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FINTECH: EXAMINING DIGITIZATION, DATA, AND TECHNOLOGY

HEARING

BEFORE THE

COMMITTEE ON BANKING, HOUSING, AND URBAN AFFAIRS UNITED STATES SENATE

ONE HUNDRED FIFTEENTH CONGRESS

SECOND SESSION

ON

EXAMINING FURTHER THE DIGITIZATION, DATA, AND TECHNOLOGY ASPECTS OF FINTECH

SEPTEMBER 18, 2018

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FINTECH: EXAMINING DIGITIZATION, DATA, AND TECHNOLOGY

TUESDAY, SEPTEMBER 18, 2018

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

The Committee met at 10:01 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. This hearing will come to order.

Today we will hear four very unique perspectives on a segment of financial technology, or "FinTech."

Almost exactly 1 year ago, the Committee held a hearing to explore the various sectors and applications of FinTech.

In the short time period between that hearing and this one, many developments and innovations have occurred, both in the private sector and on the regulatory front.

Digitization and data, in particular, are constantly evolving, challenging the way we have traditionally approached and conducted oversight of the financial services sector.

As technology has developed and the ability to readily and cheaply interact with and use data has flourished, we have experienced a sort of revolution in the digital era. This digital revolution brings with it the promise of increasing consumer choice, inclusion, and economic prosperity, among other things.

Less than a decade ago, the concept of mobile banking, a simple transaction, was relatively new. Now consumers have countless options by which to interact with and access their financial information and conduct transactions.

As this marketplace rapidly develops, so must we constantly evaluate our regulatory and oversight framework, much of which was designed prior to the digital era. To the extent that there are improvements that can be made to better foster and not stifle innovation, we should examine those.

Although these technological developments are incredibly positive, the increased digitization and ease of collecting, storing, and using data presents a new set of challenges and requires our vigilance.

Many products and services in the FinTech sector revolve around big data analytics, data aggregation, and other technologies that make use of consumer data. Oftentimes these processes operate in

the background, and are not always completely transparent to consumers.

It is important for consumers to know when their data is being collected and how it is being used. It is equally important for the companies and the Government alike to act responsibly with this data and ensure that it is protected.

As we have seen in recent years, this can be a challenging task. In order to fully embrace the immense benefits that can result from technological innovation, we must ensure that proper safeguards are in place and consumers are fully informed.

Today I hope to hear from our witnesses about the ways in which FinTech is changing the financial sector and the improvements that can be made to ensure the regulatory landscape welcomes that innovation; what kind of data is being collected and used and how such data is secured and protected; and what the opportunities and challenges are going forward.

Senator Brown.

OPENING STATEMENT OF SENATOR SHERROD BROWN

Senator BROWN. Thank you, Mr. Chairman.

In the run-up to the financial crisis, Wall Street banks bragged about innovations that they claimed made the financial system less risky and credit more affordable. Some of these innovations were in consumer products, like interest-only subprime mortgages. Other innovations were happening behind the scenes, like the growth in risky collateralized debt obligations and credit default swaps.

According to the banks, technological advances like increased computing power and information sharing through the Internet allowed financial institutions to calculate and mitigate the risks of these complex financial innovations. In Washington, banks told lawmakers that regulation would hold back progress—they say that often on many issues—and make credit more expensive for consumers. Rather than look at financial technology with an eye to the risks, Federal banking supervisors repealed safety and soundness protections, and they used their authority to override consumer protection laws in several States.

Eventually, so-called financial innovations led to the biggest economic disaster in almost a century, costing millions of Americans their homes, their jobs, and much of their savings.

Criticizing the bankers and regulators who lost sight of the enormous risks that came with these new innovations, former Fed Chair Paul Volcker declared, "The ATM has been the only useful innovation in banking for the past 20 years."

I am more optimistic about some new technologies benefiting consumers rather than just lining Wall Street's pockets, but I think we should look at this Treasury report with the same level of skepticism.

Rather than learn from past mistakes, the Treasury report embraces the shortsightedness of precrisis regulators. It exalts the benefits of "financial innovation," describes Federal and State regulation as "cumbersome" or as "barriers to innovation," and recommends gutting important consumer protections, like the CFPB's payday lending rule. It even suggests stripping away what little control we as consumers now have over our own personal financial

data, just a year after Equifax put 148 million Americans' identities at risk, 5 million in my State alone.

Just like a dozen years ago, Wall Street banks and big companies are making record profits, but working families are struggling just to get by. Student loan debt is at record levels; credit card defaults are rising. Worker pay is not keeping up with inflation—comments from the Administration notwithstanding—but we have managed to cut taxes for the richest Americans while CEOs and shareholders have reaped huge windfalls through over half a trillion dollars in stock buybacks.

Plenty of financial institutions are adopting new technologies without running afoul of the law. Rather than focusing on how we can weaken the rules for a handful of companies who prefer to be called "FinTechs" rather than "payday lenders," or "data aggregators" rather than "consumer reporting bureaus," Treasury should be focused on policies that help working families.

This is not a partisan issue for me. I raised concerns about relaxing the rules for FinTech firms when Comptroller Curry, appointed by President Obama, suggested a special "FinTech" charter almost 2 years ago.

The new leaders at the Federal Reserve, the OCC, the FDIC, and the CFPB have already made it clear that they are ready to give Wall Street whatever it asks for. And they never have enough. And the recommendations in this report call for more handouts for financial firms, FinTech or otherwise.

I am interested, however, to hear from our witnesses about how new financial technologies could increase our control over our own information, better protect against cyberattacks, or make it easier for lenders to ensure they are following the law. And as traditional banks partner with technology firms, I think it is important for the Committee to consider where gaps in regulation might lead to future systemic risks.

Thank you, Mr. Chairman, for holding the hearing.

Chairman CRAPO. Thank you, Senator Brown. And I agree with you this is not a partisan issue. We all want to get the benefits of what can be developed with this kind of increase in technological capacity. But there is significant concern about privacy and protection of data of our consumers that is agreed to on both sides of the aisle here, I believe.

We welcome our witnesses here with us today. We have Mr. Steven Boms, the president of Allon Advocacy, on behalf of the Consumer Financial Data Rights association; Mr. Stuart Rubinstein, president of Fidelity Wealth Technologies; Mr. Brian Knight, director of the Innovation and Governance Program at Mercatus Center at George Mason University; and Ms. Saule Omarova, who is a professor of law and director of the Jack Clarke Program on the Law and Regulation of Financial Institutions and Markets at Cornell University.

We again welcome all of you. We appreciate your being here to share your expertise with us. Your written statements will be made a part of the record. We ask you to please be very careful to pay attention to the 5-minute clock for your oral comments and as you are engaged in questioning. The Senators have a 5-minute clock, too, and sometimes they run right up to the last second for their

last question, and when that happens, I ask you to be prompt in your responses to those questions.

With that, Mr. Boms, you may begin.

STATEMENT OF STEVEN BOMS, PRESIDENT, ALLON ADVOCACY, LLC, ON BEHALF OF CONSUMER FINANCIAL DATA RIGHTS

Mr. BOMS. Thank you, Mr. Chairman.

Chairman Crapo, Ranking Member Brown, and Members of the Committee, thank you for this opportunity to testify today on behalf of the Consumer Financial Data Rights, or CFDR, Group, a consortium of approximately 50 aggregators and FinTech firms united behind consumers' rights to access their financial data.

My testimony this morning also represents the views of the Financial Data and Technology Association, or FDATA, of North America, which is the trade association urging the adoption of an open banking-like regime in the U.S., Canada, and Mexico.

The CFDR Group and its members consulted frequently with the Treasury Department as it considered the current state of the FinTech market. Our engagement was principally focused on the crucial issue of consumer-permissioned financial data, which was an area of emphasis in the Department's report and which I would like to focus on today.

A recent White House study concluded that 20 percent of adult Americans are underbanked by the traditional financial services system and almost 9 million households are entirely unbanked. For these consumers, third-party, technology-based tools can provide vital, affordable access to a financial system that has left them behind. These tools also help other Americans address the growing complexity of the financial system. Most consumers have multiple accounts across a variety of products providers. The most basic, fundamental first step toward financial health—understanding what one has and what one owes—can be needlessly difficult. Technology-powered tools can provide intuitive, accessible platforms that enable even the least financially savvy among us to manage their finances and improve their economic outcomes. The lifeblood of these tools is user-permissioned data access: the right of the consumer or the small business to affirmatively grant access to the application of their choice to connect to or see the financial data.

Unlike in other jurisdictions globally, there is no legal requirement in the United States stipulating that a financial institution must make the consumer's a small business' financial data it holds available to a third party when the customer provides consent or whether restrictions on the consumer's access to that data are permissible. Consumers are dependent on the financial services providers with which they do business, with disparate outcomes for Americans who bank with different financial institutions. The lack of a cohesive framework also threatens American competitiveness and financial innovation internationally.

The Treasury Department identified the key outstanding issues with regard to user-permissioned data access. I briefly highlight five Treasury recommendations for the Committee's consideration here, noting that I provide significantly more reaction in my written testimony.

Number one, the Bureau of Consumer Financial Protection should affirm that third parties properly authorized by consumers fall within the definition of "consumer" for the purpose of obtaining access to financial account and transaction data.

Though it may seem self-evident, Section 1033 of Dodd–Frank provides that the Bureau has the authority to promulgate a rule to ensure end users have electronic access to their online data. But the Bureau has thus far declined to do so. Treasury's affirmation that Dodd–Frank provides this right to consumers and small businesses, even in the absence of a Bureau rulemaking, represents a significant victory for innovation and for consumer and small business financial empowerment.

Number two, all regulators should recognize the benefits of consumer access to financial account and transaction data in electronic form.

One of the systemic disadvantages facing the FinTech ecosystem in the United States is the immense relative regulatory fragmentation that exists. There are at least eight Federal regulatory agencies with jurisdiction over some portion of financial data access. There are, of course, also State regulatory authorities. Treasury has called for all agencies to align behind its interpretation of Dodd–Frank Section 1033 as an important step toward a level playing field and one that could be hastened by congressional engagement.

Number three, the Bureau should work with the private sector to develop best practices on disclosures and terms and conditions regarding consumers' use of products and services.

The United Kingdom's Open Banking architecture includes prescriptive consent flows that ensure that a consumer's or a small business' experience granting or revoking consent to access their data to any third party is uniform. These open banking consent standards are an excellent starting point for creating best practices in the U.S. market.

Number four, a solution must address resolution of liability for data access. The CFDR earlier this year released a set of principles, Secure Open Data Access, or SODA, which called for traceability, minimum cyberliability insurance standards, and other standards designed to ensure that the entity responsible for consumer financial loss as a result of a breach—be it a bank, an aggregator, or a FinTech firm—is the entity charged with making the end user whole for direct losses resulting from that breach. While CFDR members are implementing these principles, regulatory agencies and Treasury could augment and assist this work by undertaking efforts to create a more vibrant and affordable cyberliability insurance market.

Number five, address the standardization of data elements as part of improving consumers' access to their data. While the CFDR Group and FDATA North America wholeheartedly agree with the Department's recommendation, I would respectfully submit an addendum. The standardization of data elements should be made available to the consumer to permit access to third parties of their choosing so that all data elements available to the end user in their native online banking environment is also available to the third party if the consumer consents. This approach would fully enable

end users to leverage their own financial data to their economic benefit, and it would allow for the realization of a competitive, free marketplace in which consumers have full transparency into financial products and services offered by FinTech providers and financial services firms alike.

Thank you again for this opportunity to testify. Though tens of millions of American consumers and small businesses are already utilizing third-party tools to improve their financial well-being, more can be done to harness the power of innovation safely and securely. We stand ready to work with this Committee to identify and implement Treasury's recommendations.

Thank you.

Chairman CRAPO. Thank you, Mr. Boms.

Mr. Rubinstein.

STATEMENT OF STUART RUBINSTEIN, PRESIDENT, FIDELITY WEALTH TECHNOLOGIES, AND HEAD OF DATA AGGREGATION

Mr. RUBINSTEIN. Thank you, Chairman Crapo, Ranking Member Brown, and Members of the Committee. My name is Stuart Rubinstein. I am president of Fidelity Wealth Technologies and head of Data Aggregation at Fidelity Investments. Fidelity is a leading provider of investment management, retirement planning, brokerage, and other financial services to more than 30 million individuals, institutions, and intermediaries with more than $7 trillion in assets under Administration. We are strong supporters of FinTechs and are a major FinTech investor.

I am appearing today to represent Fidelity with a specific focus on the topic of financial data aggregation. At Fidelity, we have a unique perspective. We are an aggregator ourselves, and we are also a source of data to aggregators who act on behalf of our customers.

Fidelity is a strong believer in the benefits our customers receive when they can see a consolidated picture of their finances through aggregated data. We have offered aggregation services to our customers for well over a decade, and our customers have been able to access their Fidelity data through various third parties since the 1990s. But the cybersecurity environment has changed over time, and risks have become far more pronounced and must be addressed.

First, most financial data aggregation that occurs today requires consumers to disclose their financial institution's user name and password to the third-party aggregator or FinTech. While this process may have worked in the past, it is now antiquated as there are new technologies that eliminate any such requirement. Because cybersecurity is of paramount importance, we believe that customers should not have to disclose their user name and password in order to access any third-party service.

Second, aggregators using credentials may have access to an entire website or mobile app, which means they can access more data than may be necessary to provide their services. For example, a simple app that tracks your spending does not need to know your investment holdings, but it will have access to that under the current methods.

Because of the advancement of cyberthreats, Fidelity and others in the industry have worked hard on developing a different approach to data aggregation that helps to protect consumers. At Fidelity, we have developed what we believe are five principles for empowering consumers to share their data safely with third parties.

First, consumers should be able to access their financial account data where they want it and when they want it and through third parties if they so desire. The question becomes not if they can do it, but how.

Two, access must be provided in a safe, secure, and transparent manner.

Three, consumers should provide affirmative consent and directly instruct their financial institution to share data with specific third parties.

Four, third parties should access only the financial data that they need to provide their product or service. This should not be a Trojan horse for the gathering, accumulating, and reselling of consumer data.

And, five, consumers should be able to monitor those account access rights and direct their financial institution to revoke that if they so desire.

In an effort to back up these words with actions, Fidelity announced in November of 2017 a new service based on these principles called "Fidelity Access." Fidelity Access will allow Fidelity customers to provide third-party access to customer data through a secure connection without providing log-in credentials to any third party. We have also been working with policymakers and industry groups to advance these principles and are pleased that many have taken thoughtful approaches to this problem.

Finally, I would be remiss if I did not mention the most difficult issue standing in the way of wider adoption of safer data-sharing technologies: the issue of responsibility. We believe companies that collect and handle financial data should be responsible for protecting that data and making customers whole if misuse, fraud, or theft occurs. As we have been discussing Fidelity Access, we have seen aggregators try to limit their liability, some to very small dollar amounts. Fidelity believes firms that obtain and handle consumer aggregated data should be held responsible to protect that data from unauthorized use just as we are. Any other standard creates moral hazard and does not incentivize aggregators to take their data stewardship responsibilities seriously.

Thank you again for the opportunity to testify before you today. I look forward to answering your questions.

Chairman CRAPO. Thank you, Mr. Rubinstein.

Mr. Knight.

STATEMENT OF BRIAN KNIGHT, DIRECTOR, INNOVATION AND GOVERNANCE PROGRAM, MERCATUS CENTER AT GEORGE MASON UNIVERSITY

Mr. KNIGHT. Thank you, Chairman Crapo, Ranking Member Brown, and Members of the Committee. My name is Brian Knight, and I am the director of the Innovation and Governance Program at the Mercatus Center.

Whether it is a loan to deal with an emergency, moving money to a loved one in need, or capital to build a business, access to high-quality financial services is essential. Technological innovation in financial services, or FinTech, has the potential to significantly improve this access.

As the Treasury Department notes, one area where technology may dramatically change financial services is in the collection and use of data. Technology advances allow financial services firms to obtain more data from consumers and process the data in new ways, with the goal of providing more accessible, inclusive, and cost-effective options. While it is early, there are encouraging signs that innovation is, in fact, helping consumers. These include innovative products giving consumers more transparency as to their finances and allowing lenders to offer potential borrowers better-quality credit through innovative underwriting.

There is also indication that technology is making credit markets less discriminatory. This is promising. But there have also been concerns raised about potential risks to consumers, including risks of privacy and discrimination. These concerns should be taken seriously, and we should react appropriately. But we should be loath to rush into regulation without being certain that new regulation is necessary.

