finance and internet sectors, I have explored patterns of regulatory arbitrage and opaque business practices that sparked the mortgage crisis of 2008.²⁰ I see similar themes emerging today.

In the run-up to the crisis, federal authorities preempted state law meant to protect consumers.²¹ The stated aim was to ensure financial inclusion and innovation, but the unintended consequences were disastrous. Federal authorities were not adequately staffed to monitor, let alone deter or punish, widespread fraudulent practices. Agencies like the Office of the Comptroller of Currency (OCC) also flattened diverse state policies into a one-size-fits-all, cookie-cutter approach. We all know the results.²² It now appears that the OCC may be repeating its past mistakes.

¹⁸ FINANCIAL CRISIS INQUIRY COMMISSION, FINAL REPORT OF THE NATIONAL COMMISSION ON THE CAUSES OF THE FINANCIAL AND ECONOMIC CRISIS IN THE UNITED STATES (2011)

¹⁹ Tom C.W. Lin, *Infinite Financial Intermediation*, 50 WAKE FOREST L. REV. 643 (2015). This article’s sections on “linked stability,” “financial cybersecurity,” and “intermediary independence” (pages 661 onwards) should be of particular interest to the committee. See also Tom C.W. Lin, *The New Financial Industry*, 65 ALA. L. REV. 567, 595 ff. (2014) (offering 10 “regulatory principles for the new financial industry”).

²⁰ Frank Pasquale, *The Black Box Society* (2015). Chapter 4 (*Finance’s Algorithms: The Emperor’s New Codes*) describes these problems in detail. Chapter 5 offers regulatory proposals.

²¹ FCIC Report, 112 and *passim* (“Once OCC and OTS preemption was in place, the two federal agencies were the only regulators with the power to prohibit abusive lending practices by national banks and thrifts and their direct subsidiaries.”); *id.*, at 350 (“The Office of Thrift Supervision has acknowledged failures in its oversight of AIG . . . a former OTS director[] told the FCIC that as late as September 2008, he had “no clue—no idea—what [AIG’s] CDS liability was.”).)

²² Fortunately, the Supreme Court quickly signalled after the crisis that its pro-preemption approach here had gone too far. See Arthur E. Wilmarth, *Cuomo v. Clearing House: The Supreme Court Responds to the Subprime Financial Crisis and Delivers a Major Victory for the Dual Banking System and Consumer Protection*, in THE PANIC OF 2008: CAUSES, CONSEQUENCES AND IMPLICATIONS FOR REFORM, Lawrence E. Mitchell and Arthur E. Wilmarth Jr., eds., Edward Elgar Publishing, 2010, at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1499216.

The OCC has released a White Paper, Exploring Special Purpose National Bank Charters for Fintech Companies, in 2016 (“White Paper”).²³ The OCC believes that such charters “could advance important policy objectives, such as enhancing the ways in which financial services are provided in the 21st century, while ensuring that new fintech banks operate in a safe and sound manner, support their communities, promote financial inclusion, and protect customers.”²⁴ The OCC is, to be sure, well-intentioned. Its Office of Innovation has energetically helped entrepreneurs to understand regulatory mandates by offering informal, candid discussions “with OCC staff regarding financial technology, new products or services, partnering with a bank or fintech, or any other matter related to financial innovation.”²⁵ However, several negative consequences could arise out of OCC efforts to go beyond informal counseling about extant legal obligations, by substantively altering these obligations via special purpose national bank charters for fintech firms.

For example, such fintech charters could enable regulatory arbitrage around state restrictions on payday lending. As 270 entities—community, labor, civil rights, faith-based, and military and veterans groups—observed earlier this year, 90 million Americans “live in jurisdictions where payday lending is illegal.”²⁶ These state consumer protection laws help consumers “save billions of dollars each year in predatory payday loan fees that trap people in long-term, devastating cycles of debt.”²⁷ OCC should not take action to preempt them.²⁸

²³ Office of the Comptroller of the Currency, Exploring Special Purpose National Bank Charters for Fintech Companies (2016), <https://www.occ.treas.gov/topics/bank-operations/innovation/special-purposenational-bank-charters-for-fintech.pdf> (“White Paper”).

²⁴ *Id.*, at 2.

²⁵ OCC Office of Innovation Office Hours, at, e.g., <https://www.occ.gov/topics/responsible-innovation/innovation-office-hours.pdf>; see also CFPB’s Project Catalyst.

²⁶ Center for Responsible Lending, States without Payday and Car-title Lending Save Over \$5 Billion in Fees Annually, at

http://www.responsiblelending.org/sites/default/files/nodes/files/research-publication/crl_payday_fee_savings_jun2016.pdf (2016); Comment Letter of Over 200 Community, Labor, and Nonprofit Groups, at http://www.neweconomy.org/wp-content/uploads/2017/01/comment_occ_fintech_01132017.pdf (2017) (“While the fintech industry has the potential to encourage innovation, we have also seen costly payday lenders hide behind the costume of ‘fintech.’”).

²⁷ *Id.*

²⁸ Americans for Financial Reform, Exploring Special Purpose National Bank Charters for Fintech Companies, Comment Letter, Jan. 15, 2017, at <https://www.occ.gov/topics/responsible-innovation/comments/comment-americans-for-financial-reform.pdf> (explaining broad array of legal and policy concerns that would arise if such charters were granted); Center for Digital Democracy and U.S. PIRG, Exploring Special Purpose National Bank Charters for Fintech Companies, Comment Letter, at <https://www.occ.gov/topics/responsible-innovation/comments/comment-cdd-uspig.pdf> (“lack of transparency around the processing of data and automated algorithms may lead to increasing information asymmetries between the financial institution and the individual and thus consumers are left with less awareness and a lack of understanding and control over important financial decisions.”).

These are not mere hypothetical concerns; as the New Economy Project has documented, online lenders “have been subject to a long list of state and federal enforcement actions, settlement agreements, and investigations.”²⁹ Moreover, they may lure unsuspecting borrowers away from much more sustainable alternatives, including publicly vetted options.³⁰

Nor should the Senate rush to consider a proposed bill to legislatively overturn the 2nd Circuit’s decision in *Madden v. Midland Funding, LLC*, which applied New York state usury law to loans purchased by a debt collector who believed that those laws would be preempted, since the loans were originated by a national bank.³¹ As Adam Levitin has explained, there are not sound legal or policy arguments to ground present challenges to *Madden*.³² As Levitin explains, “Preemption is part of a package with regulation, but once the loan passes beyond the hands of a National Bank, it loses its preemption protection and becomes subject to state usury laws.”³³ There is little reason to undermine the dual banking system by applying a talismanic shield against usury laws to loans even once they have been sold by the intended beneficiary of preemption.³⁴

One more aspect of regulatory arbitrage is now in fintech news: recent applications by Square and SoFi for Industrial Loan Company (ILC) charters. Walmart’s 2006

²⁹ New Economy Project, Testimony Of New Economy Project Before The New York Senate Committees On Banks And Consumer Protection and the Assembly Committees On Banks, Small Business, and Consumer Affairs & Protection, Public Hearing on Online Lending Practices, at <http://www.neweconomyproject.org/resource/testimony-nys-senate-assembly-hearing-regarding-online-lending/>. For more on New York concerns, see Daniel Alter, The “Business of Banking” in New York – An Historical Impediment To the OCC’s Proposed National “Fintech Charter,” Notice & Comment, Blog of the Yale J. Reg., June 29, 2017, at <http://yalejreg.com/nc/the-business-of-banking-in-new-york-an-historical-impediment-to-the-occs-proposed-national-fintech-charter-by-daniel-s-alter/>.

³⁰ David Lazarus, Pricy ‘fintech’ lenders put the squeeze on cash-strapped small businesses, LA Times, June 16, 2017, at <http://www.latimes.com/business/lazarus/la-fi-lazarus-small-business-loans-20170616-story.html> (reporting that an “associate administrator for the federal Small Business Administration’s Office of Capital Access, advised starting the hunt for capital not with a fintech firm but with the agency’s LINC search tool (that’s LINC as in Leveraging Information and Networks to access Capital),” in response to Lazarus’s story of a small business owner charged amounts that “translated to an annual percentage rate of 55%” by a fintech firm).

³¹ *Madden v. Marine Midland Funding*, No. 14-2131 (2d Cir. 2015).

³² Adam Levitin, *Madden v. Marine Midland Funding*, <http://www.creditslips.org/creditslips/2015/07/madden-v-marine-midland-funding.html>.

³³ *Id.*; see also Adam Levitin, *Hydraulic Regulation: Regulating Credit Markets Upstream*, 26 Yale Journal on Regulation (2009).

³⁴ Adam Levitin, *Guess Who’s Supporting Predatory Lending*, Credit Slips, <http://www.creditslips.org/creditslips/2017/08/guess-whos-supporting-predatory-lending.html> (2017) (“[T]here’s no problem with the world post-Madden, so why mess with things. But if a “fix” is needed, it ought to be (1) narrowly tailored, and (2) ensure maximum consumer protection. . . . [A]ny fix that goes beyond protecting securitizations by banks in which servicing is retained is facilitating predatory lending.”).

application for an ILC charter was eventually withdrawn, but it led to a compelling policy argument about the optimal separation between banking and commerce.³⁵ Arthur E. Wilmarth, Jr., warned that allowing commercial firms to acquire ILCs would conflict with the general American financial policy of separating banking and commerce, generate systemic risk, and enable the resulting ILCs and their parent firms to avoid necessary regulatory scrutiny, since “FDIC does not have authority to exercise consolidated supervision over commercial owners of ILCs.”³⁶ Professor Mehrsa Baradaran countered that, in some instances, allowing firms to merge banking and commerce functions could enhance the safety and soundness of the banking system.³⁷

However, in this case, neither SoFi nor Square appear to be the type of commercial firms which would fit Baradaran’s account, since they would not inject the source of strength that was praised by Baradaran in the Walmart scenario (a large and viable non-financial business) into the banking system. I agree with Professor Wilmarth that “Banking-industrial combinations would . . . create unfair competitive advantages for large commercial and industrial firms that can afford the costs of acquiring and operating banks.”³⁸ Far more study of fintech as a sector is needed before the FDIC grants such applications. As Rep. Maxine Waters has observed, in a detailed letter to the FDIC calling for a public hearing on the issue, premature granting of applications for ILCs “would set a precedent that a wide variety of other fintech companies may choose to follow even though concerns related to financial inclusion, consumer benefits, supervision, and regulation of such entities are still unresolved.”³⁹

The Fed was right to call for the closure of the ILC loophole last year. Though there was an interesting scholarly debate after WalMart applied to obtain an ILC charter in 2006, some more recent, post-moratorium applicants do not appear to have the redeeming characteristics of a large commercial firm. They could also be acquired by other firms, further eroding the division between banking and commerce that lies at the heart of U.S. financial regulatory goals. As Professor Wilmarth has argued, given high concentration levels in the economy in general, and the technology sector in particular, “If we permit the formation of new banking-industrial conglomerates, we will be putting more of our eggs

³⁵ WalMart and several other commercial firms applied to acquire ILCs from 2005-2006.

³⁶ Arthur E. Wilmarth, Jr., *Wal-Mart and the Separation of Banking and Commerce*, 39 Conn. L. Rev. 1539 (2007).

³⁷ Mehrsa Baradaran, *Reconsidering the Separation of Banking and Commerce*, 80 George Washington Law Review 385 (2012).

³⁸ Arthur E. Wilmarth, Jr., *Beware the Return of the ILC*, American Banker, Aug. 2, 2017, at <https://www.americanbanker.com/opinion/beware-the-return-of-the-ilc>.

³⁹ Press Release, Waters Calls on FDIC to Hold Public Hearing on SoFi’s Application for Bank Charter, at <https://democrats-financialservices.house.gov/news/documentsingle.aspx?DocumentID=400739>.

into very few baskets, and federal regulators will be under great pressure to protect those baskets during future financial and economic disruptions.”⁴⁰

III. Futurist Fintech

Though sober reports from the World Economic Forum, Deloitte, and governmental entities give a good sense of the incrementalist side of fintech, it is important to realize that much of the excitement about the topic of financial technology arises out of a more futuristic perspective. On Twitter, hashtags like #legaltech, #regtech, #insurtech, and #fintech often convene enthusiasts who aspire to revolutionize the financial landscape—or at least to make a good deal of money disrupting existing “trust institutions” (e.g., the intermediaries which help store and transfer financial assets).

Futurist fintech envisions “smart contracts,” which would be executed via some degree of automatic, code-based enforcement.⁴¹ As one article puts it, “Where a smart contract’s conditions depend upon real-world data (e.g., the price of a commodity future at a given time), agreed-upon outside systems, called oracles, can be developed to monitor and verify prices, performance, or other real-world events.”⁴² However, until robotic assessments of physical reality are far less delayed, corroded by a lack of data, and contestable (thanks to the messy complexity of discordant human meanings), the prevalence of totally automated, smart contracts is likely to be limited.

There are many contractual relationships that are too complex and variable, and require too much human judgment, to be reliably coded into software. Code may reflect and in large part implement what the parties intended, but should not *itself* serve as the contract or business agreement among them.

Still, some technologists and lawyers aspire to that subsumption, echoing older movements for financial deregulation.⁴³ The rise of Bitcoin as an alternative currency has

⁴⁰ Arthur E. Wilmarth, Jr., *Beware the Return of the LLC*, American Banker, Aug. 2, 2017, at <https://www.americanbanker.com/opinion/beware-the-return-of-the-llc>

⁴¹ Joshua Fairfield, *Smart Contracts, Bitcoin Bots, and Consumer Protection*, 71 WASH. & LEE L. REV. ONLINE 35, 38–39 (2014) (“Smart contracts—automated programs that transfer digital assets within the block-chain upon certain triggering conditions—represent a new and interesting form of organizing contractual activity.”).

⁴² Nicolette De Sevres, Bart Chilton & Bradley Cohen, *The Blockchain Revolution, Smart Contracts and Financial Transactions*, 21 No. 5 CYBERSPACE LAWYER 3, 3 (June 2016). A smart contract is created by encoding the terms of a traditional contract and uploading the smart contract to the blockchain. “Contractual clauses are automatically executed when pre-programmed conditions are satisfied,” and because the transactions are monitored, validated, and enforced by the blockchain, there is no need for a trusted third party, such as an escrow agent. *Id.*

⁴³ DAVID GOLUMBIA, *THE POLITICS OF BITCOIN* (2016) (describing parallels between cryptocurrency movement, crypto-anarchist beliefs, and older movements to discredit or dismantle financial regulation and central banking).

sparked an interest in automation of transactions and recordation.⁴⁴ Software can allow distributed computers to transfer information en masse and monitor one another.⁴⁵ Bitcoin is a particular case of using blockchain technology to ensure a durable record of ownership, which is intended to be regulated by code.⁴⁶ Blockchain enthusiasts envision it scaling en masse to serve as a distributed ledger of all manner of transactions.

Given enthusiasm expressed for blockchain at the highest levels of international finance,⁴⁷ governments may soon explore more extensive use of blockchain-based, public ledgers of ownership transactions, such as land records.⁴⁸ Such a digital transition would cut out a fair number of time-consuming steps in current financial processing. Using technology to modernize transactions would seem to be a huge opportunity for saving personnel costs and reducing inconvenience.

Yet there are also reasons for caution. As James Grimmelmann observed in 2005, “software is vulnerable to sudden failure, software is hackable, and software is not

⁴⁴ Joshua Fairfield, *Bitproperty*, 88 S. CAL. L. REV. 805, 805 (May 2015) (“Increased interest in cryptocurrencies has driven the development of a series of technologies for creating public, cryptographically secure ledgers of property interests that do not rely on trust in a specific entity to curate the list.”).

⁴⁵ Michael J. Madison, *Social Software, Groups, and Governance*, 2006 MICH. ST. L. REV. 153, 156 (2006).

⁴⁶ Nicolette De Seves & Bart Chilton & Bradley Cohen, *The Blockchain Revolution, Smart Contracts and Financial Transactions*, 21 NO. 5 CYBERSPACE LAWYER NL 3, 3 (June 2016). A blockchain is a peer-to-peer network where each computer in the network verifies and records every transaction on the network, where transactions are only recorded on the ledger once the network confirms the validity of the transaction, thus preventing third party manipulation and streamlining the record.

⁴⁷ World Economic Forum, *The future of financial infrastructure: An ambitious look at how blockchain can reshape financial services*, (Aug. 2016) http://www3.weforum.org/docs/WEF_The_future_of_financial_infrastructure.pdf; South African Reserve Bank, *Position Paper on Virtual Currencies*, (Dec. 3, 2014), [https://www.resbank.co.za/RegulationAndSupervision/NationalPaymentSystem\(NPS\)/Legal/Documents/Position%20Paper/Virtual%20Currencies%20Position%20Paper%20Final_02of2014.pdf](https://www.resbank.co.za/RegulationAndSupervision/NationalPaymentSystem(NPS)/Legal/Documents/Position%20Paper/Virtual%20Currencies%20Position%20Paper%20Final_02of2014.pdf); see also David Mills, et. al., *Distributed ledger technology in payments, clearing and settlement*, Federal Reserve Board (2016) available at <https://www.federalreserve.gov/econresdata/feds/2016/files/2016095pap.pdf>.

⁴⁸ It is at this point unclear whether decentralization via distributed ledger technology would address or exacerbate key problems identified in the Mortgage Electronic Registration Systems, Inc. (MERS) in the wake of the financial crisis. Its implementation of “cloud computing” technology was meant to enable instantaneous transfers of ownership rights within the confines of a centralized database. MERS aspired to remove recording responsibilities from the state to a private entity owned by parties (mortgage lenders) with an interest in ownership disputes. Christopher L. Peterson, *Two Faces: Demystifying the Mortgage Electronic Registration System’s Land Title Theory*, 53 WILLIAM AND MARY LAW REVIEW 111 (2011).

robust.⁴⁹ No technology has developed that would make the blockchain environment impervious to these problems. Waves of hacking and illicit intrusions have rocked health care institutions,⁵⁰ banks,⁵¹ and even campaigns⁵² and governments.⁵³ While blockchain enthusiasts claim that distributed ledgers help avoid the “honeypot” problem of database centralization (which is an inviting target for hackers), concentration of “mining power” could lead to a 51% attack on even a distributed ledger system. Excessive forking is also a threat to the integrity of such networks.

Moreover, some early adopters of this ideal of self-executing or coded law have experienced troubling and telling failures.⁵⁴ Investors in a “decentralized autonomous organization” (DAO) run on code have already experienced the turbulent and troubling aspects of software-governed legal orders. In early 2016, a hacker managed to take millions of dollars in a fashion unanticipated by the drafters of the code governing the organization. The main organizer of the DAO, Vitalik Buterin had to code a “hard fork” for the organization, which essentially shifted funds from the hacker’s account to an account where the original investors in the project could withdraw their funds.⁵⁵

According to Buterin and other organizers of the DAO, this intervention was a success story: it proved the recoverability of their system. But for advocates of futurist fintech, this was a Pyrrhic victory. The *post hoc* intervention violated the principle of autonomy supposedly at the core of the DAO.⁵⁶ Persons managed the smart contract—not mere code.⁵⁷ In other words, the only way the supposedly smart, incorruptible, automated,

⁴⁹ James Grimmelmann, *Regulation by Software*, 114 YALE L.J. 1719, 1742-44 (2005); see also James Grimmelmann, *Anarchy, Status Updates, and Utopia*, 35 PACE L. REV. 135 (2015) (demonstrating the persistence of governance problems in social software).

⁵⁰ See Jessica Jardine Wilkes, *The Creation of HIPAA Culture: Prioritizing Privacy Paranoia over Patient Care*, 2014 B.Y.U. L. REV. 1213 (2014) (“In 2009, the Office of Civil Rights started recording incidents of PHI breaches and created the “Wall of Shame,” which publicly exposes breaches affecting 500 people or more”).

⁵¹ Paul Merrion, *NY Fed’s role in SWIFT cyber heist prompts House panel data request*, WL 3085306, CQ ROLL CALL 2016. (describing hack of Bangladesh’s central bank).

⁵² Anthony J. Gaughan, *Ramshackle Federalism: America’s Archaic and Dysfunctional Presidential Election System*, 85 FORDHAM L. REV. 1021 (2016). (discussing Russian hackers); Melissa Eddy, *After a Cyberattack, Germany Fears Election Disruption*, N.Y. TIMES, Dec. 8, 2016.

⁵³ Tim McCormack, *The Sony and OPM Double Whammy: International Law and Cyber “Attacks”*, 18 SMU SCI. & TECH. L. REV. 379 (2015).

⁵⁴ Nathaniel Popper, *A Hacking of More Than \$50 Million Dashes Hopes in the World of Virtual Currency*, N.Y. TIMES (June 17, 2016).

⁵⁵ Michael del Castillo, *The Hard Fork: What’s About to Happen to Ethereum and the DAO*, COINDESK July 18, 2016, <http://www.coindesk.com/hard-fork-ethereum-dao/>; Vitalik Buterin, *Hard Fork Completed*, ETHEREUM BLOG (July 20, 2016), <https://blog.ethereum.org/2016/07/20/hard-fork-completed/>.

⁵⁶ Matt Levine, *Blockchain Company’s Smart Contracts Were Dumb*, BLOOMBERG NEWS (June 17, 2016), <https://www.bloomberg.com/view/articles/2016-06-17/blockchain-company-s-smart-contracts-were-dumb>.

⁵⁷ *Id.*

and immutable contract actually protected investors was by *allowing human intervention to change its terms and consequences*. Rather than demonstrating the dispensability of human interventions, the DAO has proved the opposite—the vital necessity of human governance over even extensively coded and computerized forms of human cooperation.

When Primavera De Filippi and Samer Hassan speak of the “incorporation of legal rules into code” and “regulation by code,” culminating in a reliance on code “not only to enforce legal rules, but also to draft and elaborate these rules,” they do not present these phenomena as unalloyed goods.⁵⁸ Rather, they are cautious about the “the prospect of automated legal governance” because it may “reduce the freedoms and autonomy of individuals.”⁵⁹ The answer to these concerns is not to double down on the translation of legal rules into code. Rather, the preservation of human control over financial systems will require an alternative paradigm—a vision of software as a tool to assist persons, rather than a machine replacing them. Nor should policymakers abandon long-standing principles of financial regulation to make way for forms of financial automation that have yet to be proven. There is little evidence that regulation means their “revolutionary promise” would be lost, as it was probably never there in the first place.⁶⁰

IV. Conclusion

This testimony has presented reasons to be cautious about legislative or regulatory efforts to federally preempt state laws now applying to both incrementalist and futuristic fintech. I know that advocates for deregulation will likely argue that imposing a level playing field on fintech and non-fintech firms will harm innovation in the fintech sector. But innovation is not good in itself. The toxic assets at the core of the financial crisis were innovative in many ways, but ultimately posed unacceptable risks.⁶¹ So, too, may the superficially attractive services of many fintech firms.