As we assess what the Government response to technological innovation should be, we should keep a few things in mind.

First, we should judge an innovation compared to the status quo, not perfection. Innovative financial service products will not be perfect, but they may be better than the alternative. Imposing unduly burdensome regulation that hampers innovation and competition may ultimately be more harmful to the very consumers that regulation seeks to protect.

Second, we should acknowledge that existing regulations may address new risks. For example, the requirement that a lender be able to explain why it took an adverse action could mitigate against a concern that algorithmic underwriting will be unduly opaque. There are existing regulatory incentives as well as market incentives for companies to ensure their products are fair and appropriately transparent.

Third, we should be open to the possibility that in some cases the current regulatory system is, in fact, overly burdensome. There may be cases where the costs of regulation now exceed the potential benefits or where a regulatory structure that made sense in the past has been overtaken by market developments. This does not mean that new regulation may not sometimes be needed, but as technology changes what is possible with financial services, the optimal level or type of regulation may change.

FinTech offers exciting possibilities for better, cheaper, and more inclusive financial services. We should be mindful of the risks posed, but we should not overreact. Instead, we should work to ensure that the legal and regulatory system facilitates innovation and competition while preserving consumer protection so that Americans can obtain the best financial services possible.

I look forward to our discussion, and thank you for your time.

Chairman CRAPO. Thank you, Mr. Knight.

Ms. Omarova.

STATEMENT OF SAULE T. OMAROVA, PROFESSOR OF LAW, AND DIRECTOR, JACK CLARKE PROGRAM ON LAW AND REGULATIONS OF FINANCIAL INSTITUTIONS AND MARKETS, CORNELL UNIVERSITY

Ms. OMAROVA. Senators, thank you for inviting me to testify here today. My written testimony lays out the details of what I have to say, so let me focus on a few big-picture points.

FinTech is by far the hottest topic in today's finance. Cryptography, cloud computing, big data analytics are changing financial markets by making transacting faster and easier to automate and scale up. We have just heard arguments emphasizing the immense societal benefits of these changes as long as FinTech innovations are not stifled by outdated regulations.

Let us put these arguments in context. It is quite symbolic that we are convened here today almost exactly on the tenth anniversary of Lehman Brothers' failure that triggered the global financial crisis. I do not have to tell you, Senators, what a calamity that crisis was. You lived through that crisis. And for years before the crisis, you and your colleagues probably sat through many hearings just like this one listening to many confident and articulate gentlemen with impeccable industry credentials tell you that you should not let outdated regulations stifle financial innovation. They told you and the American public that innovative products like derivatives and subprime mortgage loans were making the financial system more efficient, resilient, and democratic by enabling better risk management, expanding consumer choices, and making credit available to low-income Americans. And so risky derivatives and predatory subprime loans were allowed to grow unregulated until they crashed the financial system 10 years ago.

Today the same rhetoric of financial innovation and consumer choice that brought us the crisis of 2008 returns to the center stage in the policy debate on FinTech. Of course, this time it is different. It is not about derivatives, but about crypto assets. It is not about predatory subprime lending, but about marketplace lending—once again new technologies promising to make the system more efficient, resilient, and democratic: to expand consumer choices and to give low-income Americans access to financial services.

The Treasury report adopts this rhetoric and translates it into a strategy of significant deregulation in the U.S. banking sector, meant to enable banks to form large-scale business partnerships and even outright corporate affiliations with technology companies.

For example, the report advocates for a significant rollback of existing regulations in order to make it easier for the banks to give unaffiliated tech companies, data aggregators, cloud service providers, and various FinTech firms much more direct access to their customers' account and transactional data.

Currently banks are reluctant to allow data-mining businesses to get the direct feed of their depositors' account data because regulations make banks ultimately responsible for the handling of sensitive customer information. For the same reasons of regulatory compliance and liability, banks are currently cautious about moving all of their data to the cloud operated by a third party.

The Treasury characterizes this as a bottleneck in the flow of financial information and calls for a concerted regulatory effort to

push banks to share their customer data and to outsource its management to third parties much more freely. The claim here is that allowing unaffiliated tech companies to access, host, and manage bank data will make financial services faster and cheaper for all consumers and give consumers control over their financial affairs.

Of course, banks will benefit from being able to reduce their operational and compliance costs and potentially increasing their revenues by charging aggregators for direct feeds of customer data. And consumers will get the convenience of living in a seamless virtual space where all FinTech apps can just magically connect to all of their bank accounts. But this will also expose consumers to tremendous risks. Imagine that your personal bank account data, transaction history, and other sensitive information previously managed by your local bank is now stored in the cloud and shared directly and in real time with multiple data-collecting companies. These companies are not regulated under a bank-like regime with dedicated supervisors making sure that the data is safe and secure, that these companies maintain strong operational controls and do not misuse sensitive consumer information. In this environment, it is easy to imagine not just one but many Equifax-style catastrophes occurring far more frequently and with far more devastating consequences.

This is, in fact, a particular kind of a broader problem that our system of bank regulation has jealously guarded against since the 19th century: the potential for excessive concentration of financial and market power, if banks are allowed to engage too intimately with nonbank commercial businesses. This separation of bank and commerce remains a core principle of U.S. banking law to this day. The Treasury report, however, calls for measures that will directly undermine this longstanding and sensible regime.

What it frames as low-key technical fixes to how regulators apply banking laws is, in fact, opening the door to de facto FinTech conglomeration. If allowed, this new platform trust will be able to monopolize the flow of both money and information and effectively take control of our lives not only as economic actors but also as citizens.

The American Republic of George Washington and Teddy Roosevelt was never meant to become a dystopic company town of this kind. As you are deliberating on FinTech as a public policy matter, I urge you to stand on guard and not let this become even a remote possibility.

Thank you.

Chairman CRAPO. Thank you, Ms. Omarova.

I will start my questions with you, Mr. Knight. While innovations in data have brought many benefits, it has also become known that firms may be, in fact I think are, using this data to drive social policy and to restrict access to entirely legal, in fact sometimes constitutionally protected conduct and do this for reasons of trying to influence social policy unrelated to safety and soundness or other concerns that would make these targeted groups unfit to do business with.

Do you think this presents a problem?

Mr. KNIGHT. Thank you, Senator. I do, and I think it presents a couple of problems. The first one, to key in on the data point, is

to the extent that a financial institution is collecting data that relates to a sensitive or private matter, and particularly the more granular the data collection is, the potentially more harmful a breach would be. Information that is relatively innocuous at one level of detail can become extremely damaging at another level of detail. And, of course, depending on how much microtargeting, if you will, the bank is doing and the level of detail that the bank has stored, if that data is breached, that data is now available and people can be harmed more than had the data been recorded at a less granular level.

The second and, I think, bigger issue that we are dealing with here is I think our starting point should be that a business can choose to do or not do business with anyone they want for whatever reason they want in a free market, and then we are going to narrow that for some compelling societal issues like antidiscrimination. The problem is banks are not a free market. For banks, because of public policy, there are barriers to entry; there are barriers to exit; there is significant subsidy. And so banks derive part of their market power from public power. And so when they choose to use their market power in an effort not to do what they have been charged to do, which is effectively intermediate credit or provide savings, but instead try to insist or de facto regulate the American people in a social policy setting, they are not using their market power. They are using public power. And the people who are on the receiving end of that do not have the same market protections that they would in a freer market.

You know, let us take an example of YouTube, which will periodically say, "We will not cover certain types of videos for social policy reasons." Well, you can stand up a YouTube competitor tomorrow. You do not need a Government-granted discretionary charter. And if you were to stand up a competitor to YouTube, YouTube does not get special access to Government Internet. It does not get insurance. It does not get loans from the Government. There is not a presumption that if YouTube is about ready to fail, the Government will bail it out, which is something that banks enjoy versus their nonbank competition, and that increases the ability of banks to throw market power around that is not derived from anything other than Government power.

Chairman CRAPO. Well, thank you, and I share those concerns.

I want to shift a little bit here, and to you, Ms. Omarova. I appreciated your testimony on some of the positive aspects that FinTech offers consumers. But some of the concerns that you raise are also concerns that I share.

There is an article in today's *Wall Street Journal* that highlights this intersection, and this is the title of it: "Facebook and Financial Firms Tussled for Years Over Access to User Data". This follows an August article in the *Wall Street Journal* entitled, "Facebook to Banks: Give Us Your Data, We Will Give You Our Users". The article suggests that data privacy is a sticking point in these conversations.

Can you discuss the data privacy concerns and the need to better understand what kind of data is being collected and used and how such data is secured and protected? And I only have about a minute left in my time, so I——

Ms. OMAROVA. I think this article actually highlights precisely what is at stake here. This is not what the Treasury report is suggesting: it is not so much about what current data aggregators do with data today. It is about companies like Facebook, and it just shows that those big tech companies, platform companies that use information as currency in their businesses, once they get their hands on the data, on the sensitive bank customers' data, in any way for any reason, they will try to use that data to increase their revenues in a variety of spheres. And it will be extremely difficult to actually check how they use the data. They use proprietary algorithms to basically hide that from us. And who is going to oversee it? Who regulates Facebook for these kinds of issues? Nobody does.

I am glad that Bank of America and Wells Fargo refused Facebook access to their bank customers' data, but I do not kid myself for a minute that they have done it out of some kind of moral respect for customer privacy. They have done it because of the regulations that apply to them today. If we remove those regulations, then all of our sensitive financial data will be open to companies like Facebook and we will not know how it will be used.

Chairman CRAPO. Well, thank you, and I share those concerns as well.

Mr. Rubinstein and Mr. Boms, I am out of time, but I am not out of questions for you. I might have to submit them if we do not get another opportunity.

Senator Brown.

Senator BROWN. Thank you, Mr. Chairman.

Ms. Omarova, thank you for mentioning the tenth anniversary. There is, as I remind many of my colleagues here, a bit of collective amnesia on this dais and in this Senate, and thank you for always reminding me of that.

I have three questions I would like to get through, and I am going to start with you, Ms. Omarova, and if you would give answers as close to yes or no as you can, I will start with her on each of the questions and move from my right to my left.

The Treasury Department and much of the financial industry argue that consumers should have the right to share their financial data with any third party of their choosing. Do you think this should include the right for consumers to require that a FinTech or a data aggregator erase all information at that consumer's request?

Ms. OMAROVA. Yes, absolutely. And, you know, we have to keep in mind, though, that this rhetoric of consumer choice and consumer's right to share the information also implies the firm's right to share their information, and that is what we need to guard against.

Senator BROWN. Mr. Knight.

Mr. KNIGHT. Yes, subject to reasonable considerations like law enforcement.

Senator BROWN. OK. Mr. Rubinstein.

Mr. RUBINSTEIN. Yes, absolutely. Consumers should understand why they are sharing their data, and share it for a specific purpose. When they no longer have that purpose, they should be able to stop sharing it and have it deleted.

Senator BROWN. Mr. Boms.

Mr. BOMS. Agreed, subject to applicable regulations and laws.

Senator BROWN. Thanks.

Ms. Omarova, it is hard for consumer to understand all the ways that financial data might be used by a company they share it with. Should there be legal limits on how aggregators use the consumer's financial information in addition to consumer identified limits?

Ms. OMAROVA. Yes, absolutely. Basically, data aggregators and other data platform companies like Facebook should not be allowed to engage in a form of "insider trading" once they get access to customer data in one context so they could use it another context.

Senator BROWN. Mr. Knight, legal limitations?

Mr. KNIGHT. I believe the limitations should revolve around disclosure and the fact that any consent is knowingly given and the consumer has rights to terminate that consent at any time.

Senator BROWN. Mr. Rubinstein.

Mr. RUBINSTEIN. Yes, I would agree with that. I think really under a disclosure with explicit consent so the consumer knows what they are getting into, really understands it, and can control it. I do not know that we need a specific legal limitation, though.

Senator BROWN. Mr. Boms.

Mr. BOMS. I would echo what the past gentleman said with the additional addendum, which is we as an industry, not just FinTech but the financial industry, can and should do a lot better on conspicuous disclosures.

Senator BROWN. OK. So you are saying legal limits. You are saying disclosure should be the emphasis.

Last question. Companies like Google and Facebook collect enormous amounts of personal information. They also influence what information consumers are exposed to. For example, Facebook might show payday loan advertisements to servicemembers or to minorities, but not its other users. Should fair lending laws be updated to cover not just providing credit products but also their targeted advertisements on social media platforms? Ms. Omarova.

Ms. OMAROVA. Yes, absolutely. Algorithmic opacity raises a new spectrum of discrimination concerns, and we have to guard against that.

Senator BROWN. Mr. Knight.

Mr. KNIGHT. Senator, that is a great question, and I do not know if I can give you an answer in the time limit you would want. If you would like to submit a QFR, I am happy to answer it.

Senator BROWN. I will do that. Thank you.

Mr. Rubinstein.

Mr. RUBINSTEIN. Senator, I am sorry. I am not an expert in fair lending, and I probably cannot respond to that question.

Senator BROWN. Could I still send a letter to you and have people at Fidelity answer it?

Mr. RUBINSTEIN. You can send the letter. We can try. We are not lenders, so I do not know that we would have a good answer on that one for you.

Senator BROWN. OK. Mr. Boms.

Mr. BOMS. Senator, I would echo, I would be happy to respond in writing. It is not smuggling that we have discussed with our members.

Senator BROWN. OK.

Fourth question. Thanks for your promptness, all of you. The biggest four banks control about 45 percent of bank assets. According to your testimony, Facebook and Google together capture between 59 and 73 percent of the online advertising revenue in the U.S. Do you think the Treasury report's recommendation, which many of you have cited, favorably would benefit the large incumbents or would increase competition? Ms. Omarova.

Ms. OMAROVA. Well, the increase in competition is another good rhetorical choice to, you know, promote deregulation. But, in reality, both the financial sector and the tech sector are the businesses where economies of scale and economies of scope are extremely important. So in reality, what the Treasury report wants us to have is the maximum scale and maximum scope of these conglomerates.

Senator BROWN. So it would benefit the larger——

Ms. OMAROVA. It would benefit the large incumbents.

Senator BROWN. Mr. Knight.

Mr. KNIGHT. Senator, I believe that it would actually be potentially a mixed benefit. In some cases the largest companies would benefit; in some cases the ability of smaller financial institutions to plug into large data providers may allow them to compete with larger financial services companies.

Senator BROWN. Mr. Rubinstein.

Mr. RUBINSTEIN. Yes, Senator, the Treasury report refers to APIs, which is tech speak for more secure data-sharing methods. I do believe that they actually increase competition. With respect to standards, small companies only need to build to one API standard to plug into many interfaces, so, yes, I do think it helps competition.

Senator BROWN. It would certainly be working against trends, but, Mr. Boms.

Mr. BOMS. And, Senator, I would just say on behalf of many smaller financial technology firms, not the Facebooks or Googles of the world, there is a very strong view that this would promote competition.

Senator BROWN. So the smaller guys think it would promote competition?

Mr. BOMS. Yes, that is correct.

Senator BROWN. Thank you.

Chairman CRAPO. Senator Rounds.

Senator ROUNDS. Thank you, Mr. Chairman. First of all, thank you all for being here today.

One of the common threads that I have noted throughout each of your testimonies was the importance of data breach or data security in FinTech. I am really curious about the issue of the importance of or the challenges of a national data breach standard.

A number of businesses and trade associations have called for Congress and the Federal Government to step in and to establish one unified data breach standard so businesses could operate across State lines; they would not be forced to comply with a patchwork of different regulations. In addition, my colleague in the House, Congressman Blaine Luetkemeyer, recently released the Consumer Information Notification Requirement Act. This legislation, which has passed the House Financial Services Committee,

would require Federal regulators to establish a national unified data breach standard.

On the other hand, 31 State Attorneys General have released a letter opposing a prior version of a data breach bill in the House because it would preempt State laws.

I would like your thoughts, first of all, on what we are discussing right now coming out of the House. And, second of all, is a national standard necessary? And if so, how do we balance that with State interests? Who would like to begin?

Ms. OMAROVA. Let me take this on. I think, as a general matter, just because a particular standard is unified, universally applied, and easier to understand does not necessarily make it the better standard. It depends on what the standard is, qualitatively.