To be sure, promoters of fintech deregulation may claim that such worries are anecdotal. But many tech firms have only themselves to blame for obscuring what we know about the sector. As I explain in my book *The Black Box Society*, aggressive assertion of trade secrecy claims—both about data collection and use, and the algorithms used to make judgments about us—keep regulators and legislators in the dark about the full range of

⁵⁸ Primavera De Filippi & Samer Hassan, *Blockchain Technology as a Regulatory Technology: From Code is Law to Law is Code*, *FIRST MONDAY*, 21 (12-5) (2016); <http://firstmonday.org/ojs/index.php/fm/article/view/7113/5657#author>.

⁵⁹ *Id.*

⁶⁰ ADAM GREENFIELD, *RADICAL TECHNOLOGIES* 303 (2017) (“the inventors of the blockchain overtly intended to erode statism and central administration. Virtually everywhere, decision algorithms are touted to us on the promise that they will permanently displace human subjectivity and bias. And yet in every instance we find that these ambitions are flouted, as the technologies that were supposed to enact them are captured... by existing concentrations of power.”).

⁶¹ JENNIFER TAUB, *OTHER PEOPLE’S HOUSES* (2015).

risks in fintech.⁶² If there is any message I can deliver to the committee today, it is to empower agencies like CFPB and the OFR, and to expand their funding, as they try to come to grips with a rapidly financial landscape.

Data gathering is important, because nearly every story of technologized “financial inclusion” can be countered with other stories of exclusion, via digital redlining. As Cathy O’Neil’s book *Weapons of Math Destruction* shows, consumers often are in the dark about what new algorithms are judging them, and how they can respond if they think they’ve been treated unfairly.⁶³ Regulators need to understand more fully what these firms are doing, and how they are performing. Moreover, as the recent Equifax hack shows, concentration of information in almost any firm creates great risks to consumers. Improving financial cybersecurity should be an essential goal in fintech policy.⁶⁴ I applaud the GAO for highlighting security issues in its report, and Senator Jack Reed for proposing forward-thinking legislation on this front.

We should not have faith that accelerated deregulation will free the financial sector to solve important social problems. The value proposition of some fintechs merely points out larger problems in existing credit provision that could be solved by more direct action. For example, if fintechs can make a hefty profit by refinancing student debts owed to the U.S. government, perhaps that is less an indication of fintechs’ business prowess, than it is evidence that the government is overcharging students for loans.⁶⁵ If consumers are desperate for marketplace lending to cover next month’s utility bills, maybe we need to ensure work pays more fairly, rather than plying them with digital loans. I am confident

⁶² FRANK PASQUALE, *THE BLACK BOX SOCIETY* (2015).

⁶³ CATHY O’NEIL, *WEAPONS OF MATH DESTRUCTION* (2016).

⁶⁴ Kristin Johnson, *Managing Cyber Risks*, 50 Ga. L. Rev. 547 (2016), at https://papers.ssm.com/sol3/papers.cfm?abstract_id=2847234 (discussing SEC cyber-risk management disclosure obligations); Kristin Johnson and Steven Ramirez, *Sustainability: A New Guiding Principle for Financial Market Regulation*, 11 U. ST. THOMAS L.J. 386 (2015).

⁶⁵ Michael Simkovic, *The Knowledge Tax*, U. Chi. L. Rev. (2015), at <http://chicagounbound.uchicago.edu/uclrev/vol82/iss4/4/>; Marc Nerlove, *Some Problems in the Use of Income-contingent Loans for the Finance of Higher Education*, 83 J. POL. ECON. 157, 160, 180 (1975). When private sector refiners can “cherry pick” or “cream skim” the most creditworthy borrowers from a federal credit program, that risk selection eventually leaves the government dependent on repayment by the worst credit risks. That erodes the sustainability of the federal loan program—and its borrower protections, like income based repayment. See Frank Pasquale, *Democratizing Higher Education: Defending & Extending Income Based Repayment Programs*, 28 LOY. CONSUMER L. REV. 1 (2015), at <http://lawcommons.luc.edu/lclr/vol28/iss1/2>, for more on the politics of public finance accounting and the role of private lenders in undermining the perceived and actual sustainability of federal credit programs.

that a system of postal banking would do far more than the fintech sector to deliver financial inclusion to the millions of Americans without adequate access to deposit accounts.⁶⁶

In conclusion: Fintech should not be an excuse for more regulatory arbitrage. We need far more information about how fintech firms are gathering and processing data. And we should be wary about the ability of technology alone to solve much larger social problems of financial inclusion, opportunity, and fair, non-discriminatory credit provision.

⁶⁶ MEHRSA BARADARAN, *HOW THE OTHER HALF BANKS* (2015). Over 25% of US households are unbanked or underbanked. FDIC, *FDIC National Survey of Unbanked and Underbanked Households* (2016).

**RESPONSES TO WRITTEN QUESTIONS OF
SENATOR MENENDEZ FROM LAWRENCE L. EVANS**

Q.1. The Equifax data breach which impacted more than 143 million U.S. consumers revealed weaknesses in the company’s data security protocols. In your opinion, do consumer reporting agencies have sufficient data security standards and infrastructure to effectively protect the sensitive personal data they hold? Are there any existing legislative or regulatory gaps that contribute to this problem?

A.1. While we cannot opine on the sufficiency of data security standards and infrastructure at consumer reporting agencies at this time, we are initiating work in response to a request from the Ranking Member of the Subcommittee on Financial Institutions and Consumer Protection that will allow GAO to address these concerns. Based on our existing body of work we can comment on infrastructure, data security and the regulatory landscape more broadly.

Regarding oversight of critical infrastructure (which includes 16 key sectors, including the financial services sector) the National Institute of Standards and Technology Cybersecurity Framework is a voluntary standard intended to establish a common taxonomy for building cybersecurity programs. Outside of that, each industry is driven by its own regulatory requirements and Federal/State oversight structures.

Current regulations impose requirements on financial institutions to protect consumer data and these safeguards explicitly apply to consumer reporting agencies. Specifically, the Gramm–Leach–Bliley (GLB) Act restricts, with some exceptions, the disclosure of nonpublic information by companies defined under the law as “financial institutions”. The Act also requires the Federal Trade Commission (FTC) and certain other Federal agencies to establish standards for financial institutions relating to administrative, technical, and physical information safeguards. As part of its implementation of the GLB Act, the FTC issued the Safeguards Rule, which requires financial institutions under FTC jurisdiction to have measures in place to secure customer information and ensure affiliates and services providers also safeguard this information.¹ The Rule applies to many companies of all sizes that are significantly engaged in financial products and services, including consumer reporting agencies. FTC has also used its statutory authority to address unfair and deceptive acts and practices under section 5 of the FTC act to enforce data security compliance.

Currently, there is no Federal law that governs breach reporting but the prudential banking regulators have issued interpretive guidance requiring their regulated institutions to report breaches promptly to allow breach victims to take steps to protect themselves. Similarly, the Securities and Exchange Commission and the Commodity Futures Trading Commission have also issued rules that require compliance with the notification requirements of GLB Act.

¹For additional information on the Rule see <https://www.ftc.gov/tips-advice/business-center/guidance/financial-institutions-customer-information-complying>.

Moreover, States have varying laws associated with privacy/data breach notification. It is important to note that the FTC Safeguards Rule establishes standards but does not place requirements on institutions to notify customers within a specified timeframe.² While banks are subject to regular examination of their information security practices, the nationwide consumer reporting companies (Equifax, TransUnion, and Experian) may not receive the same level of supervisory scrutiny. The Bureau of Consumer Financial Protection (CFPB) has supervisory and enforcement authority over the national consumer reporting companies but the extent to which this oversight includes regular examinations of information security practices will be the subject of future GAO work. CFPB does not have authority to enforce the GLB Act's data security provisions, but the agency has taken an enforcement action under its unfair, deceptive or abusive acts or practices authority against a payments company for allegedly deceptive statements about data security practices.

**RESPONSES TO WRITTEN QUESTIONS OF
SENATOR MENENDEZ FROM ERIC W. TURNER**

Q.1. The Federal Deposit Insurance Corporation (FDIC) found that in 2013 nearly 30 percent of Americans households were “unbanked” or “underbanked,” with the highest rates among non-Asian minorities, low income households, and unemployed households. What technological advancements in the Fintech industry can promote financial inclusion among the “unbanked” and underbanked”?

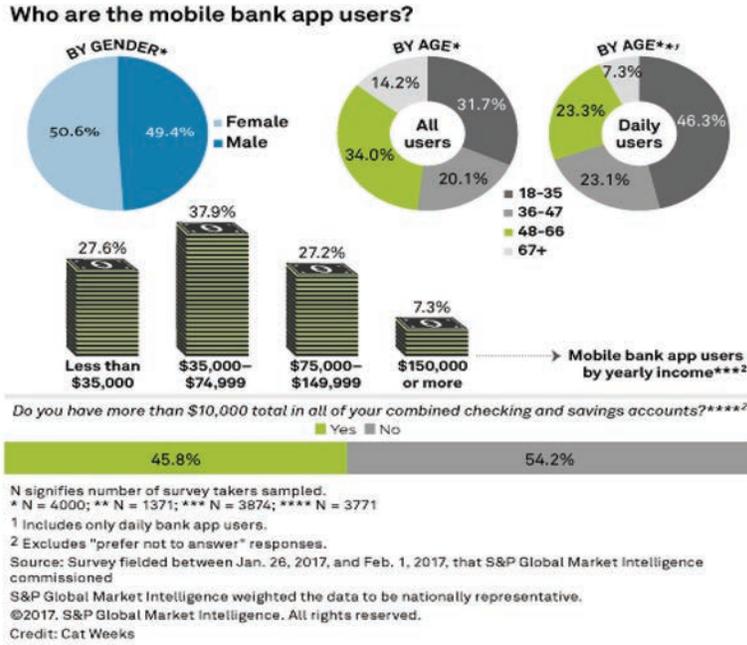
A.1. Innovations in financial technology can provide increased financial inclusion through the ability to obtain services and the use of alternative data sources or underwriting methodologies.

Traditionally consumers have obtained financial services from physical branch locations. As banks continue to close branches, many consumers have lost access to important financial services. U.S. bank branches decreased by 1,981 locations during the period between June 30, 2016, and June 30, 2017. As this trend continues, fintech innovations are filling the gap by providing traditional banking services such as deposit accounts, payments, and lending through digital channels.

Regardless of their location, users can now access these services through online or mobile channels. This especially benefits people in rural or other areas that have a low number of bank branches due to the economics of keeping a physical location. Mobile banking technology can also help community banks serve more customers even without the extensive branch networks of large banks.

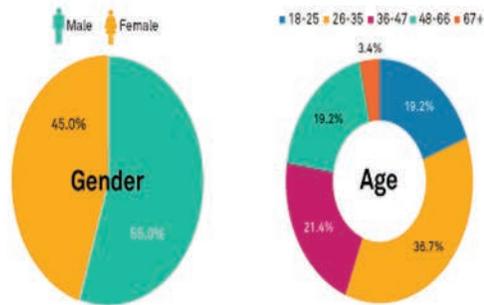
According to a survey fielded by S&P Global Market Intelligence earlier this year, 65.5 percent of mobile banking users had an annual income of less than \$75,000 and 54.2 percent of users held less than \$10,000 in their combined checking and savings accounts.

²The FTC is seeking comment on the Safeguards Rule, including whether the elements of an information security program should include a breach response plan. See 81 *FR* 61,632.