We have the Federal system of regulation in this country because we believe in the checks and balances. Sometimes State consumer protection laws have to step in more effectively to protect us consumers from abuse by large companies. And sometimes the Federal laws do a better job by basically, you know, creating an even playing field for everybody else.

So, my response to that would be it is not necessarily a bad idea to have a unified standard, but the key to that would be that that standard creates the maximum protection for the customer's financial data from various abuses that would likely ensue if we take State authorities completely out of the game.

Senator ROUNDS. Thank you.

Other thoughts?

Mr. RUBINSTEIN. I am happy to respond, Senator.

Senator ROUNDS. Please.

Mr. RUBINSTEIN. Thank you for the question. We do support a Federal breach notification. While a large firm like ours can stay on top of the various State laws, speed is often very necessary in a breach notification. Being able to understand one law and being able to respond quickly to that I think enhances consumer protection, and gets customers and regulators just notified faster.

Senator ROUNDS. Other thoughts?

Mr. BOMS. Senator, if I may, I would just add I think certainly you would find broad support within the FinTech ecosystem for a national standard, provided that it was strong enough and provided the right consumer protections.

Just to juxtapose that with the ecosystem that we have today, it is very inconsistent from a regulatory perspective. We have CFDR members who are, for example, FFIEC supervised and examined as third-party vendors to large financial institutions. We have other FinTechs who are State regulated, and so who are not subject to the prudential bank regulatory oversight. And so one standard that encapsulates best practices I think would be welcomed.

Mr. KNIGHT. Senator, I cannot speak to Representative Luetkemeyer's bill specifically, but I would also say that when assessing whether or not a Federal standard makes sense, some other things to think about are whether or not the patchwork of regulations is generating inefficiency that ends up costing consumers money; whether or not there is a disparate treatment among competitors, so some people get to leverage one standard, some people get to leverage a different standard;, and third, wheth-

er or not we are seeing citizens being de facto regulated by other States to a significant degree because, of course, you know, if you are a national player, you are going to comply with California even if someone in Wisconsin maybe would not support that standard.

One of the potential advantages of a Federal standard is that there is broader political representation in setting it and everyone gets a seat at the table, even if you do not end up winning.

Senator ROUNDS. Is there a process today where a lot of these States that have individual offices, in particular Attorneys General offices and consumer offices, to where they have—do they have an association, so to speak, where they can speak with a unified voice in terms of what should be part of a core of a national standard that you have worked with?

Mr. KNIGHT. Well, I have not worked with them on this topic, but the National Association of Attorneys General may be a place to go. They do work together both on advocacy and on enforcement through multi-State enforcement actions.

Senator ROUNDS. Any of you worked with any one of your associations? No? OK. Thank you.

Thank you, Mr. Chairman.

Chairman CRAPO. Thank you, Senator Rounds.

Senator Reed.

Senator REED. Well, thank you, Mr. Chairman. And thank you for your excellent testimony.

Mr. Rubinstein, thank you. Very thoughtful comments. We appreciate it. You point out in your written testimony that there are significant benefits, but there are also, as you say, very real cybersecurity and privacy risks. Can you project or let us know what your fears are about sort of the big problems that are out there lurking?

Mr. RUBINSTEIN. Senator, thank you for the question. Number one is the issue of credential sharing, people giving away their IDs and passwords. Today when FinTechs or aggregators show up at our front door, they log in typically with robotic activity. It is robots that impersonate the customer, basically, same as you sitting at your keyboard typing in your ID and password. That only gives access to data, and some of that data may be private which you did not intend to share. But it also can give access to transactions. If you think about that, what does that mean? It means that potentially a robot can come in and move your money to somewhere else. That is a risk from having just open access to the website, which the current methods have.

It is difficult for a financial institution to know that that is a robot coming in because it looks just like a customer. It is also difficult for the customer then to come back later and say, "I did not authorize that activity," when, in fact, they actually gave their ID and password to a third party. Those are real risks that we think about each and every day.

Senator REED. Thank you very much.

The other aspect of this is that we are at the beginning of a huge wave. Eventually the aggregation of data will go way beyond just sharing financial information from an institution with customers of a place like Facebook. It will go to all the information they collect: what websites you are looking at, maybe what potential pharma-

ceuticals you are ordering, et cetera. The financial decisions that are being made may not be being made by even individual human beings, and they might not be made in the financial institutions. It will be a machine that is sharing all this data. Is that something that you are concerned about?

Mr. RUBINSTEIN. I think there are great concerns with data that flows without the customer's knowledge and affirmative consent. So I think, you know, all that comes in.

However, we do firmly believe in the customer's right to share their data. It is their data. If they understand that it is being shared, understand how it is being used, frankly, if they want to participate in selling that data, let them participate. Hopefully they will get rewarded for that. But they should be able to turn it off at any time, too.

Senator REED. So in one concept there is the notion that—and I think we have said it before—there has to be an opt-in and opt-out, not just a generic one when you sign up, but constantly as the situation changes; that if there is value in your data, then somehow the customer should be able to realize that value, or at least make the decision based upon, you know, I am giving something up or I am getting something. And then the notion of erasing data is critical. Do you agree?

Mr. RUBINSTEIN. Yes, Senator. Take Fidelity Access, as I mentioned earlier in my comments, as an example. When we use that, a customer can actually have a dashboard that they can see which third parties they have granted access to their data, so they can monitor that on an ongoing basis and with a single click be able to revoke that consent.

Now, that only works—and many financial institutions are building similar things. That only works on the financial institution side. Once a consumer shares their data with a third party, we do believe that they should be able to get that erased. But that is actually between the third party and the consumer.

Senator REED. That is where we have to step in and provide some type of sensible rule so they can do that. Correct?

Mr. RUBINSTEIN. I think so, yes.

Senator REED. Ms. Omarova, in this deregulatory climate, which more and more is going to be left to the market, isn't that an argument for giving people the right to go to court if they feel aggrieved, even more so than today, giving people a private right of action if they feel aggrieved?

Ms. OMAROVA. I suppose so. I think in general, because of the complexity of the environment with which we are dealing today and because of the complexity of understanding exactly what kind of personal data is available to whom and how it could be used and the difficulty of monitoring all of that use, I think absolutely every lever of control over the use of that data by the big tech companies, especially, should be utilized.

Senator REED. Thank you very much.

Thank you, Mr. Chairman.

Chairman CRAPO. Senator Perdue.

Senator PERDUE. Thank you, Mr. Chairman.

One of the unintended consequences of the Dodd–Frank law was I think it spawned probably—and it is arguable—the greatest pe-

riod of bank consolidation in U.S. history. We have lost 1,700 banks in the last decade, and virtually no new banks have been started. So I have got a question.

In that environment, Dr. Omarova, you mentioned earlier—I have a question for Mr. Knight first, but I want to come back to you on a second question. But Dr. Omarova talked about aggregation, the bigger the banks get, the more important this aggregation of data becomes. I am concerned that today in that environment of consolidation we have six examining agencies charged with consumer financial protection. One of those is the CFPB. We had the Acting Director before this Committee a couple months ago tell us there have been at least 240 breaches of data that they are investigating and possibly as many as 800. Any one of those could be worse than the Equifax breach.

So the question I have, as we talk about—Mr. Knight, you talk about accessing this data can help banks actually improve services, particularly for people who are underserved today, and I agree with that. But this unified national data security standard, as we are talking about, breach notification that I think we all agree on, how would that apply in your mind to these Federal examining agencies that have access to this same data?

Mr. KNIGHT. I apologize. If I understand your question, is the concern that there is going to be a breach at the agency level?

Senator PERDUE. Yeah, we have already been told—there are 240 CFPB known breaches today, 800 they are investigating, any one of which could be worse than the Equifax breach.

Mr. KNIGHT. I absolutely share that concern, and I think that the challenge is if you allow any entity to access data, be it the bank or be it a Federal agency, there is that risk. And I think that while there are concerns and tools available to punish banks in the case of a breach or Equifax in the case of a breach—and we can debate whether or not those tools are adequate—it is harder in many respects to go after an agency due to issues like sovereign immunity.

Senator PERDUE. But should they be held to the same standard of data protection that commercial interests are?

Mr. KNIGHT. At least the same standard, Senator.

Senator PERDUE. Thank you.

Dr. Omarova, I have a question about where the United States sits with our regulatory environment relative to other countries. In Kenya, for example, 93 percent of Kenyans have access to a bank account through M–PESA, a mobile phone-based money transfer and microfinancing service in China. Alibaba—I was on a visit with Alibaba and Tencent a couple months ago in China. They help facilitate $12.8 trillion in mobile payments in China. They have leapfrogged us and our technology here. No matter what we think of our FinTech, a lot of these innovations were developed here, but we are slow adopters somehow in the United States. Are we falling behind places like the U.K., Kenya, and China in terms of the adoption of this technology and FinTech?

Ms. OMAROVA. Well, Kenya is very different, has a very different financial services market than we do here. They do not have an actual banking system.

Senator PERDUE. But the U.K. is very similar.

Ms. OMAROVA. I will get to that in a second. And in Kenya, by the way, the success of their mobile banking was built on the central bank and the major telephonic provider banding together. So the State was critical to providing the service to everybody else.

China, yes, China has Alibaba, which is competing with our, you know, PayPals and Facebooks and what have you. Again, in China, the State apparatus is so strong that China can control whatever those companies do, and that is a critical factor.

The U.K., we always hold up the U.K., especially the industry does, as this sort of principles-based, much more market friendly, much smarter kind of regulator type environment. But, remember, before the crisis, I worked in the Treasury, and we were doing reports about how the Financial Services Authority was so much better than our regulators were in terms of allowing financial innovation to go forward. And then the crisis hit. Where is the Financial Services Authority now? I am not so sure that the Open Banking Initiative in the U.K. is actually achieving the benefits that it was promising.

So I think what we should look for is not so much how, you know, industry-friendly or deregulatory a particular country's environment is. I think we should look at our market structure and the concentrations of power in the tech industry and the financial sector in our country.

Senator PERDUE. And that is my question. I have to gauge this against other standards and other performances, and so are we falling behind the adoption of these technologies relative to consumer protection and consumer access to banking services? And I would welcome anybody's response to that.

Ms. OMAROVA. I do not think we are falling behind. I think we are taking a more cautious approach simply because we have probably much more to lose.

Senator PERDUE. Very good. Anybody else?

Mr. BOMS. Senator, I would just add we should not discount the vibrancy and resilience of the U.S. market, which obviously stands way above other markets.

That said, the lack of consistency and clarity in the regulatory and legal framework in the U.S. with regard to data access presents a potential future competitive risk for the U.S. market.

Senator PERDUE. Thank you very much.

Thank you, Mr. Chairman.

Chairman CRAPO. Thank you.

Senator Warner.

Senator WARNER. Thank you, Mr. Chairman.

I want to follow up where Senator Perdue was at, Mr. Boms, with what the Europeans are doing, with what the Brits are doing. How does this affect, again, our market's ability to stay competitive in what is obviously a global field?

Mr. BOMS. Sure, Senator. It is very early days. PSD2 and Open Banking in Europe and the U.K. just went live on the 13th of January this year. There was a conformance period that will last until September of next year. So we are in this transition period. But we are seeing adoption of Open Banking APIs by consumers in the U.K., for example, increase 50 percent month over month. So, clearly, there is interest in adoption of these tools.

We are seeing significant investment into the FinTech market in London. It is not because the cost of living or taxes are low. It is because there is a clear regulatory framework and a legal framework for how these tools can be deployed, proscriptive consent and disclosure flows that consumers have come to expect and are aware of.

So I do not think it is an imminent threat, but I do think if we do not get our house in order in the relative near term, it could become a threat.

Senator WARNER. One of the things I—and related to this, while not the direct topic today, you know, there is a group of us, bipartisan, that have been working for now 3½, 4 years to try to at least standardize data breach legislation. The fact that we have got 49 or 47 different data breach legislative laws—this is different than data portability, but I would hope you would think that some level of Federal leadership on data breach would be important as well.

Mr. BOMS. Absolutely, Senator, so long as the floor that it establishes provides sufficient consumer protection.

Senator WARNER. Right, and that is, I think, what we have done. Frankly, it has been some of—I was from the telecom business before. It is my old industry that has been some—everybody is for data breach legislation, but then they all want a carveout for their specific industry, and that is not going to end up being, I think, the way we get there. Unfortunately, those efforts have lagged a little bit in the last 8 or 9 months, and I think as we think about this, we have got to think holistically. And, Ms. Omarova, that is where I want to go to my question with you. I am a big advocate around data portability, and I think Senator Brown may have indirectly raised this question already. In my efforts on the Intelligence Committee, where we are looking at the social media firms who have these platforms, who have enormous, enormous power and growing power, if we deal with data portability in the FinTech space alone but do not deal with data portability in terms of our individual personal data, if we are not able to move from Facebook to another enterprise and make it easy and allow our cat videos to move easily as well, we are really not going to be able to have the type of competitive market, I think, in that field.

I would just like you to comment on the need to not only get this right in the FinTech, in the financial arena, but more broadly based.

Ms. OMAROVA. You are absolutely correct. Information is the currency in the digital economy, and, you know, it takes many forms and it flows through many, many markets for many, many goods and services, not just financial markets but markets for other types of data. And it is a structural problem. I understand the concerns with competitiveness, and I am completely in favor of allowing consumers to move freely between different apps and utilize various information in ways that serve their interests. But the problem here is that you have to understand that, structurally speaking, financial institutions are sitting on the type of information that presents, you know, a much heightened danger of misuse, and this is where we should be particularly careful with respect to FinTech and how the financial information is moving structurally in these markets and probably deal with the broader issues of data protec-

tion outside the financial sector and perhaps antitrust issues as well, because those are serious structural issues that exist everywhere in the big tech sector separately.

Senator WARNER. My concern is that what—and this Committee has looked in terms of Russia sanctions, what happened in 2016, where Russia intervened, but what I see as the next iteration is that someone will come in and break into nonprotected personal financial data, as they did with Equifax, and Senator Warren and I have a bill, and it is, I think, a travesty that we are a year later and there still has been no penalty paid by that company. But they will break in, get personal information, contact any of us as an individual, and then what will pop up with be what is called a "fake video," and it will be somebody that looks like Senator Brown, but it is not actually Senator Brown live stream video. And the combination to wreak havoc there not only on the political side but on the market side is really huge, so we have to solve this issue not just for financial data portability but across the board.

Ms. OMAROVA. Oh, that is absolutely correct. That is absolutely correct.

Senator WARNER. Thank you.

Chairman CRAPO. Thank you.

Senator Cortez Masto.

Senator CORTEZ MASTO. Thank you, and thank you, Mr. Chair and Ranking Member. Obviously, this is an important discussion, and thank you all for being here today. It is a great conversation.

I echo my colleague Senator Warner. I think we have to look at this in a holistic approach. I think what I have heard today, we all agree we have got to address the data privacy, security, and consumer protection piece of this, but this is emerging technology. It is not going away, and we are going to have to figure out at a Federal level how we address this, but also, I believe, incorporating State laws in the States as well. They have to be a part of this discussion.

So let me ask you this, because we received a letter from the National Association of federally Insured Credit Unions, the Committee did. One statement the association makes is that, "As new companies emerge and compete in this area, it is important that they compete on a level playing field of regulation, from data security to consumer protection." Would each of you agree with that statement?

Mr. BOMS. Senator, yes.

Mr. RUBINSTEIN. Yes, absolutely. Whoever holds consumer data should be held to the same standards.

Mr. KNIGHT. Yes.

Senator CORTEZ MASTO. Thank you.

Ms. OMAROVA. Well, yes, it is generally a good principle.

Senator CORTEZ MASTO. And that level playing field of regulation does not mean that we roll back regulation, does it?

Mr. BOMS. Senator, from my perspective, no, it does not. It means that we make the regulation consistent across the various regulators who have some stake in this.

Senator CORTEZ MASTO. Thank you.

Mr. RUBINSTEIN. Yes, I would agree.

Senator CORTEZ MASTO. Right. And I think you would all agree.

Mr. KNIGHT. Senator, I would say that when we talk about level playing field, we should be thinking about what is the risk that is generated that we are trying to regulate against, and so if that risk exists, comparable regulation should exist. If a new player comes along and offers a comparable service but does not generate a certain risk, then they should not be regulated in the same way vis-a-vis that risk. For example, a lender that does not fund their loans from federally insured deposits should not be regulated as a depository because they are just not generating the risks that go along with the deposit holding. They should be regulated vis-a-vis consumer protection in lending, for example.

Senator CORTEZ MASTO. OK.

Ms. OMAROVA. Well, sometimes it is very difficult to figure out exactly what types of risks a particular lender or a particularly institution really poses. Sometimes we do not see how exactly they fund their loans and their services. We have learned that from this last crisis. And I think that in that sense, it is important that, if we are looking for leveling the playing field, we have to make sure that that common level is not the minimum regulatory level of oversight but the maximum one. And when we are looking at the maximum level of regulatory oversight in the interest of the American public, we should keep in mind the biggest players in those markets, not the smallest ones.

Senator CORTEZ MASTO. Thank you. And can I ask you, each one of you, when we are talking about banks and credit unions that allow data aggregators access to bank customers' accounts, if there is a violation of those customers' privacy information and that privacy information for those customers, who should be legally liable? Should the banks and credit unions be legally liable if they are working with those third-party aggregators and there is a breach?

Mr. BOMS. Senator, you have identified, I think, perhaps the largest, most significant obstacle in this ecosystem, which Mr. Rubinstein referenced in his opening statement. The members that I represent would say that he who breaches the data should be responsible for making the consumer whole.

The catch to that and the issue with that is we have decades of regulation and consumer expectations that say that it is the financial institution that either should or must make the consumer whole. So on some level, even though our members have taken it upon themselves, are adopting this notion of he who breaches must make the consumer responsible, at some point we need to holistically take a look at the regulations that we have on the books and modernize them for the 21st century economy.

Senator CORTEZ MASTO. OK. Anyone else?

Mr. RUBINSTEIN. Senator, as Mr. Boms said, it is a very difficult topic, and we firmly believe that whoever causes harm to the consumer should make the consumer whole.

Unfortunately, this is a chain. Consumer data starts at the financial institution. It moves to a financial data aggregator. Then it moves to a FinTech. It may continue to move beyond that.

The financial institution only has a direct relationship in that first step of the chain with the financial aggregator. They need to look to that financial aggregator to make the financial institution whole if the financial institution has reimbursed the consumer and

then they can deal with their own customer. Similar to getting into a car accident, right? You have auto insurance. You turn to your insurance company, and then your insurance company goes and subrogates with the others down the chain. It has been very difficult. The industry is not adopting that yet, and we can use a nudge in that direction.

Senator CORTEZ MASTO. Thank you. Please, whoever would like to go next.

Ms. OMAROVA. I think that everybody in that chain should bear a responsibility and be exposed to the liability for data breaches of bank customer data. And what concerns me about the Treasury report in particular is that it never really addresses that issue directly, and it talks about, yes, we need to kind of have an appropriate liability regime, but it is not clear to me what that regime will be like.

What I know, though, is as a practical matter, in order to incentivize banks to share their information, their bank customer information, with various technology companies, you are going to have to relax the actual liability constraints existing today on them, because, otherwise, they simply would not share it. So that is what concerns me a lot.

Senator CORTEZ MASTO. Thank you. And I know I am out of time, Mr. Chair. I do not know, Mr. Knight, if you wanted to say a few words—I do not want to take up any more time.

Chairman CRAPO. Briefly.

Senator CORTEZ MASTO. Thank you.

Mr. KNIGHT. So in addition to all that has been said, I would say that one threshold question we need to talk about is that Treasury takes the position in the report that Dodd–Frank Section 1033 compels the bank to make the information available to the consumer's chosen aggregator. I do not know if that is the position the Bureau will take, and if we are compelling the bank, then the normative argument for holding the bank liable if some accident happens down the chain with an aggregator they did not choose to partner with but were compelled to partner with weakens; whereas, if it is a matter of choice all the way down, then the principles discussed make more sense.

Chairman CRAPO. Senator Scott.

Senator SCOTT. Thank you, Mr. Chairman. Thank you to the panel for investing the time to be here this morning.

Things get complicated when a company is headquartered in Tennessee, does business in South Carolina, and is breached in Arkansas. Those States all have different laws on the books governing when and how companies must notify the public of a data breach.

The reality is that a patchwork quilt of 50 different breach notification standards creates a race to the bottom in which breached parties will often comply with the lowest possible standard. Consumers are ultimately the ones that pay the price. They are the ones that lose out.

I know that Senator Rounds touched on this question earlier, but let me ask you, Mr. Boms, is a State-by-State framework for breach notification effective? Who stands to benefit from a more uniformed approach?

Mr. BOMS. Senator, we think that there is certainly room for improvement. A Federal approach that lifts up what the ceiling is across the board would benefit consumers, it would benefit the industry. We think it would be a win–win for everybody involved.

It is not simply an issue of regulatory complexity at the State level. Several of the FinTech firms that I work with have Federal supervision through third-party vendor risk management, and so there is a piece of prudential bank regulatory authority here as well on this score. This is another area where consistency among regulation, not deregulation, would be immensely helpful.

Senator SCOTT. Thank you, sir.

The Gramm–Leach–Bliley Act from 1999, we did business very differently then. I think we were all still using paper for most of our transactions. We probably had dial-up for our Internet connection, and we certainly did not have cell phones that could do anything other than call, and that was a pretty expensive venture as well.

The bottom line is that the world has changed so significantly since GLBA was enforced, became law, but it is still the foundation of how we govern data aggregators for financial institutions. I am encouraged by the fact that we are moving to APIs from screen scraping, but it is happening fairly slowly.

Mr. Boms, you mentioned Europe, Mexico, and Japan in your testimony. How are U.S. policymakers falling behind in crafting laws that foster FinTech innovation and protecting consumer data?

Mr. BOMS. Senator, I would answer in two parts. I think the first thing I would say is APIs in and of themselves are not a panacea. They will not solve everything. The API, in addition to being secure, as we have heard, also must be robust. So the API must include data fields like fees, for example, so that a consumer who is using a third-party tool that compares fees at one, for example, financial institution can compare what its fees would be for the same products or services at another financial institution. So making sure that the APIs with the direct feeds are robust is the first step.

The second is there are no standards in the U.S. market. The Treasury report talks about data standardization, which we think is a very important area that other markets have addressed. In the U.K. open banking environment, the data elements are standardized. The Mexican central bank and securities regulator are currently working on an API that would standardize the data sets. This would be, we think, one place to start, but there are quite a few that regulators here could begin with.

Senator SCOTT. Thank you.

Almost 30 percent of Americans living in economically distressed communities are credit-invisible, meaning they have no credit score. An additional 15 percent are unscorable due to having an insufficient or old credit history. In South Carolina, that combined number is about 23 percent, or one out of every four adults.

Senator Cortez Masto and I have worked diligently to find ways to bring that credit-invisible person to a place where their consistent habits of paying their bills, whether it is their electric bill or their cell phone or the rent from a place that they are renting, if they are paying those on time, they should get some credit for that.

Mr. Knight, you testified that innovative underwriting can provide consumers with benefits such as lower interest rates. Can you speak to the benefits of using rent and utility payments in credit scoring and to other developments in underwriting that will benefit consumers?

Mr. KNIGHT. Thank you, Senator. Yes, I think that expanding access to the types of data that bear on the creditworthiness of a borrower, even if they have not traditionally been captured in traditional underwriting like a FICO score, has the potential to be valuable in allowing lenders to make an accurate assessment of the risk that they would take on by lending to a borrower. In some cases, that will make someone who is credit-invisible visible and, therefore, the lender has enough data they feel like they could make an offer.

In other cases, it will indicate that people who are, in fact, good credit risks or better credit risks than they otherwise get credit for, because you are looking at data that has not otherwise been picked up. So I think that there is potential value there.

Senator SCOTT. Thank you. I have another question on my legislation, the MOBILE Act, that I will submit for the record.

Thank you, Mr. Chairman.

Chairman CRAPO. Thank you.

Senator Warren.

Senator WARREN. Thank you, Mr. Chairman.

So FinTech holds out a lot of promise for consumers and also raises a number of concerns. I think it is critical that the Government move methodically on a regulatory approach to FinTech, so we encourage productive innovation but we do not expose consumers to a lot of unnecessary risks.

So the Treasury Department issued a report on FinTech earlier this year, and in almost every instance, it advocates for deregulation in an effort to stimulate the FinTech industry. And I am concerned about a lot of those recommendations.

One set of recommendations is about rolling back the rules that govern how banks can share personal financial information with third-party data aggregators. So, Professor Omarova, I know you addressed this issue in your written testimony, and I just would like you, if you could very briefly, to explain what your concerns are with the Treasury Department's recommendations on this front.

Ms. OMAROVA. So my main concern is that the Treasury's approach will essentially open the floodgate for the banks that are currently regulated to open up this treasure trove of sensitive financial data on the customers that they have for much broader types of uses by various tech companies. So my concern is about Facebook, it is about Google, it is about Amazon. And we do not know what they do with the data they touch, so they could use it, they could get access to that data in one capacity, let us say as a cloud service provider and the code writer, but then misuse it in order to sell something to the customer, and that is what I worry about. And the customer consent here could be obtained by the bank at the point when the customer is actually opening a deposit account with the bank, and that is what concerns me. This notion of consent and choice could be actually diminished.

Senator WARREN. All right. That is very important. Thank you. You know, given what just happened with the Equifax breach, I think a lot of my constituents and constituents for pretty much everybody here would be uncomfortable with the idea of even more companies getting access to our financial data without our effective consent and without strict rules on how they have to protect that data.

Another set of Treasury recommendations would further weaken the wall between banking and commerce. They would allow our biggest banks and our huge technology platforms to join their corporate empires—you were just talking about this—and giant technology companies like Facebook and Google to buildup equity stakes in multiple smaller banks across the country.

Again, could you go back to this, Professor, and describe some of the potential harms in allowing this kind of consolidation across different industries?

Ms. OMAROVA. Right. So the Treasury basically seeks to weaken how control is defined in the Bank Holding Company Act. The Bank Holding Company Act currently subjects any company that controls a U.S. bank or is affiliated with a U.S. bank to various regulations and supervision, and it is essentially an antitrust law that seeks to prevent banks from abusing their control of immense power over public money and credit. And what the Treasury says is essentially we should make it much easier for the banks to acquire equity stakes in tech companies and vice versa. And I worry about the fact that it will not create greater competition; it will actually lead to extreme concentrations of power over money and information across the sectors. And it will take the "too big to fail" problem to an unprecedented level because in the next crisis we may have to save Facebook and Amazon because they would be so intertwined in the financial sector.

Senator WARREN. So, actually, this is powerfully important, and I appreciate your comments on this. You know, a lot of discussion in FinTech centers on the consumer to corporate part of this, but there is also the part about the effect it would have on wholesale banking. Can you just say a word more about that? You have talked about blowing up "too big to fail." Just a bit more.

Ms. OMAROVA. So remember with subprime mortgages, for example, it was also—the rhetoric was all about the right of the consumer to choose to take a very expensive loan, for example, but in reality, those mortgages were the fuel for the wholesale market speculation. And so I worry that allowing digitization of data and all of this sort of new FinTech innovation without proper controls will actually increase the potential for wholesale market speculation in the secondary markets that would make the system more volatile and more unstable, and we have to be aware of that danger.

Senator WARREN. Good. Thank you very much. You know, I know there is a lot that improving technology can do to reduce costs and improve service for customers. But I am concerned that this Treasury report consistently ignores real concerns that could arise both for consumers and for the industry and change the—have an impact on protecting data, on reducing consumer choices, on maintaining safety in the financial system.

So thank you very much, Mr. Chairman, for holding this hearing. I hope we will continue to dig into this issue. Thank you.

Chairman CRAPO. We definitely will. And I think there is lot of bipartisan agreement on a lot of these issues.

I need to wrap up the hearing. However, Senator Brown has asked for one more round of 5 minutes.

Senator BROWN. I have a couple questions. Thanks.

Chairman CRAPO. Senator Brown, I will grant that to you, and I am sorry, then I am going to have to wrap the hearing up.

Senator BROWN. Mr. Chairman, thank you. We have had sort of private discussions about overlap and the common interests we see in some of this on privacy, and I am hopeful that we can come together on some things.

I have a couple questions left. Professor Omarova and Mr. Knight, if I could direct the first one to you, starting with you, Professor Omarova. Should a nonfinancial company be allowed access to consumers' detailed financial data such as transactions or account balances? Or should the traditional separation of banking and commerce extend to data sharing as well?

Ms. OMAROVA. I absolutely think that the traditional separation of banking and commerce should extend to everything that relates to data. I do not think that pure disclosure really cures the problem because the problem is structural. The problem is about the market power crossing over different sectors and essentially hurting all of us and the long-term competitiveness of our economy.

Senator BROWN. Thank you.

Mr. Knight, any comments on that?

Mr. KNIGHT. So I am somewhat more optimistic. I think that there may be circumstances where allowing that sort of exchange can actually be beneficial to the consumer. I do think that meaningful disclosure, meaningful acceptance is critical to this, because we are talking about very sensitive information, and if the consumer is allowing that information to be shared, it should be used only for the purposes that the consumer has granted access to, and that consent should be periodically reacquired. It should not be something that you click "yes" on a splash screen when you first sign up and then never hear about it again. But I do think that there may be scenarios where that exchange actually is worth it.

Senator BROWN. Thank you.

And the last question to Mr. Boms, and thank you, Mr. Chairman. What would be the impact of a successful hack of one of your members?

Mr. BOMS. Senator, it would depend on which of the members we are talking about. So if I could, I will separate them from the aggregator members and the end FinTech clients.

For the aggregator members, there is a wide variety. They are mostly read-only platforms. You cannot execute transactions across them. While many do hold credentials as a way to get into the ecosystem, they employ best in class security systems, hardware encryption, elements of data security that I am not qualified to get into. That is not to say that more cannot be done, but, of course, they are not encumbered by——

Senator BROWN. And there have been successful hacks in the past, of course.

Mr. BOMS. Well, I would argue, respectfully, that the vast majority of the hacks that we see in the financial ecosystem are at the incumbent financial institutions, not the FinTech players, or at least the ones that I represent. That is not to say that one will not happen the second this hearing ends.

For the end user—and I should also add, for the aggregators, many have adopted policies where they do not collect PII. So they are the pipeline; they connect one entity to the data that they acquire for the use case, but do not themselves retain the identifying information that the end user provides to their third party.

But I think underlying the question, Senator, is there need to be standards for data security in this ecosystem, and that is why my members at least have come out and said, whether it is regulatorily prescribed or whether it is private sector driven, we are ready to have that conversation. And we have already started to deploy some of those standards across the 50 companies that I work with.

Senator BROWN. Thank you.

Chairman CRAPO. All right. Thank you, Senator Brown, and I again want to thank the witnesses. I have a lot more questions I want to ask, and I do not know if I will pummel you with all of those, but over time we are going to dig much more deeply into this as a Committee. It is an incredibly important issue. And it is complex. It needs to be understood, and we appreciate your helping us to get a deeper understanding today.

That concludes the Committee questioning. For Senators wishing to submit questions for the record, those questions will be due in 1 week, on Tuesday, September 25. Witnesses, we ask you, when you receive questions, if you would promptly respond to them. And, again, we thank you for your willingness to come and share your expertise with us today.

With that, this hearing is adjourned.

[Whereupon, at 11:21 a.m., the hearing was adjourned.]

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

PREPARED STATEMENT OF CHAIRMAN MIKE CRAPO

Today, we will hear four very unique perspectives on a segment of financial technology, or "FinTech."

Almost exactly one year ago, the Committee held a hearing to explore the various sectors and applications of FinTech.

In the short time period between that hearing and this one, many developments and innovations have occurred, both in the private sector and on the regulatory front.

Digitization and data, in particular, are constantly evolving, challenging the way we have traditionally approached and conducted oversight of the financial services sector.

As technology has developed and the ability to readily and cheaply interact with and use data has flourished, we have experienced a sort of revolution into the digital era.

This digital revolution brings with it the promise of increasing consumer choice, inclusion and economic prosperity, among other things.

Less than a decade ago, the concept of mobile banking, a simple transaction, was relatively new.

Now, consumers have countless options by which to interact with and access their financial information and conduct transactions.

As this marketplace rapidly develops, so must we constantly evaluate our regulatory and oversight framework, much of which was designed prior to the digital era.

To the extent that there are improvements that can be made to better foster and not stifle innovation, we should examine those.

Although these technological developments are incredibly positive, the increased digitization and ease of collecting, storing and using data presents a new set of challenges and requires our vigilance.