These statistics are similar to those of mobile payment users, who instead of using cash or checks to complete transactions rely on mobile applications to do things such as pay a bill, send money to another individual, or complete a purchase. According to S&P Global Market Intelligence survey results, 63.7 percent of mobile payment users had an annual income of less than \$75,000.

Who are the mobile payment users?

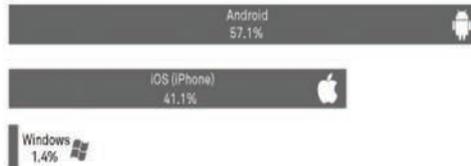


Please indicate your personal annual salary range.¹

- Less than \$34,999 per year
- \$35,000-74,999 per year
- \$75,000-\$149,999 per year
- \$150,000+ per year



Which type of smartphone is your primary personal phone?²



Which device do you use to make mobile payments?³



Data compiled May 26, 2017.
 N= 504, N signifies the number of survey takers sampled who had used a mobile payment app in the past 30 days.

¹ Excludes "prefer not to answer" responses (2.4%).

² Excludes "other" and "Blackberry" responses (less than 1%).

³ Responses do not sum to 100% because survey takers could select more than one response.

Source: Survey fielded between Jan. 25, 2017, and Feb. 2, 2017, that S&P Global Market Intelligence commissioned.

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Credit: Zain Ullah

In both cases, it is clear that lower income individuals have found mobile banking and payment technologies beneficial to their financial well being.

Furthermore, increased access to term loans, as opposed to payday loans, can benefit the traditionally unbanked or underbanked. Digital lenders rely on mobile or web-based platforms and non-traditional underwriting models to deliver loans to consumers and small businesses that may otherwise be denied credit by traditional banks. Square Capital, for instance, sees 54 percent of loans go to women, compared to the 16 percent quoted by the Small Business Administration.¹

Digital lenders offer credit to borrowers based on advanced analytics, nontraditional underwriting, and alternative data. These platforms leverage quantitative models that look to create proprietary credit scores outside of those provided by models such as FICO or even Vantage scores. While some platforms use inputs from national credit reporting bureaus, they may also include alternative data or weight credit factors differently than more well known models.

Alternative data presents the opportunity to gain a more holistic view of a borrower. For example, information such as utility or rent payments can be included in the underwriting decision. For low-income borrowers who may choose to rent housing and where utility bills may be a large monthly expense, these are important and likely more predictive factors when it comes to the ability to repay.

According to a Federal Reserve research paper published in July 2017, alternative data sources allowed borrowers with few or inaccurate credit records to access credit.² This report further reinforced that these borrowers were from areas that lacked access to credit due to low income levels or disproportionate branch closings.

Q.2. Fintech companies are subject to anti-discrimination laws related to the services and products they provide. However, there are concerns that using new data and algorithms could result in a company unintentionally discriminating against a protected group. What steps are companies taking to ensure that their services and products do not discriminate against protected classes?

A.2. The use of new data and algorithms primarily applies to providing credit to individuals in the digital lending space. These lenders have sought ways to provide credit to previously underserved individuals using alternative sets of data. As the industry has matured, there have been numerous cases where it was decided that some data sets could potentially discriminate against protected classes. For example, offering personal loans based on the college from which you graduated was largely considered a valid input for lenders years ago, but many have shifted away from this. Other inputs like social media usage were once considered but never ultimately made it into underwriting criteria due to similar concerns.

Digital lenders have made great effort to ensure that underwriting algorithms are accurate and provide the best financial in-

¹ https://www.snl.com/web/client?auth=inherit#news/article?id=42127613&KPLT=6&s_data=si%3D2%26kpa%3D4db0879a-62d3-40e0-b6fd-9e14f2ab7bee%26sa%3D

² <https://www.philadelphiafed.org/-/media/research-and-data/publications/working-papers/2017/wp17-17.pdf>

clusion possible. In order to ensure that this continues, regulators should create a friendly environment for innovation. This could be through a regulatory sandbox or innovation office. The recent no-action letter from the CFPB to personal-focused digital lender Upstart is a good example of how regulators can better understand the space.³

Many of the underwriting inputs used by fintech startups today are similar to those used by traditional lenders, but in cases where alternative data is used, it will be up to the lenders and regulators to closely monitor adherence to fair lending practices.

Thank you again for the questions; I hope that our response has been useful.

**RESPONSES TO WRITTEN QUESTIONS OF SENATOR BROWN
FROM FRANK PASQUALE**

Q.1. Senator Crapo asked about regulatory sandboxes that would allow financial technology companies to experiment in real markets, and you mentioned some pilot programs have “proven their worth in health care policy.” Can you describe the types of pilot programs that have worked in other sectors; how such programs navigated conflicts between State and Federal law; and under what parameters or considerations a financial technology pilot program would need to operate in order to protect consumers and the marketplace?

A.1. Pilot programs can be important tools for gathering data necessary to evaluate products and services in various sectors, such as the health care and financial sectors.¹ Regulators in these sectors need to understand more fully what technology firms are doing and how they are performing to ensure proper regulations are in place that safeguard individuals but do not stifle innovation; pilot programs can be a tool to do this. Effective pilot programs support “responsible innovation” and provide transparency of process necessary to expose any potential pitfalls or unanticipated issues.²

Pilot programs are particularly important in gathering information from sectors that are not apt to be transparent with data. As in health care, where the average consumer does not have the information necessary to “‘second guess’ his or her [medical] provider about the amount or nature of care needed,³” the average consumer does not know how his or her financial and personal data is being used, or what data is even being mined, in order to make informed decisions and protect his or her financial health. Due to this knowledge gap, consumers of both health care and financial services depend on regulations that are based on a thorough and thoughtful understanding of the industry being regulated. Pilot

³ <https://www.consumerfinance.gov/about-us/newsroom/cfpb-announces-first-no-action-letter-upstart-network/>

¹ This answer was prepared by Jennifer Smith, Ryan H. Easley Research Fellow at the University of Maryland School of Law, after a request with initial guidance from Frank Pasquale, the witness. Professor Pasquale has reviewed the response and believes it to be a fully responsive response to the question.

² Press Release, Off. Comptroller of the Currency, Dept. of the Treasury, “OCC Issues Responsible Innovation Framework” (Oct. 26, 2016), <https://www.occ.gov/news-issuances/news-releases/2016/nr-occ-2016-135.html>.

³ Frank Pasquale, “Ending the Specialty Hospital Wars: A Plea for Pilot Program as Information-Forcing Regulatory Design”, in *The Fragmentation of U.S. Health Care: Causes and Solutions* 235, 272 (Einer Elhauge, ed., 2010).

programs can provide State and Federal regulators with the data and information necessary to formulate thorough and thoughtful regulations that do not stifle innovation and protect consumers.

In the health care sector, pilot programs are used to promote innovation and test new models of patient care and service. Although the health care and financial industries have their own unique issues and obstacles, health care pilot programs provide lessons that can assist the development and implementation of fintech pilots. For a recent example, the Food and Drug Administration (FDA) announced the launch of the Pre-Cert for Software Pilot Program in July 2017 and in September announced the nine companies selected to take part in the pilot program.⁴ One of the pilot program goals is to “enable [the FDA] to develop a tailored approach toward regulating [digital health] technology by looking first at the software developer and/or digital health technology developer, rather than primarily at the product, which is what [the FDA] currently [does] for more traditional medical devices.”⁵ Although this pilot program is in the beginning stages, the impetus, framework, and eventual outcomes may serve as guidance for developing pilot programs for fintech firms and regulators.

An example of a completed health care pilot program that may provide guidance for fintech pilots is a program testing a bundled payment model for care.⁶ This program was through the Agency for Healthcare Research and Quality (AHRQ) at the Department of Health and Human Services (HHS). Some of the takeaways that may inform the development and implementation of fintech pilot programs are: ensure the number of stakeholders and volume of participants are sufficient to provide good data; build consensus around key definitions and issues, such as assumption of risk; and build trust among participants. Additionally, the bundled payment model pilot program faced “delays and uncertainty related to State regulations.”⁷ Specifically, California hospitals and health care plans participating in the pilot program worried physician payments through the bundled payment contracts would violate California regulations prohibiting the “corporate practice of medicine.”⁸ In response to this concern a model contract template was created and participants in California developed a split-bundle model. The “development and successful deployment of a common contracting

⁴Scott Gottlieb, “FDA Announces New Steps To Empower Consumers and Advance Digital Healthcare”, *FDA Voice* (July 27, 2017), <https://blogs.fda.gov/fdavoices/index.php/2017/07/fda-announces-new-steps-to-empower-consumers-and-advance-digital-healthcare/>; Press Release, U.S. Food & Drug Admin, “FDA Selected Participants for New Digital Health Software Precertification Pilot Program” (Sept. 26, 2017), <https://www.fda.gov/NewsEvents/Newsroom/PressAnnouncements/ucm577480.htm>. The nine companies selected are Apple, Fitbit, Johnson & Johnson, Pear Therapeutics, Phosphorus, Roche, Samsung, Tidepool, and Verily. Id.

⁵Digital Health Software Precertification (Precert) Program, U.S. Food & Drug Admin. (Sept. 27, 2017), <https://www.fda.gov/MedicalDevices/DigitalHealth/DigitalHealthPreCertProgram/default.htm>.

⁶In a bundled payment model “a group of providers receives a fixed payment from participating health plans. The payment is designed to cover the average cost of a defined ‘bundle’ of services related to a procedure or course of treatment.” M. Susan Ridgely et al., “The IHA Bundled Episode Payment and Gainsharing Demonstration”, AHRQ Delivery System Research: Study Snapshot 1 (AHRQ Pub. No. 15-0016-2-EF, 2015).

⁷M. Susan Ridgely et al., “The IHA Bundled Episode Payment and Gainsharing Demonstration”, AHRQ Delivery System Research: Study Snapshot 2 (AHRQ Pub. No. 15-0016-2-EF, 2015).

⁸M. Susan Ridgely et al., “The IHA Bundled Episode Payment and Gainsharing Demonstration”, AHRQ Delivery System Research: Study Snapshot 2 (AHRQ Pub. No. 15-0016-2-EF, 2015).

template that largely satisfied the contracting parties and State regulators” is cited as one of the programs’ successes.⁹

In addition to examining domestic pilot programs in various sectors, it is informative to look at international regulatory sandbox and pilot programs. Internationally, regulatory sandboxes/pilot programs are utilized to promote innovation in fintech and develop regulations.¹⁰ The United Kingdom’s Financial Conduct Authority (FCA) is often cited as a model for regulatory sandbox programs.¹¹ To date, the FCA has completed one cohort of testing, is in the process of testing for the second cohort, and is reviewing applications for inclusion in cohort three.¹² Hong Kong also utilizes supervisory sandboxes to “encourag[e] financial institutions to make use of Fintech and support[] initiatives that drive Fintech adoption and innovation.¹³” Hong Kong’s supervisory sandboxes are run through three regulators: the Hong Kong Monetary Authority,¹⁴ the Securities and Futures Commission,¹⁵ and the Insurance Authority.¹⁶ Additionally, the Monetary Authority of Singapore (MAS) supports regulatory sandboxes that “provide appropriate regulatory support by relaxing specific legal and regulatory requirements . . . for the duration of the sandbox.¹⁷”

In conclusion, pilot programs can be important tools for gathering data necessary to evaluate and refine fintech. Regulators need to understand how fintech firms operate and how they perform in order to properly regulate fintech and ensure innovation is supported and consumers are protected; pilot programs can support and advance responsible innovation.

⁹M. Susan Ridgely et al., “The IHA Bundled Episode Payment and Gainsharing Demonstration”, AHRQ Delivery System Research: Study Snapshot 2 (AHRQ Pub. No. 15-0016-2-EF, 2015).

¹⁰See Hong Kong Fintech, “Sandboxes”, <http://www.hongkong-fintech.hk/en/sandboxes.html> (last visited Oct. 3, 2017); “Monetary Authority Singapore, Fintech Regulatory Sandbox”, <http://www.mas.gov.sg/Singapore-Financial-Centre/Smart-Financial-Centre/FinTech-Regulatory-Sandbox.aspx> (last visited Oct. 3, 2017); Fin. Conduct Authority (U.K.), “Regulatory Sandbox”, (last updated Aug. 8, 2017), <https://www.fca.org.uk/firms/regulatory-sandbox>.

¹¹Stephanie Forshee, “OCC Has Banking Sandbox-like ‘Pilot’ for Fintechs in the Works”, Law.com (Aug. 10, 2017), <http://www.law.com/sites/almstaff/2017/08/10/occ-has-banking-sandbox-like-pilot-for-fintechs-in-the-works/?sreturn=20170902083457>. See also Fin. Conduct Authority (U.K.), “Regulatory Sandbox”, (last updated Aug. 8, 2017), <https://www.fca.org.uk/firms/regulatory-sandbox>.

¹²Fin. Conduct Authority (U.K.), “Financial Conduct Authority Provides Update on Regulatory Sandbox” (June 15, 2017), <https://www.fca.org.uk/news/press-releases/financial-conduct-authority-provides-update-regulatory-sandbox>.

¹³Hong Kong Fintech, “Sandboxes”, <http://www.hongkong-fintech.hk/en/sandboxes.html> (last visited Oct. 3, 2017).

¹⁴Hong Kong Monetary Authority, “Fintech Supervisory Sandbox” (FSS) (Sept. 29, 2017), <http://www.hkma.gov.hk/eng/key-functions/international-financial-centre/fintech-supervisory-sandbox.shtml>. The Hong Kong Monetary Authority operates a Fintech supervisory sandbox for “Fintech and other technology initiatives intended to be launched in Hong Kong by banks.” Id.

¹⁵Sec. & Futures Comm’n, “SFC Regulatory Sandbox” (Sept. 29, 2017), <http://www.sfc.hk/web/EN/sfc-fintech-contact-point/sfc-regulatory-sandbox.html>. The Securities and Futures Commission operates a regulatory sandbox “to provide a confined regulatory environment for qualified firms.” Id. Qualified firms are “both licensed corporations and start-up firms that intend to carry on a regulated activity under the [Securities and Futures Ordinance].” Id.

¹⁶Ins. Auth. (H.K.), “Insurtech Corner”, https://www.ia.org.hk/en/aboutus/insurtech_corner.html (last visited Oct. 3, 2017). The Insurance Authority’s “Insurtech Sandbox” was created to “facilitate a pilot run of innovative Insurtech applications by authorized insurers to be applied in their business operations.” Id.

¹⁷Monetary Authority Sing., “Understanding and Applying to the Sandbox”, <http://www.mas.gov.sg/Singapore-Financial-Centre/Smart-Financial-Centre/FinTech-Regulatory-Sandbox/Understanding-and-applying-to-the-sandbox.aspx> (last visited Oct. 3, 2017). See also “Monetary Authority Sing., Fintech Regulatory Sandbox Guidelines” (Nov. 2016), <http://www.mas.gov.sg/media/Smart%20Financial%20Centre/Sandbox/FinTech%20Regulatory%20Sandbox%20Guidelines.pdf>.

**RESPONSES TO WRITTEN QUESTIONS OF
SENATOR MENENDEZ FROM FRANK PASQUALE**

Q.1. The Federal Deposit Insurance Corporation (FDIC) found that in 2013 nearly 30 percent of Americans households were “unbanked” or “underbanked,” with the highest rates among non-Asian minorities, low income households, and unemployed households.¹ As new companies begin to market products and services to unbanked and underbanked households, what actions should Federal or State regulators pursue to ensure that consumers receive sufficient protections?

A.1. Fintech can be a means of building financial inclusion, especially for those Americans currently unbanked or underbanked; but there must be proper protections to ensure consumers are protected and information is obtained and used in a secure manner and in a way that does not unintentionally discriminate.² Federal and State regulators need to ensure consumers are protected from technical and privacy issues we know about now, as well as those we have yet to encounter. In order to build consumer trust and ensure protections, Federal and State regulators can take a number of actions, including: addressing regulatory confusions; extending privacy protections in other areas of the law to cover consumer data compiled and used by data brokers and fintech firms; require data brokers register with the Federal Trade Commission (FTC); and empower and expand funding to Federal agencies like the Consumer Financial Protection Bureau (CFPB) and the Office of Financial Research (OFR). But State and Federal regulators should not rush to deregulate in order to spur innovation and, further, the Federal Government should not preempt State laws aimed at protecting consumers, especially the unbanked and underbanked.

Consumers encounter confusion regarding regulations of the traditional banking sector and fintech sector. For example, Rob Nichols, president and chief executive of the American Banker Association stated: “consumers [] face potential confusion when dealing with two sectors that have differing regulatory regimes” and Nichols views this confusion as “leading to gaps in consumer protections.”³ As more consumers use fintech services regulatory confusion is likely to grow.⁴ Regulatory confusion may be particularly acute with the unbanked and underbanked, who are more likely to have lower levels of education than banked individuals.⁵ Addressing regulatory confusion on the State and Federal level is necessary to ensure consumers are protected.

Unbanked and underbanked individuals who may utilize fintech services instead of traditional banking services can benefit from ex-

¹ Fed. Deposit Ins. Corp., “2013 FDIC National Survey of Unbanked and Underbanked Households: Executive Summary” (2014), <https://www.fdic.gov/?householdsurvey?/2013??execsumm.pdf>.

² This answer was prepared by Jennifer Smith, Ryan H. Easley Research Fellow at the University of Maryland School of Law, after a request with initial guidance from Frank Pasquale, the witness. Professor Pasquale has reviewed the response and believes it to be a fully responsive response to the question.

³ Rob Nichols, “BankThink: Bank or No Bank, Fintech Must Be Regulated”, *Am. Banker* (Feb. 18, 2016, 9:30 AM), <https://www.americanbanker.com/opinion/bank-or-no-bank-fintech-must-be-regulated>.

⁴ A recent global survey on fintech adoption by EY found the global average of fintech adoption as 33 percent, up from 16 percent in 2015. *EY*, “EY Fintech Adoption Index 2017” 6 (2017).

⁵ Fed. Deposit Ins. Corp., “2015 FDIC National Survey of Unbanked and Underbanked Households” 15–16 (Oct. 20, 2016).

tension of existing privacy protections. Specifically, the Health Insurance Portability and Accountability Act (HIPAA)⁶ and the Fair Credit Reporting Act⁷ can be modernized to apply to all companies that peddle sensitive personal information. For example, HIPAA protections do not govern health profiles compiled and traded by data brokers and fintech firms. Further, Congress should require data brokers to register with the FTC and allow individuals to request immediate notification once they have been placed on lists that contain sensitive data. In addition to expanding already existing regulations, Congress should empower and expand funding to Federal agencies, including the CFPB and the OFR, to ensure these agencies have the resources necessary to come to grips with a rapidly changing financial landscape.

Fintech can be a means of opening up the financial industry to unbanked and underbanked consumers but Federal and State legislatures must be cautious about rushing to deregulate as a means of spurring innovation. Some fintech may promote competition and create new options for consumers, but it must be fair competition. Further, Federal authorities should not preempt State law meant to protect consumers. Although preemption may be aimed at ensuring financial inclusion and innovation, preemption of consumer protections can have disastrous unintended consequences, as we saw in the mortgage crisis of 2008.⁸ For example, the Office of the Comptroller of the Currency's (OCC) proposed plan to charter fintech companies could have unintended consequences, such as enabling regulatory arbitrage around State restrictions on pay day lending.⁹ Regulatory arbitrage around State restrictions could have negative impacts on the unbanked and underbanked individuals the OCC is attempting to open the financial industry to.¹⁰

It is important to remember consumer protections build consumer trust. Consumer trust is an essential factor in encouraging the unbanked and underbanked to utilize financial services in general. For example, research by the FDIC reveals unbanked and

⁶Health Insurance Portability and Accountability Act of 1996, Pub. L. No. 104-191, 110 Stat. 1936 (codified as amended in scattered sections of 18, 26, 29, and 42 U.S.C.).

⁷Fair Credit Reporting Act, 15 U.S.C. §1681 (1970).

⁸For a discussion of regulatory arbitrage and opaque business practices that sparked the 2008 mortgage crisis, see Frank Pasquale, "The Black Box Society" (2015), specifically Chapters 4 and 5.

⁹"Exploring Special Purpose National Bank Charters for Fintech Companies", Off. Comptroller Currency (Dec. 2016). For comments to the OCC's paper, see "Public Comments On Exploring Special Purpose National Bank Charters For Fintech Companies", Off. Comptroller Currency, <https://www.occ.gov/topics/responsible-innovation/fintech-charter-comments.html> (last visited Oct. 3, 2017).

¹⁰See Comment, "New Economy Project on Behalf of Signees, Re: Exploring Special Purpose National Bank Charters for Fintech Companies" (Jan. 13, 2017), <https://www.occ.gov/topics/responsible-innovation/comments/comment-new-economy-project-fintech-charters.pdf> (comment letter from over 200 consumer, civil rights, and community groups opposing the proposed OCC nonbank lending charters, stating that "[s]tate laws often operate as the primary line of defense for consumers and small businesses" and they "have also seen costly payday lenders hide behind the costume of 'fintech.'"); Comment, "Am. For Fin. Reform, Re: Exploring Special Purpose National Bank Charters for Fintech Companies" (Jan. 15, 2017), <https://www.occ.gov/topics/responsible-innovation/comments/comment-americans-for-financial-reform.pdf> (comment letter "urging the OCC to refrain from issuing charters to nondepository fintech lenders" and explaining a broad array of legal and policy issues that could arise); Comment, "Ctr. For Digital Democracy & U.S. Pub. Int. Res. Group, Re: Exploring Special Purpose National Bank Charters for Fintech Companies" (Jan. 15, 2017), <https://www.occ.gov/topics/responsible-innovation/comments/comment-cdd-uspirg.pdf> (comment letter opposing the proposed OCC nonbank lending charters, stating "lack of transparency around the processing of data and automated algorithms may lead to increasing information asymmetries between the financial institution and the individual and thus consumers are left with less awareness and a lack of understanding and control over important financial decisions.").

underbanked households have limited trust or a complete lack of trust in the banking industry, which influences how and if they utilize banking or other financial services.¹¹ Additionally, “concern over security—real or perceived—is one of the most significant barriers to [mobile financial services] adoption for consumers.”¹² Deregulation, even if it is done with the goal of innovation and inclusion, can lead to unintended consequences that weaken trust in the financial system and eventually lead to more unbanked and underbanked Americans.

In conclusion, fintech can help build financial inclusion, especially for the unbanked and underbanked; but there must be proper protections to build and sustain consumer trust and ensure consumers are protected. Diminishing regulatory confusion, extending existing privacy protections, and providing resources to agencies to keep abreast of the evolving financial sector are all ways Federal and State regulators can help protect the unbanked and underbanked and build consumer trust. But regulators should not rush to deregulate to spur innovation, nor should Federal regulators preempt State laws aimed at protecting consumers, especially the unbanked and underbanked.