Many products and services in the FinTech sector revolve around big data analytics, data aggregation and other technologies that make use of consumer data.

Oftentimes these processes operate in the background, and are not always completely transparent to consumers.

It is important for consumers to know when their data is being collected and how it is being used.

It is equally important for the companies and the Government alike to act responsibly with this data and ensure it is protected.

As we have seen in recent years, this can be a challenging task.

In order to fully embrace the immense benefits that can result from technological innovation, we must ensure that proper safeguards are in place and consumers are fully informed.

Today, I hope to hear from our witnesses about: the ways in which FinTech is changing the financial sector and the improvements that can be made to ensure the regulatory landscape welcomes that innovation; what kind of data is being collected and used, and how such data is secured and protected; and what are the opportunities and challenges going forward?

PREPARED STATEMENT OF SENATOR SHERROD BROWN

In the run-up to the financial crisis, Wall Street banks bragged about innovations that they claimed made the financial system less risky and credit more affordable. Some of these innovations were in consumer products—like interest-only subprime mortgages. Other innovations were happening behind the scenes, like the growth in risky collateralized debt obligations and credit default swaps.

According to the banks, technological advances like increased computing power and information sharing through the internet allowed financial institutions to calculate and mitigate the risks of these complex financial innovations. Here in Washington, banks told lawmakers that regulation would hold back progress and make credit more expensive for consumers. Rather than look at financial technology with an eye to the risks, Federal banking supervisors repealed safety and soundness protections and used their authority to override consumer protection laws in several States.

Eventually, so-called financial innovations led to the biggest economic disaster in almost a century, costing millions of Americans their homes and their jobs.

Criticizing the bankers and regulators who lost sight of the enormous risks that came with these new innovations, former Fed Chair Paul Volcker declared that "the ATM has been the only useful innovation in banking for the past 20 years."

I am more optimistic about some new technologies benefiting consumers rather than just lining Wall Street's pockets, but I think we should look at this Treasury report with the same level of skepticism.

Rather than learn from past mistakes, the Treasury report embraces the short-sightedness of precrisis regulators. It exalts the benefits of "financial innovation," describes Federal and State regulation as "cumbersome" or as "barriers to innovation," and recommends gutting important consumer protections, like the CFPB's payday lending rule. It even suggests stripping away what little control we have over our personal financial data, just a year after Equifax put 148 million Americans' identities at risk.

Just like a dozen years ago, Wall Street banks and big companies are making record profits, but working families are struggling just to get by. Student loan debt is at record levels, and credit card defaults are rising. Worker pay isn't keeping up with inflation, but we've managed to cut taxes for the richest Americans while CEOs and shareholders have reaped huge windfalls through over half a trillion dollars in stock buybacks.

Plenty of financial institutions are adopting new technologies without running afoul of the law. Rather than focusing on how we can weaken the rules for a handful of companies who prefer to be called "FinTechs" rather than "payday lenders", or "data aggregators" rather than "consumer reporting bureaus", Treasury should be focused on policies that help working families.

This isn't a partisan issue for me. I raised concerns about relaxing the rules for FinTech firms when Comptroller Curry, appointed by President Obama, suggested a special "FinTech" charter almost two years ago.

The new leaders at the Federal Reserve, the OCC, the FDIC, and the CFPB have already made it clear that they're ready to give Wall Street whatever it asks for. And the recommendations in this report call for more handouts for financial firms, FinTech or otherwise.

I am, however, interested to hear from our witnesses about how new financial technologies could increase our control over our own information, better protect against cyberattacks, or make it easier for lenders to ensure they're following the law. And as traditional banks partner with technology firms, I think it's important for the Committee to consider where gaps in regulation might lead to future systemic risks.

Thank you to the Chairman for holding this hearing, and to the witnesses for their testimony today.

PREPARED STATEMENT OF STEVEN BOMS

PRESIDENT, ALLON ADVOCACY, LLC, ON BEHALF OF CONSUMER FINANCIAL DATA RIGHTS

SEPTEMBER 18, 2018

Introduction

Chairman Crapo, Ranking Member Brown, and Members of the Committee, thank you for the opportunity to testify today on behalf of the Consumer Financial Data Rights, or CFDR, Group. The CFDR Group is a consortium of nearly 50 financial technology (FinTech) companies, including financial data aggregation companies and end user-facing technology tools, on whose services more than 100 million consumers and small businesses collectively depend for access to vital financial services and wellness applications that serve them at every stage of their financial lifecycles. CFDR Group member-companies provide, for example, automated savings services, no-fee credit cards, investment advisory services, retirement savings advice and critical small business capital. In the complex and often opaque financial services ecosystem, the CFDR Group strives to be the voice of consumers and small businesses before policymakers and market stakeholders alike.

My testimony today also provides the perspective of the Financial Data and Technology Association (FDATA) of North America, a trade association for which I serve as Executive Director. FDATA North America is comprised of several financial services providers, some newer entrant FinTech firms and some incumbent, traditional providers, united behind the notion that standardization of consumer data access is both a fundamental consumer right and a market-driven imperative. FDATA North America is a regional chapter of FDATA Global, which was the driving force for Open Banking in the United Kingdom and which continues to provide technical expertise to regulators and policymakers in London, to the European Commission, and to regulatory bodies internationally contemplating many of the same issues identified in the Department of the Treasury's ("the Department" or "Treasury") report

released on July 31, *A Financial System That Creates Opportunities: Nonbank Financials, FinTech, and Innovation.*

The CFDR Group and its members consulted frequently with the Department as it considered the current state of the FinTech market, the consumer and small business benefits it provides to Americans today, and how best to harness innovation in the FinTech ecosystem moving forward while ensuring that consumers, small businesses and the financial system itself are well protected. The CFDR Group's engagement with Treasury was principally focused on the crucial issue of consumer-permissioned financial data, which ultimately was an area of emphasis in the Department's report.

Ultimately, any provider of a technology-based financial tool, whether that provider is a FinTech firm or a longstanding market incumbent, depends on the ability to access and utilize, with the consumer's or small business' express permission, elements of that customer's financial data to offer its products or services. Financial data, including, for example, balances, fees, transactions, and interest charges, are essential to facilitating the technology tools on which millions of Americans depend. These data elements are typically held at the financial institution with which that customer holds a checking, savings, and/or lending account. Before providing an overview of how this data exchange works today in the United States, I would first like to underscore the immense need that the technology-based tools offered by CFDR Group and FDATA North America member firms are fulfilling.

The State of U.S. Consumer Finances

Although the U.S. economy is performing well from a macroeconomic standpoint, there are unquestionably significant numbers of Americans who are being left behind and are financially invisible. The level of credit card debt in the United States is historically high and, earlier this year, exceeded $1 trillion for the first time ever, with the average American household holding approximately $8,200 in credit card debt.[1] About half of American consumers have no retirement savings at all, and of those that do, the average retirement account balance is about $60,000.[2] Approximately one-third of American adults have sufficient savings to last comfortably for more than a few months during their golden years.[3]

The crisis, of course, is not limited only to an accumulation of debt or a lack of retirement savings. The Federal Reserve Board of Governors determined earlier this year that 40 percent of American consumers could not afford a surprise $400 expense without either selling an asset or taking on additional debt.[4] And, unsurprisingly, many of us do encounter these surprise expenses. According to a recent study by CIT Bank, while half of Americans experience a financial emergency, such as a major health event or an unforeseen home repair, every year, more than one in four do not save for these unexpected events.[5]

It is no wonder, then, that 85 percent of Americans report feeling anxious about their financial state, with more than two-thirds believing that their financial anxiety is negatively impacting their overall health.[6]

Compounding this economic predicament is the growing complexity of most consumers' and small business' relationships with the American financial system. The vast majority of Americans have multiple different accounts across a variety of products providers. The most basic, fundamental first step towards financial health—simply understanding what one has and what one owes—is often intimidating and logistically difficult for all but the most financially savvy. The technology-powered tools on which millions of Americans have come to depend, provide intuitive, accessible platforms that enable even the least financially savvy among us to manage their finances and improve their economic outcomes. In addition to allowing Americans to see the totality of their financial accounts in one place, these applications empower consumers and small businesses to find lower loan rates or better loan

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[1] Comoreanu, A. (2018, June 11). "Credit Card Debt Study: Trends and Insights". Retrieved from *https://wallethub.com/edu/credit-card-debt-study/24400/*.

[2] Morrissey, M. (2016, March 3). "The State of American Retirement: How 401(k)s Have Failed Most American Workers". Retrieved from *https://www.epi.org/publication/retirement-in-america/*.

[3] "1 in 3 Americans Have Less Than $5,000 in Retirement Savings". (2018, May 8). Retrieved from *https://news.northwesternmutual.com/2018-05-08-1-In-3-Americans-Have-Less-Than-5-000-In-Retirement-Savings.*

[4] "Report on the Economic Well-Being of U.S. Households in 2017". (2018, May 22). Retrieved from *https://www.federalreserve.gov/publications/files/2017-report-economic-well-being-us-households-201805.pdf.*

[5] "Summer Survey: Trends on Saving for Life's Planned and Unplanned Events". (2018, August 1). Retrieved from *https://bankoncit.com/blog/2018-summer-savings-survey/*.

[6] "Planning and Progress Study 2016". (2016, June 8). Retrieved from *https://news.northwesternmutual.com/planning-and-progress-study-2016.*

terms, to avoid predatory products and services, to compare fees across different product offerings, to receive personalized investment and wealth management advice, to find and secure capital that otherwise may not be extended, or to take advantage of budgeting and savings tips to secure their financial future.

This of course presumes that one has access to the system in the first place. Twenty percent of adult Americans are underbanked by the traditional financial services system and almost nine million American households are entirely unbanked.[7] For these consumers, third-party, technology-based tools can provide vital, affordable access to a financial system that has left them behind.

Regardless of the use case a consumer or a small business wishes to leverage, and irrespective of whether that technology-powered tool is offered by a FinTech firm or a traditional financial services provider, the lifeblood of these tools is user-permissioned data access: the right of the consumer or small business to affirmatively grant access to the third party of their choice to connect to or see the financial data required to provide them the product or service for which they have provided their consent.

The State of Consumer-Permissioned Financial Data

Usage of third-party, FinTech tools in the U.S. is widespread: by 2017, 87 percent of consumers preferred to adopt a FinTech application rather than use a product or service offered by a traditional financial services provider.[8] To gain access, with the consumer's or small business' consent, to their customer's financial data in order to provide their products or services, the vast majority of technology-based tools retain contractual relationships with financial data aggregators, such as Envestnet Yodlee, Quovo, or Morningstar ByAllAccounts, all of which are members of the CFDR Group. These aggregators, which have built data connectivity to thousands of U.S. financial institutions over many years, function as technology service providers for the consumer or small business-facing applications. Once the consumer or small business has affirmatively provided their consent to the application that they wish to utilize, that consent is transmitted to their financial institution and they are authenticated. Upon authentication, the aggregator utilizes one or more methods of data consumption to capture the financial data permissioned by the end user that is required to deliver the use case requested and delivers it to the application provider. The application provider then uses this data to provide its service or product to the consumer or small business.

Because there are no overarching statutory, regulatory or market standards in the United States with regard to consumer or small business authentication, or with regard to the data consumption protocol used by aggregators to transmit the end user's data, with their permission, to their application of choice, there are several different methods used in the ecosystem today. To authenticate, end users typically provide their online banking credentials, either to the third-party application provider delivering them the service or product they have selected, or, through redirection, to their financial institution, which in turn issues an access token to the third party and the aggregator with which it partners. Once the consumer or small business is authenticated, the aggregator may use any of several data consumption methods to retrieve the financial data required for the use case. Some financial institutions have created direct feeds, such as Application Programming Interfaces (APIs), specifically for aggregators and third parties to utilize for the purpose of providing products or services to their customers; however, the vast majority of U.S. financial institutions have not. The significant capital investment required to build and maintain these feeds typically results in only the largest U.S. financial institutions deploying them. In the case where no direct data feed is available, aggregators employ proprietary software to retrieve the data required for the use case from the end user's native online banking environment. This data consumption method is colloquially referred to as "screen scraping."

I note here a critical issue that underlies the entire FinTech ecosystem's ability to continue to deliver the products and services on which many consumers and small businesses now rely: There is no legal requirement in the United States stipulating that a financial institution must make the consumer's or small business' financial data it holds available to a third party in the event their customer provides affirmative consent for the institution to do so. Accordingly, a consumer's or small business' ability to take advantage of the benefits offered by third-party, technology-

[7] "Financial Inclusion in the United States". (2016, June 10). Retrieved from *https://obamawhitehouse.archives.gov/blog/2016/06/10/financial-inclusion-united-states.*

[8] "EY FinTech Adoption Index 2017". (2017, June 28). Retrieved from *https://www.ey.com/Publication/vwLUAssets/ey-fintech-adoption-index-2017/$FILE/ey-fintech-adoption-index-2017.pdf.*

based tools rests almost entirely with the inclination of their financial institutions to allow them to do so. Not all financial institutions are disposed to allow third-party tools, some of which compete directly with their own products and services, complete access to their customers' data. The Treasury's report notes, for example, that "access [to financial data] through APIs was frequently and unilaterally restricted, interrupted, or terminated by financial services companies."[9] In many cases, these APIs also may not provide the full suite of data required by technology-powered tools to deliver their products or services. The market is therefore fundamentally dislocated; the ability of U.S. consumers and small businesses to utilize third-party technology tools is dependent on the financial services provider(s) with which they do business, with disparate outcomes for Americans who bank with different financial institutions. The unevenness of this playing field could materially worsen as many large U.S. financial institutions seek to impose on consumers and small businesses their view of how the ecosystem should function in the form of bilateral agreements with aggregation firms.

The Bureau of Consumer Financial Protection ("BCFP" or "the Bureau") engaged in a year-long process to address this issue, which ultimately culminated in the release in October 2017 of nonbinding principles for consumer-authorized financial data sharing and aggregation.[10] Though the BCFP's engagement was earnest and well-intentioned, the principles it ultimately released did not meaningfully shape or change market behavior, both because they were not legally binding and because the Bureau declined to forcefully stake out a position regarding consumer-permissioned data access. The BCFP asserted, for example, that consumers "generally" should be able to use "trusted" third parties to obtain information from account providers[11] but provided no further detail regarding these qualifiers. As a result of this ambiguity, and despite the BCFP's much-needed engagement in the market, the state of consumer-permissioned financial data access in the United States is not meaningfully different today than it was when the Bureau's nonbinding principles were released almost 1 year ago.

While policymakers in the United States have not issued any regulation specific to consumer-permissioned financial data access, regulators and legislators abroad have sought to harness innovation. As these other jurisdictions implement frameworks that harness innovation, the U.S. market is at risk of losing pace internationally with the development and delivery of new, innovative financial tools for consumers. There is, accordingly, "a huge risk the U.S. will fall behind, and with that a risk that jobs will go elsewhere."[12]

The United Kingdom's Open Banking regime, under which consumers can utilize authorized third-party tools without restriction, began its implementation phase earlier this year, as did Europe's Second Payments Services Directive, or PSD2. In Mexico, following a recently passed new FinTech law, the Bank of Mexico and the National Banking and Securities Commission (CNBV) are in the midst of developing API standards that national financial institutions will be required to adopt in order to facilitate the use of third-party FinTech tools. The Australian Government has made public its intention to begin its implementation of an Open Banking regime in July 2019, and New Zealand, Canada, and Mexico are not far behind.

In the preamble to its report, Treasury rightly notes that policymakers' engagement with the FinTech ecosystem—and the decisions that are made by the financial regulatory agencies in response to the Department's recommendations, particularly with regard to consumer-permissioned data access—will have implications for U.S. global competitiveness.[13] Developments such as the announcement earlier this month of a pact between the Monetary Authority of Singapore and the Dubai Financial Services Authority to work collaboratively on digital payments and blockchain projects are becoming increasingly common. While the U.S. market continues to consider the most fundamental policy issues regarding innovation in financial services,

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[9] "A Financial System That Creates Economic Opportunities: Nonbank Financials, FinTech, and Innovation". (2018, July 31). Retrieved from *https://home.treasury.gov/sites/default/files/2018-08/A-Financial-System-that-Creates-Economic-Opportunities---Nonbank-Financials-Fintech-and-Innovation_0.pdf.*

[10] "Consumer Protection Principles: Consumer-Authorized Financial Data Sharing and Aggregation". (2017, October 18). Retrieved from *https://files.consumerfinance.gov/f/documents/cfpb_consumer-protection-principles_data-aggregation.pdf.*

[11] Ibid.

[12] Phillips, C. (2018, September 12). Remarks to the Exchequer Club of Washington. Speech, Washington, DC.

[13] "A Financial System That Creates Economic Opportunities: Nonbank Financials, FinTech, and Innovation". (2018, July 31). Retrieved from *https://home.treasury.gov/sites/default/files/2018-08/A-Financial-System-that-Creates-Economic-Opportunities---Nonbank-Financials-Fintech-and-Innovation_0.pdf.*

policymakers in other jurisdictions are assertively creating well-regulated, innovative regulatory frameworks designed to attract and encourage large-scale innovation. The stakes are high: Globally, the FinTech market attracted more than $31 billion in 2017, with the United States attracting more than half the investment in the market.[14]

Treasury Report Recommendations

Both the CFDR Group and FDATA North America strongly believe that the Department in its July report identified the key outstanding issues with regard to consumer and small business financial data access. I would respectfully highlight five of the Treasury recommendations for the Committee's consideration, as formalizing standards around these areas would significantly bolster the ability of Americans to utilize third-party technology tools to improve their financial well-being:

1. *The Bureau should affirm that for purposes of Section 1033 [of the Dodd–Frank Wall Street Reform and Consumer Protection Act], third parties properly authorized by consumers . . . fall within the definition of "consumer" under Section 1002(4) of Dodd–Frank for the purpose of obtaining access to financial account and transaction data.*

Treasury's assertion that the Dodd–Frank Act's inclusion of language in Section 1033 mandating that financial institutions provide their customers with electronic access to their data should be interpreted to "cover circumstances in which consumers affirmatively authorize, with adequate disclosure, third parties such as data aggregators and consumer FinTech application providers to access their financial account and transaction data from financial services companies"[15] marks a significant step forward for consumers' and small businesses' financial rights. Though it may seem self-evident, because Section 1033 of Dodd–Frank provides that the BCFP has the authority to promulgate a rule to ensure end users have electronic access to their online data, and the Bureau has thus far declined to do so, Treasury's affirmation that the Dodd–Frank Act provides this right to consumers and small businesses, even in the absence of a Bureau rulemaking, represents a significant victory for innovation and for consumer and small business financial empowerment. The CFDR and FDATA North America both respectfully echo the Department's call for further action on this score by the BCFP.

2. *All regulators . . . should recognize the benefits of consumer access to financial account and transaction data in electronic form and consider what measures, if any, may be needed to facilitate such access for entities under their jurisdiction.*

One of the systemic disadvantages facing the FinTech ecosystem in the United States as compared with many other countries that have imposed standards with regard to consumer-permissioned data access is the immense relative regulatory fragmentation that exists in the U.S. financial system. In the United Kingdom, for example, two agencies, the Financial Conduct Authority and the Competition and Markets Authority, represent the totality of regulatory authorities that were required to implement an entirely new, innovative approach to harnessing FinTech under Open Banking. Mexico's CNBV and the Bank of Mexico are themselves responsible for developing and imposing financial API standards. The Australian Treasury and the Competition and Consumer Commission alone will deliver Open Banking in 2019.

There are at least eight Federal regulatory agencies with jurisdiction over at least some portion of financial data access in the United States: the BCFP, the Office of the Comptroller of the Currency, the Federal Deposit Insurance Corporation, the National Credit Union Administration, the Federal Reserve Board of Governors, the Securities and Exchange Commission, the Commodity Futures Trading Commission, and the Federal Trade Commission. (Other Federal agencies, including the Financial Crimes and Enforcement Network and the Financial Industry Regulatory Authority, have also been involved in the issue of consumer-permissioned data recently permissioned data recently.[16]) One commonly discussed regulatory constraint to the

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[14] "The Pulse of FinTech—Q4 2017". (2018, February 13). Retrieved from *https://home.kpmg.com/xx/en/home/insights/2018/02/pulse-of-fintech-q4-2017.html.*

[15] "A Financial System That Creates Economic Opportunities: Nonbank Financials, FinTech, and Innovation". (2018, July 31). Retrieved from *https://home.treasury.gov/sites/default/files/2018-08/A-Financial-System-that-Creates-Economic-Opportunities---Nonbank-Financials-Fintech-and-Innovation_0.pdf.*

[16] "Know Before You Share: Be Mindful of Data Aggregation Risks". (2018, March 29). Retrieved from *http://www.finra.org/investors/alerts/know-you-share-be-mindful-data-aggregation-risks.*

open transmission of permissioned consumer and small business financial data has been the prudential bank regulatory agencies' third-party vendor risk management guidance.[17]

There are also, of course, regulatory authorities in each State that have jurisdiction over entities that play a role in the FinTech market, financial services providers and FinTech firms alike. While Treasury cannot address the intrinsic, structural disadvantages in the United States' regulatory regime as compared with other countries', its call for all of the agencies in this space to align behind the Department's interpretation of Section 1033 of the Dodd–Frank Act is an important step towards a level playing field, and one that could be hastened by Congressional engagement. While, interestingly, some U.S. regulatory agencies have begun to collaborate with their peers internationally,[18] greater domestic coordination that provides harmonization, rather than divergence, would spur innovation and improved consumer and small business financial outcomes.

3. *The Bureau [should] work with the private sector to develop best practices on disclosures and terms and conditions regarding consumers' use of products and services powered by consumer financial account and transaction data provided by data aggregators and financial services companies.*

The CFDR Group and FDATA North America strongly believe that consumers and small businesses should be empowered to use their financial data for their own financial benefit. To fully realize this empowerment, however, end users must be able to clearly and easily understand to what data elements they are granting third parties access to and for what purpose, as well as how they can revoke their consent to access and use the data. Though several industry groups have previously sought to establish guidelines in this space—and others continue to seek to formulate best practices—given the vast scope of the financial services market, very little standardization has taken place.

Fortunately, to the extent that the private sector, the BCFP and other regulatory agencies come together to develop best practices that could be adopted broadly across the industry, a market-tested framework already exists. The United Kingdom's Open Banking architecture includes prescriptive consent flows that ensure that a consumer's or small business' experience granting or revoking consent to access their data to any third party in the Open Banking environment is uniform. Accordingly, consumers in the Open Banking ecosystem experience the same consent-granting process across every third-party application they use, regardless of the financial institution with which they have their primary banking relationship. Offboarding is similarly uniform. The evidence suggests that end users of the Open Banking ecosystem are quickly becoming comfortable and familiar with these standards; three million Open Banking API calls were made this July, a month-over-month increase of 50 percent.[19] Public and private sector participants would do well to use these Open Banking consent standards as a starting point for creating best practices in the U.S. market.

4. *Any potential solution [to move to more secure and efficient methods of data access should] address resolution of liability for data access. If necessary, Congress and financial regulators should evaluate whether Federal standards are appropriate to address these issues.*

The CFDR and FDATA North America believe that the issue of liability is the fundamental obstacle preventing the U.S. market from offering a more even, consumer-centric delivery of third-party tools powered by permissioned data connectivity. Decades-old regulations, such as Regulation E, create either the regulatory expectation or the consumer perception that financial institutions will largely make their customers whole in the event of any financial loss, including as a result of a data breach at a third party.[20] Further, prudential bank regulators have told the FinTech community that the potential liability exposure to customers that nationally regulated banks face in the event of a data breach for which customers experience a financial loss represents a safety and soundness concern.

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[17] "Third-Party Relationships". (2017, June 7). Retrieved from *https://www.occ.gov/news-issuances/bulletins/2017/bulletin-2017-21.html.*

[18] "BCFPB Collaborates With Regulators Around the World To Create Global Financial Innovation Network". (2018, August 7). Retrieved from *https://www.consumerfinance.gov/about-us/newsroom/bcfp-collaborates-regulators-around-world-create-global-financial-innovation-network.*

[19] "Open Banking Progress Update 13 July–31 August". (2018, September 3). Retrieved from *https://www.openbanking.org.uk/about-us/news/open-banking-progress-update-july-august-2018/.*

[20] 12 CFR 205.

Largely as a result, some of the financial institutions seeking bilateral agreements with data aggregators are seeking to place the aggregator in the position of holding full, unlimited liability for the FinTech ecosystem. These financial institutions hold that, because the aggregator is the only party with which they will have a bilateral agreement, the aggregator is the only entity from which they can recoup customer losses; however, this position is both impractical and untenable. Aggregators typically have no direct relationship with consumers or small businesses. Practically, they do not have the scale necessary to be in a position to provide their financial institution counterparties with boundless liability protection for the entire FinTech market, nor would that fairly apportion responsibility throughout the ecosystem. As responsible stewards of consumer data, however, aggregators are prepared to be liable for any direct consumer harm that arises as a result of a breach for which they are at fault.

More broadly, the question of liability must also address the responsibility of the third party with which the consumer or small business has a relationship, whether it is a FinTech application or a technology tool delivered by a traditional financial institution. The CFDR earlier this year released a set of principles, Secure Open Data Access (SODA), which called for the implementation of traceability, minimum cyberliability insurance standards and other standards designed to ensure that the entity responsible for consumer financial loss as a result of a data breach—be it a bank, an aggregator, or a FinTech firm—is the entity charged with making the end user whole. While CFDR members are starting to implement the SODA principles with regard to liability, the financial regulatory agencies and Treasury could augment and assist this work by undertaking efforts to create a more vibrant and affordable cyberliability insurance market, similar to the steps taken by Her Majesty's Treasury in the United Kingdom last year.

5. *Any potential solution [to move to more secure and efficient methods of data access should] also address the standardization of data elements as part of improving consumers' access to their data.*

Treasury notes in its report that "a standardized set of data elements and formats would help to foster innovation in services and products that use financial account and transaction data . . . "[21] While the CFDR Group and FDATA North America wholeheartedly agree with the Department's recommendation, I would respectfully submit an addendum to this recommendation. Standardization of data elements will only be impactful to American consumers and small businesses if they are able to grant access to all of the data required to power the use case they have selected. A standardized data set that, for example, does not allow end users to grant access to any data fields related to the fees or interest rates a financial institution assesses inherently restricts the ability of that customer to utilize fee comparison tools or to use a third-party tool to select an alternative, lower-cost provider.

Therefore, with the appropriate consent, authentication, and liability safeguards in place, the standardized data elements made available to the consumer or small business to permit access to third parties of their choosing should include all of the data elements available to the end user in their native online banking environment. This approach would fully enable end users to leverage their own financial data to their economic benefit and it would allow for the realization of a competitive, free marketplace in which consumers have full transparency into financial products and services offered by FinTech providers and financial services firms alike.

Conclusion

Though tens of millions of American consumers and small businesses are already utilizing third-party tools to improve their financial well-being, more can and should be done to harness the power of innovation and to give Americans full control of their own financial data and future. The Treasury's report provides an insightful overview of the outstanding issues facing the U.S. market that should be collaboratively addressed in order to better serve consumers and to ensure that the United States remains globally competitive as multiple countries implement comprehensive, consumer-centric financial data access frameworks. The CFDR Group and FDATA North America stand ready to work with the Department, the regulatory agencies, market stakeholders, and, of course, Congress, to implement the Treasury's recommendations.

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[21] "A Financial System That Creates Economic Opportunities: Nonbank Financials, FinTech, and Innovation". (2018, July 31). Retrieved from *https://home.treasury.gov/sites/default/files/2018-08/A-Financial-System-that-Creates-Economic-Opportunities---Nonbank-Financials-Fintech-and-Innovation_0.pdf.*

PREPARED STATEMENT OF STUART RUBINSTEIN

PRESIDENT, FIDELITY WEALTH TECHNOLOGIES, AND HEAD OF DATA AGGREGATION

SEPTEMBER 18, 2018

Chairman Crapo, Ranking Member Brown, and Members of the Committee: thank you for holding this important hearing. Fidelity is very interested in FinTech and data policy and has a unique perspective to share on financial data account access and aggregation used by many FinTech firms.

My name is Stuart Rubinstein and I am President of Fidelity Wealth Technologies and Head of Data Aggregation. In this role, I oversee the team focused on helping Fidelity and other institutions enable consumers to securely share account data and documents with third parties. Fidelity is a leading provider of investment management, retirement planning, portfolio guidance, brokerage, benefits outsourcing, and other financial products and services to more than 30 million individuals, institutions, and financial intermediaries with more than $7 trillion in assets under Administration. Our goal is to make financial expertise broadly accessible and effective in helping people live the lives they want.

I will focus my testimony for this hearing on an issue I first worked on over 20 years ago: financial data aggregation services and ways we can make data sharing safer and more secure.

Fidelity's Perspective on Data Aggregation

Fidelity has a unique perspective on financial data aggregation practices and necessary protections for customers. We are on all sides of this issue: we are an aggregator of data for third parties,[1] we are a significant source of data for aggregators acting on behalf of our mutual customers, and we offer a data aggregation service for our retail customers and retirement plan participants.[2] This perspective gives us a thorough understanding of the benefits of financial data aggregation, but also of the very real cybersecurity and privacy risks that current data aggregation industry practices create.

Financial data aggregation in this context refers to services that, with customers' consent, collect financial information from their various bank, brokerage, and retirement accounts, along with other sources, to be displayed and processed in an aggregated view. An example of this kind of service might be a budgeting and planning smartphone app. Consumers use third party applications that leverage data aggregation because they value tools to help manage financial planning, budgeting, tax preparation, and other services. As part of our focus on helping our customers, Fidelity works to make it possible for customers to access the services they want to use—including third party aggregation-based services. To that end, customers have been able to use their Fidelity data in third party applications for many years. However, the cybersecurity environment has significantly changed over that time and we have a responsibility to protect the very sensitive personal financial data and assets of our more than 30 million customers from misuse, theft, and fraud.

Current data aggregation practices make this challenging, because they rely on consumers providing their financial institution log-in credentials (i.e., username and password) to third parties. Those third parties, typically data aggregators, then almost always employ a practice known as "screen scraping." At its most basic, screen scraping involves the use of computerized "bots" to log-in to financial institution websites, mobile apps, or other applications as if they were the consumer. Once the bots have access to the site or app, they "scrape" customer data from the various screens to be presented on a consolidated basis, along with information scraped and collected from other sources.

There are two consumer data security problems with this practice. First, as a matter of basic security consumers should not be asked or required to share their private log-in credentials in order to access a third party service. Doing so creates cybersecurity, identity theft, and data security risks for the consumer and financial institutions. Unfortunately, we know that due to years of this practice, financial institution log-in credentials are now held by a myriad of companies. Some are likely very secure, while others may not be secure at all. Given this, allowing third parties to log-in using these credentials as if they are the customer creates significant risk

[1] Financial advisors can use eMoney Advisor, a Fidelity-owned business that provides account aggregation services along with software that helps them provide financial advice to their clients.

[2] Fidelity offers its FullView® services to retail customers through Fidelity.com and to retirement plan participants through NetBenefits.com, and developed its first account aggregation service over 15 years ago. Fidelity FullView provides a snapshot of customers' net worth in a simple format with an ability to do budgeting and financial planning.

of cyberfraud. Because consumers go directly to data aggregators or their commercial clients and not their financial institution, the financial institutions never really know if the activity has in fact been authorized by the customers or if the customer credential has been compromised and a criminal is using the data aggregation service to test the credential's validity and illicitly gather data.

Second, screen scraping may result in access to data fields far beyond the scope of the service a third party offers the consumer—including personally identifiable information (PII) about consumers and in some cases their dependents. This means third parties have access to fields of information often used by financial institution call centers to identify customers. For example, if a consumer provides his or her log-in credentials to a budgeting app, that app potentially has access to sensitive personal information like customer dates of birth and dependent names and dates of birth, all of which might be data financial institutions use to verify customer identities online or over the phone. Collection of information beyond what is needed for the service the consumer has elected creates unnecessary risk. And all of this adds up to an array of risks financial institutions must navigate to protect the integrity of their systems and the assets of their customers.