Q.2. Are you concerned that fintech companies’ use of new data and algorithms could result in unintentional discrimination against protected classes under Federal anti-discrimination laws? If so, should Congress or Federal regulators consider legislation or regulatory guidance to ensure compliance?

A.2. The breadth and scope of data being accumulated and used by companies to determine broad aspects of a person’s life is expanding, often without consumers’ knowledge.¹³ Further, algorithms utilizing this data are opaque and consumers cannot easily determine the types of data being used or if the data is correct. The opaque process coupled with more varied datasets has the potential to produce “discriminatory scoring.”¹⁴ The potential for discriminatory results is especially troublesome in the fintech industry, where discrimination, even if unintended, can have far reaching financial implications.

Fintech companies’ use of new and nontraditional data and algorithms could result in unintentional discrimination against protected classes under Federal anti-discrimination laws. A firm’s best intentions to abide by fair lending, nondiscriminatory practices may be usurped by machine learning systems that use neutral data

¹¹Kristopher M. Rengert and Sherrie L.W. Rhine, Fed. Deposit Ins. Corp., “Bank Efforts To Serve Unbanked And Underbanked Consumers” (May 25, 2016), https://www.fdic.gov/consumers/community/research/qualitative-research_may2016.pdf; Fed. Deposit Ins. Corp., “2015 FDIC National Survey of Unbanked and Underbanked Households” (Oct. 20, 2016), <https://www.fdic.gov/householdsurvey/2015/2015report.pdf>. According to the FDIC 2015 survey of unbanked and underbanked households, one in four unbanked households “do not trust banks” and “[l]ack of trust in banks was the second most frequently cited main reason for being unbanked.” *Id.* at 60.

¹²Mobil Financial Services, Consumer Fin. Protection Bureau (Nov. 2015), http://files.consumerfinance.gov/f/201511_cfpb_mobile-financial-services.pdf.

¹³This answer was prepared by Jennifer Smith, Ryan H. Easley Research Fellow at the University of Maryland School of Law, after a request with initial guidance from Frank Pasquale, the witness. Professor Pasquale has reviewed the response and believes it to be a fully responsive response to the question.

¹⁴Mikella Hurley and Julius Adebayo, “Credit Scoring in the Era of Big Data”, 18 *Yale J.L. & Tech.* 148, 149 (2017). This article is the result of collaboration among lawyers and data scientists on the issues of big data’s use in credit scoring.

but “treat them as proxies for immutable or sensitive characteristics,” such as gender, race, or socioeconomic status.¹⁵ For example, Penny Crosman, Editor at Large at American Banker, recently wrote about the potential threats to fair lending by machine learning systems and artificial intelligence, stating “a system that considers college data could start recognizing that graduates of a particular school are a good credit risk, and those students may be from mostly privileged socioeconomic backgrounds.”¹⁶ Further, Privacy International recently reported on types of nontraditional data being used to determine creditworthiness, which many consumers may not realize is being accumulated, including people’s networks on social media,¹⁷ the manner in which a person fills out an online form,¹⁸ and if a person posts about political issues on social media.¹⁹ As Mikella Hurley and Julius Adebayo acknowledge an “overabundance of data points . . . may lead to increased accuracy in the modeling, [but] it can also increase the incidence of spurious correlations.”²⁰

Congress and regulators need to understand the types of data being used by fintech firms as well as how the data is being used. Knowledge of what fintech firms are doing is very important, especially relating to data collection, data use, and security and privacy. Based on this knowledge Congress and regulators should develop guidance and/or legislation to ensure suspect sources of data are not influencing fintech firms’ decisions in discriminatory ways. Machine learning and predictive analytics are not too complex to regulate. Regulations should make firms more accountable. Specifically, firms should have “algorithmic accountability,” meaning firms are transparent with what data is being used and how algorithms use the data.²¹ Further, although a computational process may be complex, regulators can demand to know what datasets are used in the process.

Existing privacy protections in other areas of the law can and should be extended to cover the consumer data now fueling fintech

¹⁵ Mikella Hurley and Julius Adebayo, “Credit Scoring in the Era of Big Data”, 18 *Yale J.L. & Tech.* 148, 190 (2017).

¹⁶ Penny Crosman, “Is AI a Threat to Fair Lending?”, *Am. Banker* (Sept. 7, 2017, 4:21 PM), <https://www.americanbanker.com/news/is-artificial-intelligence-a-threat-to-fair-lending>.

¹⁷ “Case Study: Fintech and the Financial Exploitation of Customer Data”, *Privacy Int’l* (Aug. 30, 2017), <https://www.privacyinternational.org/node/1499>. See also Bethy Hardeman, “Lenddo’s Social Credit Score: How Who You Know Might Affect Your Next Loan”, *Huffpost* (June 15, 2012, 9:30 AM), http://www.huffingtonpost.com/bethy-hardeman/lenddos-social-credit-score_1598026.html (describing Lenddo’s use of a person’s “Trusted Network” and an algorithm “to measure truthfulness, behavioral and demographic clues” to determine if a person qualifies for a loan).

¹⁸ “Case Study: Fintech and the Financial Exploitation of Customer Data”, *Privacy Int’l* (Aug. 30, 2017), <https://www.privacyinternational.org/node/1499>. See also Jeff John Roberts, “Bad Credit Is a Bonanza for Online Lender, But Critics Cry Foul”, *Fortune* (July 9, 2015), <http://fortune.com/2015/07/09/elevate-online-loans/> (describing Elevate’s tool, Rise, which uses a person’s FICO score and nontraditional data, such as if “someone appears too hasty to fill out the loan form,” to assess creditworthiness).

¹⁹ “Case Study: Fintech and the Financial Exploitation of Customer Data”, *Privacy Int’l* (Aug. 30, 2017), <https://www.privacyinternational.org/node/1499>. See also Mugdha Variyar and J. Vignesh, “The New Lending Game, Post-Demonetisation”, *Econ. Times: Tech.* (Jan. 6, 2017, 3:05 PM), <http://tech.economictimes.indiatimes.com/news/technology/the-new-lending-game-post-demonetisation/56367457> (quoting a lending platform’s founder as stating “[i]f someone is politically active and engages in political campaigns, which are visible through their social media profiles, it is not a good sign.”).

²⁰ Mikella Hurley and Julius Adebayo, “Credit Scoring in the Era of Big Data”, 18 *Yale J.L. & Tech.* 148, 177 (2017).

²¹ See Megan Rose Dickey, “Algorithmic Accountability”, *Techcrunch* (Apr. 30, 2017), <https://techcrunch.com/2017/04/30/algorithmic-accountability/>;

underwriting. Specifically, the Health Insurance Portability and Accountability Act (HIPAA)²² and the Fair Credit Reporting Act²³ can be modernized to apply to all companies that peddle sensitive personal information. For example, currently, HIPAA protections do not govern health profiles compiled and traded by data brokers and fintech firms. A data broker could obtain information concerning a consumer's health related purchases, such as diabetic testing strips, pregnancy tests, or medications.²⁴ This data could create "inferences about sensitive consumer preferences and characteristics."²⁵

Congress should require data brokers to register with the Federal Trade Commission and allow individuals to request immediate notification once they have been placed on lists that contain sensitive data. Regulations can help make consumers aware of the vast information landscape their data is being brokered and used in and the potential for unintentional discrimination based on this data. Further, consumers should have the ability to challenge and amend incorrect data. The right to be notified about the use of one's data and the right to challenge and correct data errors is fundamental.

In addition to the above, Congress and Federal regulators should empower and expand funding to Federal agencies like the Consumer Financial Protection Bureau (CFPB) and the Office of Financial Research (OFR). These agencies require the resources necessary to come to grips with a rapidly changing financial landscape. Empowering and expanding funding will allow the CFPB and OFR to develop and implement strategies to ensure compliance with Federal anti-discrimination laws and consumer protections.

In conclusion, Fintech companies' use of new and nontraditional data and algorithms could result in unintentional discrimination against protected classes under Federal anti-discrimination laws. Use of expanding and varied datasets and new algorithms can be beneficial and may "force[] decisions onto a more reliable empirical foundation by formalizing decision-making processes, thus limiting the opportunity for individual bias to affect important assessments."²⁶ But there is also the real potential for unintentional discrimination. Congress and Federal regulators need to understand the types of data being used by fintech firms as well as how the data is being used in order to determine appropriate regulations that will protect consumers from inappropriate and inadvertent discrimination.

²² Health Insurance Portability and Accountability Act of 1996, Pub. L. No. 104-191, 110 Stat. 1936 (codified as amended in scattered sections of 18, 26, 29, and 42 U.S.C.).

²³ Fair Credit Reporting Act, 15 U.S.C. §1681 (1970).

²⁴ See "Fed. Trade Comm'n, Data Brokers: A Call For Transparency And Accountability" 14 (May 2014).

²⁵ "Fed. Trade Comm'n, Data Brokers: A Call For Transparency And Accountability" viii (May 2014).

²⁶ Solon Barocas and Andrew D. Selbst, "Big Data's Disparate Impact", 104 *Cal. L. Rev.* 671, 676 (2016).

ADDITIONAL MATERIAL SUPPLIED FOR THE RECORD

STATEMENT SUBMITTED BY THE INDEPENDENT COMMUNITY BANKERS OF AMERICA

On behalf of the more than 5,700 community banks represented by ICBA, we thank Chairman Crapo, Ranking Member Brown, and members of the Senate Banking Committee for convening today's hearing on "Examining the Fintech Landscape." We appreciate you raising the profile of a critical issue for the future of credit, payments, and American prosperity. As outlined below, ICBA believes that fintech is a promising development for consumers, businesses, and community banks. To achieve the full potential of fintech, policymakers must ensure that it does not jeopardize safety and soundness and consumer protection. In particular, the proposed Office of the Comptroller of the Currency (OCC) special purpose national bank charter fails to address these concerns and deserves closer scrutiny by Congress.

The promise of fintech

Technological innovation and deployment continue to alter the way that consumers and businesses conduct banking and commerce. Community bankers are embracing innovative fintech solutions to simplify the banking experience for consumers. Fintech offers a wealth of opportunities for community banks. These include: simplifying the banking experience for consumers; providing a more detailed and sophisticated understanding of customers and targeting products and services to the market segments where they are most valued; creating innovative uses of data to ease and speed decision making, and providing access to the cloud infrastructure to lower costs.

Many community banks have partnered with fintech companies to access the opportunities described above. The challenge facing regulators is to encourage technological innovation without putting the financial system or consumers at risk.

Online marketplace lender performance raises serious concerns

The recent problems some online marketplace lenders have experienced with liquidity and earnings, as well as with compliance, make it important that these lenders be subject to safety and soundness supervision and regulation. These companies have not experienced a serious economic downturn yet and already they have been subject to serious funding and capital issues.

OCC charter proposal fails to address these concerns

The OCC is considering the issuance of a special purpose national bank charter for online marketplace lenders, other fintech companies, and any other company that the OCC considers to be in the "business of banking." While such a charter would subject the online lenders and fintech companies to more oversight and regulation than they now have, it fails to address the essential questions concerning the regulatory framework that would govern the supervision of these firms.

For instance, while the Licensing Supplement says that the OCC "will not approve proposals that would result in an



inappropriate commingling of banking and commerce,” it is unclear whether this prohibition would extend to the owners or affiliates of the fintech company in the same way that the Bank Holding Company Act restricts the commercial activities of a bank holding company. Allowing corporate conglomerates like Google to own banks violates the U.S. policy of maintaining the separation of banking and commerce, jeopardizes the impartial allocation of credit, creates conflicts of interest, and unwisely extends the federal safety net to commercial interests. If the OCC truly wants to separate banking and commerce, the agency should issue a rule that states that any special purpose national bank charter and/or its owners or affiliates will be subject to the same restrictions as those that apply under the Bank Holding Company Act.

ICBA supports the development of a fintech regulatory framework that is no less stringent than that which applies to insured depository institutions. The OCC should publish transparent capital and liquidity requirements for these firms that specifically address minimum levels considered appropriate for a fintech firm to be well capitalized. Fintech capital and liquidity requirements will be no less rigorous than those that apply to insured depository institutions.

Such a framework would promote a fair regulatory system, protect consumers, maintain the separation of banking and commerce, and support safety and soundness at these companies.

Any fintech charter should have statutory authority

ICBA believes that the OCC should have specific legal authority from Congress before taking a step that could fundamentally change the financial market place, put safety and soundness at risk, and jeopardize consumers. Furthermore, the OCC should issue rules, subject to notice and comment, which would prescribe the scope and requirements of the new special purpose national bank charter.

Historically, limited purpose charters have evolved far beyond their original purpose and intent

The industrial loan company charter should provide a cautionary example for financial regulators. Special purpose bank charters have the potential to evolve beyond their original purpose and intent and end up having all of the advantages and benefits of a full-service bank charter with limited supervision and regulation.

Closing

Thank you again for convening today’s hearing. ICBA hopes that Congress will exercise thoughtful oversight of the emergence of fintech and its implications for consumers, businesses, and the broader economy. We are pleased to have the opportunity to offer the community bank perspective and look forward to working with this Committee as consideration of this important issue unfolds.

LETTER SUBMITTED BY THE ELECTRONIC PRIVACY INFORMATION CENTER



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September 11, 2017

The Honorable Michael Crapo, Chairman
The Honorable Sherrod Brown, Ranking Member
U.S. Senate Committee on Banking, Housing, & Urban Affairs
534 Dirksen Senate Office Building
Washington, DC 20510

Dear Chairman Crapo and Ranking Member Brown:

We write to you regarding the upcoming hearing on “Examining the Fintech Landscape.”¹ The financial services industry is one of many industries that are rapidly changing due to new technologies. While financial technology (“fintech”) can bring financial services to consumers in new and innovative ways, it also presents substantial privacy and safety concerns. The recent breach of 143 million consumer records maintained by Equifax – containing the most sensitive personal data – is a stark reminder of the ongoing risks to Americans consumers and the nation’s economic security.²

The Electronic Privacy Information Center (“EPIC”) was founded in 1994 to focus attention on emerging privacy and related human rights issues, and to protect privacy, the First Amendment, and constitutional values. EPIC has long advocated for cybersecurity safeguards for consumer information held by financial and commercial organizations. EPIC has played a leading role in developing the authority of the FTC to address emerging privacy issues and to safeguard the privacy rights of consumers. EPIC has previously testified before Congress on the need for financial institutions and companies to protect consumers against data breaches.³

¹ *Examining the Fintech Landscape*, 115th Cong. (2017), S. Comm. on Banking, Housing, & Urban Affairs, *Disrupter Series: Improving Consumer’s Financial Options With FinTech*, 115th Cong. (2017), <https://www.banking.senate.gov/public/index.cfm/hearings?ID=E1121351-E71E-4016-B171-35C22052CF75>.

² EPIC, “143 Million US Consumers Suffer Massive Data Breach, Equifax at Fault,” <https://epic.org/2017/09/143-million-us-consumers-suffe.html>

³ See, e.g., Testimony and Statement for the Record of Marc Rotenberg, Executive Director, Electronic Privacy Information Center on “Cybersecurity and Data Protection in the Financial Sector,” Before the Senate Committee on Banking, Housing, and Urban Affairs, June 21, 2011, https://epic.org/privacy/testimony/EPIC_Senate_Banking_Testimony%206_21_11.pdf; Testimony and Statement for the Record of Marc Rotenberg, Executive Director, Electronic Privacy Information Center, Hearing on the Discussion Draft of H.R. ____, A Bill to Require Greater Protection for Sensitive Consumer Data and Timely Notification in Case of Breach, Before the House Committee on Energy and Commerce Subcommittee on Commerce, Manufacturing, and Trade, June 15, 2011, http://epic.org/privacy/testimony/EPIC_Testimony_House_Commerce_6-11_Final.pdf; EPIC

EPIC Statement to U.S. Senate Committee on Banking, Housing, & Urban Affairs 1 Examining the Fintech Landscape September 11, 2017

Defend Privacy. Support EPIC.

Fintech has transformed the financial services industry and, in some instances, has improved consumer access to financial services. However, privacy and security is now a primary concern for financial services. As this Committee examines fintech, there are several security issues that should be considered.

Some fintech companies use unconventional methods to determine who to approve or reject for loans. While traditional loan determinations are made based on familiar factors such as salary and assets, many financial services companies now include other sources, such as social media, to make determinations about consumers.⁴ Furthermore, the Committee should be concerned about algorithms that are used to determine if an individual qualifies for a loan.⁵ Any algorithms used to make such determinations should be transparent in order to ensure consumer fairness, especially if they rely on non-traditional factors.

Security should also be a priority. The serious threat that hacks and data breaches pose to the consumer information held by financial institutions cannot be overstated.⁶ Fintech and all companies in the financial services industry should be subject to strict privacy rules to protect consumers. Current rules and regulations for financial services companies should be revised so that they are mandatory, not merely guidance, and require consumers to be informed in the event of a data breach.⁷

Finally, the Committee should inquire into how fintech companies deal with lending money to individuals whose credit scores or financial situations would lead them to be denied by loans from traditional lenders. There is already ample evidence that individuals who may be struggling financially are frequently exploited by predatory lenders.⁸ As technology has

Statement to the U.S. House Committee on Energy & Commerce, *Improving Consumer's Financial Options With FinTech*, Jun. 9, 2017, <https://epic.org/testimony/congress/EPIC-HEC-FinTech-Jun2017.pdf>

⁴ Elizabeth McGinn et al., *Consumer Privacy Should Be Top-Of-Mind For FinTech Firms To Avoid Scrutiny*, Bloomberg, May 8, 2017, <https://www.bna.com/consumer-privacy-topofmind-n73014450574/>.

⁵ *Algorithmic Transparency: End Secret Profiling*, EPIC, <https://epic.org/algorithmic-transparency/>.

⁶ Portia Crowe, *JPMorgan Fell Victim to the Largest Theft of Consumer Data from a Financial Institution in US History*, Business Insider, Nov. 10, 2015,

<http://www.businessinsider.com/jpmorgan-hacked-bank-breach-2015-11>; Greg Masters, *Discover Financial Services Reports Two Breaches to California AG*, SC Media, Mar. 2016, <https://www.scmagazine.com/discover-financial-services-reports-two-breaches-to-california-ag/article/529021/>.

⁷ *Financial Institutions and Customer Information: Complying with the Safeguards Rule*, Federal Trade Commission, Apr. 2006, <https://www.ftc.gov/tips-advice/business-center/guidance/financial-institutions-customer-information-complying>.

⁸ Richard D. Ralls, *Payday Lending Traps Low-Income Families In Tragic Cycle Of Debt*, Kansas City Star, Aug. 2, 2016, <http://www.kansascity.com/opinion/readers-opinion/guest-commentary/article93346342.html>; Paul Kiel, *The 182 Percent Loan: How Installment Lenders*

advanced, lenders take extreme steps to obtain payment and added fees. For example, a complaint filed by EPIC with the CFPB focused on the use of “starter interrupt devices” that allow auto lenders to disable a vehicle when a payment is past due. This practice disproportionately affects low-income borrowers.⁹

We ask that this letter from EPIC be entered in the hearing record.

EPIC looks forward to working with the Subcommittee to ensure that necessary privacy and security standards are developed to safeguard consumers.

Sincerely,

/s/ Marc Rotenberg
 Marc Rotenberg
 EPIC President

/s/ Caitriona Fitzgerald
 Caitriona Fitzgerald
 EPIC Policy Director

/s/ Kim Miller
 Kim Miller
 EPIC Policy Fellow

Put Borrowers in a World of Hurt, Pro Publica, May 13, 2013,
<https://www.propublica.org/article/installment-loans-world-finance>.

⁹ Complaint, Request for Investigation, Injunction, and Other Relief Submitted by The Electronic Privacy Information Center (“EPIC”) to the Consumer Financial Protection Bureau (CFPB), *In the Matter of CAG Acceptance, LLC, and Gordon Howard Associates, Inc., d/b/a/ PassTime USA* (Mar. 15, 2017), <https://epic.org/privacy/cfpb/EPIC-CFPB-SID-Complaint.pdf>.

**LETTER SUBMITTED BY THE MILKEN INSTITUTE CENTER FOR
FINANCIAL MARKETS**



MILKEN INSTITUTE
CENTER FOR FINANCIAL MARKETS

September 12, 2017

The Honorable Mike Crapo
Chairman
Committee on Banking, Housing, and Urban Affairs
United States Senate
Washington, DC 20510

The Honorable Sherrod Brown
Ranking Member
Committee on Banking, Housing, and Urban Affairs
United States Senate
Washington, DC 20510

Dear Chairman Crapo and Ranking Member Brown,

On behalf of the Milken Institute Center for Financial Markets, we appreciate the opportunity to contribute to the Committee's hearing on "Examining the FinTech Landscape."

Advancements in technology, including the proliferation and use of mobile phones and the internet, coupled with billions of dollars in venture capital investment, have propelled the growth of financial technology (FinTech) firms across the globe. At the same time, digital platforms leveraging the internet of finance are challenging underlying precepts of existing regulatory approaches, requiring fresh thinking in how regulation can best foster the responsible development of FinTech. Today's hearing can help provide insight into the magnitude and velocity of change in financial markets being driven by FinTech.

Below the Institute has provided insights and considerations within the evolving FinTech landscape based on our years of work (see Appendix) and would be honored to discuss these and other FinTech developments as the Committee continues to examine this space.

The Evolving FinTech Landscape: Insights and Considerations

- **Defining "FinTech".** There is no standard definition of FinTech and given the ever-expanding number of sub-verticals underneath the more generic, umbrella term, it makes it difficult to pinpoint exactly what policymakers, regulators, and even industry stakeholders mean when they refer to "FinTech". FinTech has evolved beyond payments, lending, and virtual currencies to the blockchain, artificial intelligence, InsurTech, Regtech, and more.
- **FinTech's Role as a Catalyst for Change.** There has always been innovation in the financial services space. It can be argued that FinTech is merely another period of innovation, but it can also be argued that this period of innovation is different for the following reasons:
 - **Innovation and Adoption.** The financial services ecosystem is increasingly turning more digital with the entrance of advanced technologies, technologists, and computer/data



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scientists to the field of finance. Current platforms, largely built outside of traditional incumbents and networks, are able offer the end user a more efficient experience where products and services can be more tailored to the individual user in a timely manner across multiple platforms (mobile devices and the internet).