In considering the challenges described above, Fidelity developed the following five principles that we believe should guide industry in creating better data sharing solutions:

1. *We strongly support consumers' right to access their own financial data and provide that data to third parties.* As a provider of aggregation services ourselves, we know that customers value these products, and the demand for aggregation is likely to increase. We also believe that the concept of access is broad enough to encompass security, transparency, and cybersecurity protections for consumers.
2. *Data access and sharing must be done in a safe, secure, and transparent manner.* We firmly believe credential sharing makes the system less safe for consumers, aggregators, and financial institutions alike. While we strongly support customer access, the security of customer data, customer assets, and financial institution systems must be our primary concern.
3. *Consumers should provide affirmative consent and instruction to financial institutions to share their data with third parties.* Rather than trust that third parties who use customer log-in credentials to access a financial institution's website are authorized, customers should tell financial institutions which third parties have permission to access their financial data. This eliminates the potential that unauthorized access using credentials is mistaken for authorized access.
4. *Third parties should access the minimum amount of financial data they need to provide the service for which the customer provided access.* There should be a tight nexus between the service provided and the information collected by third party aggregators. For example, if a customer signs up for a tax planning service that leverages aggregation, that service should only access the information needed for tax planning.
5. *Consumers should be able to monitor who has access to their data, and access should be easily revocable by the consumer.* We believe data sharing and permissioning should be an iterative process, with customers engaged continuously. Moreover, many customers believe revoking access is as easy as deleting an app from their phone—this is not the case. Customers should be able to easily instruct their financial institution to revoke access when they no longer want or need the aggregation-based service.

We believe that embracing these principles will better protect consumers, aggregators, and financial institutions, and facilitate more efficient data sharing practices.

How Do We Solve This for Consumers?

Fortunately, although the risks and challenges of the current system are serious, there are steps financial institutions and aggregators can take together to improve the data sharing ecosystem. The financial services industry is employing technological solutions for the secure exchange and access of financial information. These technologies involve the implementation and use of application programming interfaces (APIs), which are provided by the financial institution to aggregators and other third parties. An API works in conjunction with an authentication process that is handled by the financial institution. There are authentication processes, for example "open authorization" (OAuth), that do not involve sharing of account access credentials with third parties. Consumers who want their data aggregated sign into

their accounts at the financial institution's website and provide authorization for third party aggregators to access their financial data. The financial institution and the data aggregator then manage that connection through secure, encrypted tokens that are provisioned for the specific connection.

There are several compelling consumer and data security benefits for moving to APIs. First, it keeps log-in credentials private and secure by eliminating the need for consumers to share log-in credentials with third parties. This reduces the cyber, identity, and personal data security risks that exist when a consumer shares private log-in details with a third-party. Second, it puts the consumer in the driver's seat by giving consumers greater transparency and control of their data by allowing consumers to provide unequivocal consent and instruction to share their data with third parties. Third, it allows financial institutions and aggregators to agree on what data should be shared and avoid over-scraping. Fourth, it eliminates the need to reconfigure aggregators' systems every time a consumer changes his or her username or password or the financial institution updates its webpage. Fifth, it removes the traffic-intensive screen scraping activity from financial institutions' web sites and other digital properties, returning that capacity to the individual consumers for whom those sites were created. Finally, it enables the consumer to monitor the ongoing access and instruct their financial institution to revoke the consent if desired.

Fidelity Access

In November 2017, Fidelity announced its own API solution for data sharing called Fidelity Access. Fidelity Access will allow Fidelity customers to provide third parties access to customer data through a secure connection without providing log-in credentials. Fidelity Access will include a control center, where customers can grant, monitor, and revoke account access at any time. We have been working closely with aggregators and other third parties on adoption of this solution.

Of particular note, eMoney Advisor, Fidelity's affiliate that offers its own aggregation service, is committed to working with other financial institutions that offer APIs. By championing the exclusive use of APIs to facilitate customers providing third parties access to their financial data, we hope to show leadership by taking action to better secure our customers' data.

Industry Standards and Policymaker Guidance

In addition to our own efforts to address the problems with data aggregation, we have been working with a wide array of industry and public sector stakeholders. We support many of the data sharing and aggregation principles that have been put forth:

- In October 2017, after a year-long inquiry into the topic, the Bureau of Consumer Financial Protection (BCFP) released nonbinding financial data sharing and aggregation principles, which helpfully emphasized the importance of access, security, transparency, and consent.[3]
- In February 2018, the Financial Services Information Sharing and Analysis Center (FS–ISAC), a cybersecurity information sharing group focused on the financial services industry, published a standard durable data API free of charge to help facilitate safer transfer of financial data.[4] The Fidelity Access API is based on this standard.
- In March 2018, the Financial Industry Regulatory Authority (FINRA) published an investor alert that explained the risks associated with aggregation-based services and noted that many firms are moving toward APIs.[5]
- In April 2018, the Securities Industry and Financial Markets Association (SIFMA) released data aggregation principles that focused on similar themes.[6]
- In July 2018, the U.S. Department of the Treasury released a report on Nonbank Financials, FinTech, and Innovation that includes a lengthy discussion of financial data aggregation and helpful recommendations, including sim-

[3] Available at *https://files.consumerfinance.gov/f/documents/cfpb—consumer-protection-principles—data-aggregation.pdf*. Fidelity commented on the Request for Information that culminated in these principles (*https://www.regulations.gov/document?D=CFPB-2016-0048-0053*).

[4] See *https://www.fsisac.com/article/fs-isac-enables-safer-financial-data-sharing-api*. Fidelity is a member of FS–ISAC and contributed to the development of the durable data API.

[5] Available at *http://www.finra.org/investors/alerts/know-you-share-be-mindful-data-aggregation-risks*.

[6] Available at *https://www.sifma.org/resources/general/data-aggregation-principles/*. Fidelity is a member of SIFMA and worked closely with other member firms in developing these principles.

plified disclosures, moving away from screen scraping, and eliminating log-in credential sharing.[7]

These efforts to provide guidance have brought many of the challenges and risks associated with data aggregation to the fore and encouraged healthy debate on how to solve them.

Continuing Challenges

Despite the general consensus that the status quo is untenable and the industry should move to safer data sharing technologies, there are roadblocks that prevent wider adoption of APIs and other solutions. Here are what we see as the most challenging:

- *Inertia:* One force working against adoption of safer data sharing technologies is simple inertia. Existing practices have been the norm for close to two decades. Getting firms to adopt new technologies can be challenging no matter what the benefits. However, given the stakes, with headlines replete with examples of cybersecurity events and data breaches, this is not an adequate reason to resist better data sharing technology.
- *Cost:* Another countervailing force is cost. One of the unfortunate truths about screen scraping is that it is cheap and effective. While safer technologies like APIs have become less costly as technology advances, building one does incur costs. We believe the incremental increase in cost is well worth the substantial security and transparency improvements for consumers. Still, financial institutions should be sensitive to this reality, which is why we are providing Fidelity Access to third parties free of charge.
- *Liability:* Liability is the most stubborn blocker to wider adoption of safer data sharing technologies. Third party aggregators want to limit their potential liability in the event that financial data is illicitly obtained. We have seen firms try to limit their liability to low dollar amounts. These kinds of limits are untenable for financial firms like Fidelity that have a duty to protect client assets. Fidelity believes firms that obtain and handle consumer data should be held responsible to protect that data from unauthorized use, just as we are. Any other standard creates moral hazard and does not incentivize aggregators to take their data stewardship responsibilities seriously.

Until all industry participants—aggregators, FinTech firms, and financial institutions—are prepared to overcome these challenges in a responsible manner, we will not move as swiftly as we otherwise could to adopt safer data sharing technologies.

Thank you again for the opportunity to testify and I look forward to answering your questions.

PREPARED STATEMENT OF BRIAN KNIGHT

DIRECTOR, INNOVATION AND GOVERNANCE PROGRAM, MERCATUS CENTER AT GEORGE MASON UNIVERSITY

SEPTEMBER 18, 2018

Good morning, Chairman Crapo, Ranking Member Brown, and Members of the Committee. I thank you for inviting me to testify.

My name is Brian Knight, and I am the director of the Innovation and Governance Program and a senior research fellow at the Mercatus Center at George Mason University. My research focuses primarily on the role technological innovation plays in financial services. Any statements I make reflect only my opinion and do not necessarily reflect the opinions of the Mercatus Center or my colleagues.

I would like to begin by thanking Chairman Crapo and Ranking Member Brown for their leadership in holding this hearing. The role of financial technology (or FinTech) in changing the market for financial services is continuing to grow, with innovations permeating all financial markets. The importance of these technological changes is reflected by the fact that the Treasury Department chose to devote almost an entire report to the topic in its series of reports on core principles in financial regulation.[1] I also appreciate your collecting speakers from a broad array of ex-

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[7] Available at *https://home.treasury.gov/sites/default/files/2018-08/A-Financial-System-that-Creates-Economic-Opportunities---Nonbank-Financials-Fintech-and-Innovation_0.pdf.*

[1] Steven T. Mnuchin and Craig S. Phillips, U.S. Dep't of the Treasury, "A Financial System That Creates Economic Opportunities: Nonbank Financials, FinTech, and Innovation" (2018) [hereinafter Treasury Report].

periences and viewpoints for what I expect will be a productive discussion. I am honored to be part of it.

Given the limited amount of time, I have focused my testimony on a handful of areas centered on the collection, aggregation, and use of data. I am happy, however, to answer any other questions you may have to the best of my ability.

I want to leave you with three main points:

1. FinTech innovation has significant potential to improve the quality of, and access to, financial services.
2. While there are potential risks, these risks should be judged against the status quo, not an unobtainable perfection.
3. Existing law can mitigate risk to some degree, and changes to the law should be considered only if existing law is proven to be inadequate and the benefits of changing the law will outweigh the costs.

The Potential for a Better Financial Services Market

Changes in technology have the potential to improve the financial services markets. Specifically, the collection, use, and aggregation of consumer data may allow consumers to enjoy more choice, more competition, and higher-quality services. Likewise, the use of artificial intelligence, machine learning, and other advanced algorithmic techniques to process data present the possibility of more accurate, fair, and inclusive underwriting and risk management.

While there are reasons to be excited, there are also potential risks. More granular data collection and broader access might increase the risk and harm of data breaches to consumers. There are concerns that the enhanced use of algorithms may lead to more discrimination, a lack of transparency, or diminished access to essential services like credit.[2] There are also fears that the existing legal and regulatory environment is unable to address the risks introduced by technology.

While these concerns merit consideration and the risks they describe should be monitored, it is premature to panic. First, the early data are promising, in many cases finding that financial technology and the competition and innovation it fosters are improving financial services. Second, existing law and regulation might mitigate some of the major risks already. Although this area is often presented as a lawless Wild West, it is incorrect to think that these areas are unregulated. As discussed below, existing regulations apply, and in general, we should see how well the existing laws and regulations work with new technology before we impose new restrictions. Indeed, we should consider the possibility that, in fact, we already have too much regulation that affects these new technologies. Otherwise we risk forestalling innovations that can lead to more competitive, efficient, and inclusive financial markets—to the detriment of the American consumer.

Data Collection

As the Treasury Report notes, the ability of financial service providers to collect and utilize a broader and more diverse selection of consumer data has the potential to improve the provision of financial services, especially to consumers who are poorly served by the status quo.[3] Not only could cost-effective access to more data help established firms improve their offerings, it could also encourage competition and innovation from new entrants.

While the ability to access and utilize more data has a significant upside, it also presents risks. For example, it is possible that the more granular a dataset a financial institution collects on a consumer, the more harm a security breach could cause. Data that might be relatively harmless at one level of detail could become highly sensitive at another. What could be labeled "professional or medical services" at one level of detail could be labeled "marriage counseling" at another. While obtaining more information could allow financial services providers to offer better products, we should also be alert to the risks that could develop.

Additionally, as the Treasury Department notes, there are divergent regulations at the State level regarding data security and breach notification.[4] These different requirements can increase compliance costs for firms and result in citizens being regulated by sets of rules put in place without consultation with them, the con-

[2] See, e.g., U.S. Fed. Trade Comm'n, "Big Data: A Tool for Inclusion or Exclusion" 8-11 (2016) (summarizing findings of public workshop on big data regarding potential risks).

[3] Treasury Report, supra note 1, at 17.

[4] Treasury Report, supra note 1, at 39–41.

sumers.[5] Given the predominantly interstate nature of cybersecurity, there is little question that Congress could constitutionally preempt State law to create consistent national standards, and given the costs of the status quo, it may want to consider doing so.

Data Aggregation

Third-party aggregators, acting on a consumer's behalf, can now allow consumers to see all of their accounts from different financial services providers at a glance. This convenient display of information can help consumers more effectively assess and manage their finances. Third-party aggregation can also be used by applications, again acting at the request of the consumer, to collect the consumer's financial data in order to allow the consumer to use the application's service. Such applications are gaining in popularity; a recent survey conducted by the Clearing House found that about a third of banking customers use financial technology applications.[6]

While there are real potential benefits to data aggregation, the practice is not without controversy. Banks and other financial institutions have expressed concern that data aggregators, particularly those using "screen scraping,"[7] place consumers' data at risk and potentially expose consumers to fraud and the bank to liability.[8] As the Treasury Department's FinTech report notes, the banks' fears are not outlandish, as there is an open question as to the scope of the banks' liability under existing law, even if the customer willingly granted access to a third party that was responsible for the data breach.[9]

This concern is part of why section 1033 of the Dodd–Frank Act is so controversial. As the Treasury Department report notes, there is a plausible reading of the act (one that the Treasury endorses) that requires financial institutions covered by Dodd–Frank to, subject to rules promulgated by the Bureau of Consumer Financial Protection (Bureau), make account records available in an electronic form not only to consumers themselves but also to a consumer's agent, including a FinTech application.[10] Paired with potential legal liability, this provides banks with few options to protect themselves.

Understandably, this presents some significant issues that the Bureau, and potentially Congress, should consider. Among them are the following:

- *The extent of the burden placed on covered financial institutions.* Must a covered financial institution make data available to all comers, or may it place limits on the basis of safety or data security?
- *The standards for data transmission.* As mentioned in the Treasury Report, there has been a shift from screen scraping to the use of application programming interfaces (APIs) that may provide a more secure method of communicating data. However, there is not a mandatory standard that would allow interoperability. While there are ongoing industry efforts to bring standardization,[11] questions remain as to whether covered financial institutions must accommodate all requests and who will set standards for data transmission methods.
- *The scope of data transmission.* One of the major concerns expressed by covered financial institutions is that data aggregators can obtain data in excess of what is needed to perform the service the consumer has authorized them to do. Conversely, data aggregators express frustration that financial service providers prevent them from accessing needed data via financial-service-provider-approved APIs.[12] While the availability of more data may allow applications to offer better services, it could also increase consumer harm if there were a

[5] For further discussion of the potential costs of State-by-State regulation on FinTech, including the costs of inefficiency and political inequity among citizens of different States, please see Brian Knight, "Federalism and Federalization on the FinTech Frontier", 20 *Vand. J. Ent. and Tech. L.* 129, 185–99 (2017).

[6] The Clearing House, "FinTech Apps and Data Privacy: New Insights From Consumer Research" 4 (2018).

[7] Screen scraping generally refers to an aggregator using a customer's login credentials to log into a financial institution's webpage on behalf of the customer and extracting data from the webpage.

[8] See, e.g., The Clearing House, "Ensuring Consistent Consumer Protection for Data Security: Major Banks vs. Alternative Payment Providers" (2015).

[9] Treasury Report, supra note 1, at 35–36.

[10] Treasury Report, supra note 1, at 31.

[11] See, e.g., "NACHA, API Standardization—Shaping the Financial Services Industry" (2018) (discussing efforts by NACHA to develop standards for financial services APIs to allow interoperability).

[12] Treasury Report, supra note 1, at 34.

breach. The scope of data that aggregators will be able to obtain from financial institutions, and what factors control that scope, will need to be determined.

- *Consumer control of data transmission.* The amount of control consumers will have over the amount of data that is obtained by aggregators, and how that control must be exercised, will need to be determined. According to the same survey by the Clearing House, a majority of consumers would like to be required to provide explicit consent to any third party seeking data.[13] However, what that might look like in practice (e.g., when that consent must be provided or how granular the consent must be), and whether that standard is even practical, remain to be determined.
- *Liability for data breaches.* As the Treasury Report discusses, there is a question regarding the scope of liability for a financial institution in the event consumer data is lost owing to a failure on the part of a data aggregator or a downstream application. Financial institutions feel at risk that they will ultimately be forced to compensate customers, even if the financial institution was not at fault, because the aggregator or application lacks sufficient resources to make aggrieved customers whole. This concern is heightened if financial institutions are forced to make data available to aggregators, rather than choosing to enter into contracts that allow the financial institutions to perform due diligence and make demands of the aggregator.