- **Disintermediation.** FinTech platforms are increasingly presenting challenges to traditional intermediaries, or gatekeepers, that regulators have relied on (and regulated) for more than a century. The ability to bypass such intermediaries continues to pose challenges to regulators on how to appropriately regulate these new actors.
- **Convergence.** FinTech platforms are increasingly breaking down financial silos and operating across multiple verticals to compete for customers. Advancements in data collection and analysis have allowed platforms like Square and PayPal to move beyond focusing solely on payments and into lending, for instance. Policymaking and regulatory guidance and rules will increasingly have to focus on the activities the entity is engaged in rather than the entity itself.
- **(Low) Barriers to Entry.** The cost of launching a digital platform has fallen considerably over the last 20 years from \$5 million in initial investment to start operations to less than \$5,000 by 2011.¹ These platforms don't rely on the brick-and-mortar approach to attracting customers and are able to offer financial services and products over the internet.
- **Borderless Platforms.** FinTech platforms aren't bound by certain geographies or borders and are capable of reaching customers across borders or globally in quick fashion. The internet of finance raises serious questions concerning federalism and international coordination. For example, global regulatory bodies have commented in the past of their concerns as it relates to safety and soundness due to the speed and proliferation of digital platforms. In addition, the battle continues over state preemption in the U.S. with the U.S. Office of the Comptroller of the Currency's recent effort to charter certain FinTech platforms,² and the Conference of the State Bank Supervisors effort to streamline current state-by-state licensing requirements for FinTech firms.³
- **Democratization of Opportunity.** Increased connectivity, decreased transaction costs, and the ability for unaccredited investors to partake in investment offerings offers users with greater access to financial services and products, but, at the same time, increases the potential for consumer and investor harm. This puts increased pressure on regulators to prevent/weed out bad actors, while at the same time ensuring that there is an appropriate balance between innovation and protection.
- **Venture Capital Investment.** In 2014, global investment in FinTech ventures surpassed \$12 billion – nearly three times the level of global investment from a year prior.⁴ A year later, FinTech investment hit \$46.7 billion. However, at the end of 2016, global investment fell back to \$25 billion.⁵ Payments and online finance platforms continue to receive the majority of investment, but those spaces are increasingly becoming saturated, leaving VCs to search for other opportunities. InsurTech, RegTech,



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and artificial intelligence are among some of the other sub-sectors of FinTech where VC interest and investment is increasing.

- **Collaboration and Competition with Traditional Financial Institutions.** In 2010, roughly 60 percent of investment went to competitive FinTechs, meaning digital platforms competing against traditional incumbents. Since then, however, the tables have turned. Roughly 60 percent of investment went to collaborative FinTechs in 2015 and that figure is likely higher as FinTechs are increasingly likely to collaborate more with incumbent financial institutions.⁴ So much so, that the Federal Deposit Insurance Corporation and the OCC have issued recent guidance related to third party partnerships and risk management guidance.
- **Domestic Growth.** There are more “tech” hotspots in the U.S. than just Silicon Valley, though most of the venture capital investment activity is still concentrated in that area. New York (Silicon Alley) often rivals, and is increasingly challenging, Silicon Valley every financial quarter for FinTech investment. The City of Atlanta, known as “transaction alley”, launched the first transatlantic payments initiative with the City of London back in February,⁴⁵ which is a hotbed for payments platforms, with the Technology Association of Georgia and Invest Atlanta contributing in efforts to further develop the city’s FinTech scene.⁴⁶ Other areas of the U.S. include Silicon Slopes (Utah) and Silicon Prairie (Texas, Nebraska, Iowa, and Illinois, among other states) regions.
- **International Growth.** Silicon Valley is one of the 44 global FinTech hubs located around the world.⁴⁷ Within the last year, the number of FinTech hubs has doubled globally from the 20 that were profiled in 2016⁴⁸ to 44 currently. The hubs are assessed based on a number of indicators including: government support, innovation culture, proximity to expertise, proximity to customers, foreign startups, and regulation.
- **Regulatory Developments.** U.S. regulatory authorities and agencies have been involved in responding to the recent spate of innovation in the financial services system since 2008, when the U.S. Securities and Exchange Commission opted to regulate the peer-to-peer lending space,⁴⁹ which led to Lending Club and Prosper registering their offerings as securities. In 2014, the Internal Revenue Service issued guidance on the tax treatment of virtual currencies.⁴⁰ Regulatory and agency actions on FinTech accelerated in 2015 with the U.S. Treasury Department issuance of a request for information on marketplace lending⁴¹ (and final report⁴²), the OCC’s interest in special purpose national charters for FinTech firms,⁴³ the CFPB’s interest in exploring alternative data for the purposes of enhancing credit access⁴⁴, and the Securities and Exchange Commission’s recent guidance on initial coin offerings⁴⁵. Over the last two years, there has been an increase in the number of actions taken by regulators against FinTech firms (or firms using innovative methods to market products), including LendUp,⁴⁶ Dwolla,⁴⁷ and Ascenergy.⁴⁸ Regulators have also been proactive in holding a number of FinTech-focused forums and open meetings, and in establishing innovation-focused offices, working groups, and initiatives to provide firms (incumbent and startup) offering innovative products and services with guidance and the opportunity to meet with agency representatives.



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For this letter, the focus has been on U.S. developments as they pertain to FinTech. However, the Institute would note that competition for FinTech firms is increasing and countries around the world are making concerted efforts to attract FinTech investment and firms, as well as to develop conducive regulatory and policy ecosystems supportive of firms offering innovative financial services and products (business to consumer and business to business).

As the Committee continues to examine the FinTech landscape in subsequent hearings, the Institute encourages to also focus on the *impact* of FinTech on the end user. The effect these technologies have on the end user is often overlooked in public discourse on FinTech. In a 2016 study,³⁰ Professor Thomas Philippon found that the unit cost of financial intermediation in the U.S. has remained around 2 percent over the past 130 years. In other words, "improvements in information technologies have not been passed through to the end users of financial services." Will "FinTech" prove differently?

The Milken Institute appreciates the opportunity to comment on the FinTech landscape and looks forward to working with the committee on FinTech-related matters going forward.

Sincerely,

Jackson Mueller
Associate Director, FinTech Program
Milken Institute Center for Financial Markets
Washington, DC



APPENDIX

Reports/Testimony

- [FinTech: Considerations on How to Enable a 21st Century Financial Services Ecosystem](#) (August 3, 2017)
- [FinReg21: Modernizing Financial Regulation for the 21st Century](#) (March 24, 2017)
- [Leaving Transferred Money on the Table: Will Remittance-Linked Financial Products Add Value to Development Financing?](#) (March 6, 2017)
- [The U.S. Online, Non-Bank Finance Landscape](#) (June 13, 2016)
- [Millennials: Who They Are and Their Impact on the Financial Services Industry](#) (May 13, 2016)
- [FinTech: Who Regulates It and Why It Matters](#). (May 11, 2016)
- [California Summit Review: An Action Plan for Growth and Innovation](#). (March 23, 2016)
- [Access to Capital: How Small and Mid-size Businesses are Funding Their Future](#). (May 11, 2015)
- [FinTech: Views from the Market](#). (April 28, 2015)
- [Disruptive Technology and Securities Regulation](#). (January 12, 2015)
- [FinTech: Building a 21st-Century Regulator's Toolkit](#). (October 21, 2014)
- [SEC'S Crowdfunding Proposal: Will It Work for Small Businesses?](#) (January 15, 2014)

Comment Letters

- [Comment Letter to the CFPB: Alternative Data and Modeling Techniques in the Credit Process](#) (May 19, 2017)
- [Comment Letter to the OCC: Licensing Manual Draft Supplement on Evaluating Charter Applications from FinTech Companies](#) (April 10, 2017)
- [Comment Letter to the OCC: Special Purpose National Bank Charters for FinTech Companies](#) (January 15, 2017)
- [Comments on the U.S. Federal Deposit Insurance Corporation proposed third-party lender guidance](#) (October 27, 2016)
- [Comments on the U.S. Office of the Comptroller of the Currency White Paper on Responsible Innovation](#) (May 31, 2016)
- [Comments on the U.S. Securities and Exchange Commission Proposed Rule Amendments to Facilitate Interstate and Regional Securities Offerings; File No.: S7-22-15](#) (January 11, 2016)
- [Comments on the U.S. Department of the Treasury Request for Public Input on Expanding Access to Credit Through Online Marketplace Lending; Docket No.: TREAS-DO-2015-0007-0001](#) (September 28, 2015)
- [Letter regarding RAISE Act to House Financial Services Committee](#). (June 12, 2015)
- [Comments on Proposed Changes to Exchange Act Registration Requirements under Titles V and VI of the JOBS Act](#), File No. S7-12-14. (March 2, 2015)
- [Comments on Proposed No-Action Letter \(NAL\) Policy: Bureau of Consumer Financial Protection; Docket No.: CFPB-2014-0025](#). (December 15, 2014)
- [Comments on Proposed Rule Amendments to Regulation A: Securities and Exchange Commission; File No. S7-11-13](#). (March 19, 2014)
- [Comments on Proposed Regulation Crowdfunding: Securities and Exchange Commission; File No. S7-0913](#). (February 3, 2014)



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Op-Eds

- ["What Critics of Fintech ILC Bids Aren't Saying"](#) American Banker (September 11, 2017)
- [FinTech: Can it be a real tool to build meaningful lives?](#) LinkedIn (May 2, 2017)
- ["The big business of small business: Fostering a digital lending revolution"](#) BAI Banking Strategies (March 29, 2017)
- ["Enough with D.C.'s Mixed Messaging on Fintech"](#) American Banker (September 16, 2016)
- ["Can Bitcoin Technology Solve the Migrant Crisis?"](#) The Wall Street Journal (June 8, 2016)
- ["Why a Commission for CFPB May Be in Agency's Best Interest"](#) American Banker (November 16, 2015)
- ["Congress Should Act to Preserve Financial Innovation"](#) Roll Call (September 1, 2015)
- ["Don't Let Outdated Laws Shackle Credit Innovation,"](#) American Banker (July 28, 2015)
- ["Americans Stand On the Cusp of a Money Revolution,"](#) Real Clear Markets (May 19, 2015)
- ["Millennials: A New Approach to Handling Money,"](#) Newsweek (February 19, 2015)
- ["From Modesto to Mombasa, Tech is Revolutionizing Small Business Lending,"](#) Forbes (August 6, 2014)
- ["Stuffing money into your digital wallet is getting easier,"](#) MarketWatch (June 19, 2014)

¹ <https://abdoriani.com/startup-infographics/how-much-has-the-cost-of-launching-a-startup-time-to-reach-100-million-users-changed-from-2000-2011/>

² <https://www.occ.treas.gov/topics/responsible-innovation/comments/special-purpose-national-bank-charters-for-fintech.pdf>

³ <https://www.csbs.org/news/press-releases/pr2017/Pages/051017.aspx>

⁴ <http://bankingblog.accenture.com/wp-content/uploads/2015/04/accenture-future-fintech-banking.pdf>

⁵ <https://assets.kpmg.com/content/dam/kpmg/sx/pdf/2017/02/pulse-of-fintech-q4-2016.pdf>

⁶ https://www.accenture.com/t20160724T221504_w_us-en/acnmedia/PDF-26/Accenture-FinTech-New-York-Competition-to-Collaboration.pdf

⁷ <http://www.businesswire.com/news/home/20170202005344/en/LondonAtlanta-Partnership-Launches-P20-Global-Payments-Industry>

⁸ <http://www.tagonline.org/files/documents/FinTech/tag-fintech-ecosystem-report-2016.pdf>

⁹ <https://www2.deloitte.com/uk/en/pages/innovation/articles/a-tale-of-44-cities-global-fintech-hub-federation-gfhf-connecting-global-fintech-hub-report-review.html>

¹⁰ <https://www.finextra.com/finextra-downloads/newsdocs/fintech-hub-review-2016.pdf>

¹¹ <http://digitalcommons.law.yale.edu/cgi/viewcontent.cgi?article=1369&context=yjreg>

¹² <https://www.irs.gov/pub/irs-drop/n-14-21.pdf>

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