If the Bureau adopts the Treasury Department's view regarding section 1033, it will need to craft a rule that provides meaningful access while addressing the legitimate concerns of covered financial institutions. However, the Bureau should also leave as many of the details as possible to market participants so as to not impede innovation or risk enshrining requirements that will become outdated or suboptimal far faster than the regulatory process can adapt. Congress should monitor these developments to determine whether any subsequent adjustment is necessary.

Innovative Underwriting

As the Treasury Department notes, credit underwriting is one area where data, in conjunction with artificial intelligence, are being used to potentially great effect. There is optimism that algorithmic underwriting may increase inclusion and improve the quality of underwriting, making it more accurate and efficient. However, there are also concerns that it could exacerbate discrimination and exclusion, because the algorithms may exacerbate existing discrimination or be so opaque that humans lose the ability to discern what is driving the algorithm's results, preventing humans from excluding improper variables.[14] These concerns are particularly acute with regard to unintentional discrimination through the use of facially neutral variables that nonetheless have a "disparate impact" on protected classes of persons.

While these concerns should be taken seriously, there are also reasons to believe they are at least somewhat overstated. First, it must be remembered that the appropriate standard to judge innovative underwriting is not perfection. Rather, we should judge whether it is an improvement over the status quo. In this regard, there is evidence that innovative underwriting may prove to be less discriminatory than current practices. Second, there are reasons to believe that the current legal and regulatory environment for financial services may be well situated to mitigate these risks.

As Professor Anupam Chander points out, there are several reasons why algorithms may prove to be less prone to discrimination than human decision making. To the extent that discrimination is driven by subconscious or unconscious bias, those biases are less likely to survive the process of being written down in an intentional underwriting algorithm compared to a "gut decision" by a lending officer.[15] Additionally, to the extent there is concern that algorithms may present a "black box" that cannot be audited, they nonetheless present less of a black box than the human mind.[16] Further, to the extent human decision making incorporates inaccurate stereotypes when making decisions, algorithms, with access to more and better data, and without the baggage of inaccurate stereotypes, may be able to do a better job.[17]

Early evidence of the use of innovative underwriting is promising. For example, researchers at the Federal Reserve Banks of Chicago and Philadelphia looked at a

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[13] The Clearing House, supra note 8, at 7.
[14] Treasury Report, supra note 1, at 57–8.
[15] Anumpam Chander, "The Racist Algorithm?", 115 *Mich. L. Rev.* 1023, 1028 (2017).
[16] Id. at 1030.
[17] Id.

leading marketplace lender's use of innovative underwriting and found that the lender was able to offer many borrowers better rates than they would have received from a traditional lender. These loans also seemed to age reasonably well, indicating that the underwriting did not present an undue risk of default.[18] Likewise, scholars at the University of California, Berkley, found evidence indicating that FinTech lenders using innovative underwriting for mortgages were significantly less likely to discriminate on the basis of race than traditional lenders.[19] While we are still in the early days and more research is necessary, there are good indications that innovative underwriting, as applied, may have significant benefits.

Additionally, certain existing regulatory requirements may encourage firms developing innovative underwriting tools to avoid some of the concerns expressed by pessimists. For example, while there are concerns about the opacity of algorithms, the Equal Credit Opportunity Act and Fair Credit Reporting Act require lenders to be able to provide prospective borrowers with adverse action notifications explaining why the borrower was denied or charged a higher rate and detail the information the lender used to make that determination.[20] Complying with this requirement will be difficult if the lender's algorithm is truly opaque, giving lenders an incentive to maintain auditability and explainability.[21]

Further, while lenders have an economic incentive to ensure that their algorithms are accurate and not irrational, there are also existing regulatory reasons to do so. To the extent that underwriting algorithms generate lending decisions that create the "artificial, arbitrary, and unnecessary barriers" that disparate impact theory is meant to address,[22] the lender may, depending on the unique circumstances and the relevant applicable statutes, also find itself subject to liability for lending decisions that, while relying on facially neutral criteria, have a disparate impact on protected classes of borrowers, unless those decisions are driven by a legitimate business purpose and cannot be accomplished with less discriminatory means. While lenders have a strong profit motive to make certain their underwriting is as accurate as possible, potential liability should also encourage lenders to actively monitor and improve their algorithms.

Conclusion

The advance of technology has shown significant promise for improving the market for financial services. Specifically, the collection, aggregation, and use of consumer data has significant potential to allow consumers to enjoy the benefits of a more competitive and innovative market. Of course, there is no such thing as a free lunch, and increased risks may accompany the benefits. However, at present there is no reason to panic, and rash regulatory intervention may frustrate proconsumer innovation, leaving consumers worse off.

Congress should carefully monitor and evaluate developments in the FinTech arena and intervene only when existing law and regulation—including market regulation—prove inadequate to address a problem and where the costs of intervening would not be worse than the problem the intervention seeks to solve. When Congress does intervene, it should do so in a technologically agnostic manner and refrain from imposing specific technical requirements on market participants because such solutions are likely to become obsolete in short order.

A specific area Congress may want to monitor is whether concerns about potential liability are chilling innovations in underwriting that might otherwise benefit society. Congress should consider tools such as "regulatory sandboxes," which can allow firms to experiment in a way that encourages innovation while maintaining appropriate consumer protection. While some regulators have announced their intention to undertake such activities under their existing authority, given the fragmented nature of financial regulation, it may require Congress to provide sufficient authority to allow for meaningful experiments.

Another area Congress should consider is the question of whether the current allocation of regulatory authority regarding data security and breach notification is

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[18] See Julapa Jagtiani and Catharine Lemieux, "FinTech Lending: Financial Inclusion, Risk Pricing, and Alternative Information" (Fed. Res. Bank of Phila., Working Paper No. 17-17, 2017); Julapa Jagtiani and Catharine Lemieux, "The Roles of Alternative Data and Machine Learning in FinTech Lending: Evidence From the Lending Club Consumer Platform" (Fed. Res. Bank of Phila., Working Paper No. 18-15, 2018).

[19] See Robert P. Bartlett, Adair Morse, Richard Stanton, and Nancy Wallace, "Consumer Lending Discrimination in the FinTech Era" (2018).

[20] Matthew Bruckner, "The Promise and Perils of Algorithmic Lenders' Use of Big Data", 93 *Chicago-Kent L. R.* 1, 38–39, 51 (2018).

[21] Id. at 40.

[22] Tex. Dep't of Hous. and Cmty. Affairs v. Inclusive Cmtys. Project, Inc., 135 S. Ct. 2507, 2522 (2015).

appropriate. As mentioned earlier, the laws governing data security and data breach notification, especially those at the State level, may be unduly burdening market participants and forcing consumers to pay for rules they had no say in. Therefore, Congress should consider whether establishing consistent, preemptive Federal standards would be appropriate.

Technology presents the opportunity for market actors to more effectively gather, aggregate, and use data to provide customers with better, cheaper, and more effective financial services. While there are potential risks that should be monitored, there is also the potential for significant benefits. Intelligent regulatory choices, including the possibility of exercising forbearance, can help create an environment where consumers are able to enjoy the maximum benefits of innovation and competition while enjoying adequate protection.

Thank you again for the invitation to testify. I look forward to your questions.

PREPARED STATEMENT OF SAULE T. OMAROVA

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SEPTEMBER 18, 2018

Dear Chairman Crapo, Ranking Member Brown, Members of the Committee: Thank you for inviting me to testify at this hearing. My name is Saule Omarova. I am Professor of Law at Cornell University, where I teach subjects related to U.S. and international banking law and financial sector regulation. Since entering the legal academy in 2007, I have written numerous articles examining various aspects of U.S. financial sector regulation, with a special focus on systemic risk containment and structural aspects of U.S. bank regulation. Prior to becoming a law professor, I practiced law in the Financial Institutions Group of Davis Polk and Wardwell. I also served in the George W. Bush administration as a Special Advisor on Regulatory Policy to the U.S. Treasury's Under Secretary for Domestic Finance. I am here today solely in my academic capacity and am not testifying on behalf of any entity. I have not received any Federal grants or any compensation in connection with my testimony, and the views expressed here are entirely my own.

FinTech—an umbrella term that refers to a variety of digital technologies applied to the provision of financial services—is by far the hottest topic in finance today. Recent advances in computing power, data analytics, cryptography, and machine learning are visibly changing the way financial transactions are conducted and financial products are used. New financial technologies promise to make transacting in financial markets infinitely faster, cheaper, easier to use, and more widely accessible. Reaching across generational and political lines, technology is bringing tech-savvy millennials, utopian anarchists, and computer scientists into the mainstream debate on the future of finance, infusing it with a new sense of excitement about the game-changing potential of the unfolding FinTech "revolution." As usual, financial markets translate these expectations into massive and rapidly growing flows of capital into FinTech-related ventures.

This is, of course, not the first time in modern history that these market dynamics are being played out.[1] As history keeps teaching us, in such periods of rising investor optimism, it is especially critical that policymakers and regulators remain cautious, cool-headed and even-handed in their assessment of FinTech. On the one hand, there is no doubt that technological progress creates previously unimaginable opportunities for improving the functioning of financial markets and, more broadly, the quality of our financial lives. On the other hand, there is no guarantee that any of these expected benefits will, in fact, materialize—or whether they will generate any real long-term benefits for the Nation's economy and society as a whole.

In this context, it is especially commendable that the Committee is taking a closer look at the current state of FinTech and the current Administration's strategic priorities in this area laid out in the U.S. Treasury Department's recent report to President Trump, "A Financial System That Creates Economic Opportunities: Nonbank Financials, FinTech, and Innovation" (hereinafter, the "Treasury Report" or "Report").[2]

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[1] See Charles P. Kindleberger and Robert Aliber, "Manias, Panics, and Crashes: A History of Financial Crises" (2005).

[2] U.S. Department of the Treasury, "Report to President Trump: A Financial System That Creates Economic Opportunities: Nonbank Financials, FinTech, and Innovation" (July 2018), [hereinafter, Treasury Report] available at *https://home.treasury.gov/sites/default/files/2018-07/A-Financial-System-that-Creates-Economic-Opportunities---Nonbank-Financi....pdf.*

At this early stage in the development and adoption of many FinTech applications, it is difficult to come up with an exhaustive list of specific policy concerns associated with each specific technology use. It is also difficult to identify the full spectrum of changes in the existing legal and regulatory regimes needed to accommodate specific uses of new technologies in financial transactions. It is both possible and necessary, however, to start taking a broader systemic view of FinTech and identifying key public policy issues arising in connection with the continuing growth of FinTech.

A comprehensive analysis of the macrolevel, systemic implications of FinTech is provided in my new working paper, "New Tech v. New Deal: FinTech as a Systemic Phenomenon", attached separately as an Appendix hereto. In this testimony, I will take a broader look at a few overarching themes that arise directly out of the Treasury Report and, in my view, deserve the Committee's special attention.

The key point here is that the Treasury Report understates or even ignores a number of critically important public policy issues and concerns raised by the unfolding digital "revolution" in finance. My testimony identifies a few such high-level public policy concerns that both (1) merit full consideration by the Committee, and (2) are not adequately discussed or acknowledged in the Treasury Report. It is not intended as a detailed critique of the Treasury's conclusions and recommendations, nor does it claim to analyze the full risks and benefits of any particular FinTech application discussed in the Report. The purpose of my testimony is to widen the lens beyond the seemingly value-neutral and narrowly technocratic "solutions"—and to introduce the necessary note of caution with respect to potentially crucial systemic implications of the Treasury's approach to FinTech innovation.

The Treasury Report: The FinTech Strategy Outlined

The Treasury Report addresses a wide range of important trends in today's FinTech sector and discusses a long list of legal and regulatory challenges such trends present. The Treasury's numerous conclusions and recommendations span across multiple issues and vary greatly in the level of specificity. The Report's primary public policy significance, however, is that it outlines the current Administration's strategic approach to FinTech—and, more generally, financial sector—regulation. Thus, understanding the Report's programmatic content is the key first step in the process of examining FinTech as a public policy challenge.

Underlying Narrative: FinTech as a Technical Phenomenon

From the outset, the Treasury clearly states its view of data digitization and the corresponding growth in the use of digital technologies in financial and commercial transactions as the fundamental drivers of innovation and economic growth in the modern economy.[3] The Report asserts that recent advances in core computing and data storage capacity dramatically reduced the cost of transmitting, keeping, and managing financial information—thus greatly increasing operational efficiencies and reducing the overall cost of delivering financial services.[4] It claims further that digitization allows financial institutions to satisfy consumers' and companies' demand for increased convenience and speed of transacting and to scale up their services to reach a greater number of customers.[5]

On the basis of this optimistic narrative, the Treasury concludes that "[t]he availability of capital, the large scale of the financial services market, and continued advancements in technology make accelerating innovation nearly inevitable."[6] Accordingly, the Report defines the Administration's overarching strategic policy priority in terms of actively facilitating the "inevitable" march of FinTech innovation.

To the extent this approach conveys a basic recognition of the need to accept and facilitate socially beneficial technological change, the Report's contribution is both timely and important. Technological progress and financial innovation, however, are not "natural" and value-neutral "win–win" phenomena: they have significant long-term distributional and systemic stability-related—and thus political—consequences. Technology is a tool that can be used in socially harmful ways that advance the interests of the few rather than those of the many.

This basic fact makes it especially important to keep in mind that the Treasury's conclusions and recommendations directly reflect, and are shaped by, certain fundamentally normative preferences and assumptions. These underlying normative choices are often hidden behind the technical idiom and deliberately technocratic discussions filling the Report's 223 pages. An unbiased evaluation of the Treasury's

[3] Treasury Report, at 6–8.
[4] Id. at 7.
[5] Id.
[6] Id. at 8.

proposed FinTech strategy, therefore, requires a clear understanding of what that strategy actually calls for—and whose economic and political interests it prioritizes.

Normative Baseline: Regulatory Accommodation of Private Sector Innovation

Two principal themes run through the long list of Treasury's recommendations: (1) an explicit and strong commitment to promoting private sector-led financial innovation; and (2) an implicit but equally strong commitment to minimizing regulatory interference with private firms' efforts to scale up FinTech operations. These fundamentally normative choices form the basis of the Treasury's overall FinTech strategy.

The Treasury Report envisions financial innovation as both (1) presumptively socially beneficial; and (2) a fundamentally and inherently private sector-led initiative. The Report consistently emphasizes private firms' leading role in digitization of financial data and services. Even where the Report advocates establishing "public–private partnerships" (PPP), its envisioned PPP model clearly places control over the nature and pace of technological change in private firms' hands. Throughout the Report, the principal role of the Federal and State lawmakers and regulators is effectively confined to providing the necessary logistical and infrastructural support for private firms' FinTech activities, while otherwise "staying out" of their way.

Accordingly, the Treasury's strategic emphasis is on "modernizing" the existing legal and regulatory regimes in order to accommodate, rather than control, the process of privately led financial innovation. In that sense, the Treasury's normative stance is fundamentally deregulatory.

Rhetorical Focus: "All About Consumers"

As a rhetorical matter, the Report justifies this inherently reactive and accommodating regulatory posture by stressing that new FinTech products are (1) created in response to consumer demand for better financial services, and (2) offer important benefits to consumers.[7]

These consumer benefits include greater speed and convenience of transacting; easier access to financial markets and services; and greater freedom of consumer choice with respect to financial products and service providers.[8] By offering these benefits, the Treasury's argument goes, FinTech serves equally the interests of all segments of America's population, from digitally savvy millennials to the underserved poor, from pragmatic bargain-hunters to ideological libertarians. Put simply, the Treasury's argument is that all of us, ordinary consumers of retail financial services, are the principal beneficiaries of the proposed regulatory unshackling and unfettered FinTech innovation.

This is, of course, a well-known mode of arguing consistently employed by the proponents of deregulation in the financial sector. The financial industry and its representatives have a long historical record of justifying their demands for regulatory easing by reference to consumer benefits. As discussed below, in the years before the 2008 crisis, the same rhetoric was widely used to avoid legislative or regulatory "interference" with predatory subprime lending practices that were at the core of the unsustainable speculative asset boom and the resulting economic devastation. It is therefore important to contextualize the Treasury's claims.

Practical Focus: Relaxing Bank Regulation To Enable Certain Structural Changes

To operationalize its programmatic goals—promoting private sector-led financial innovation and minimizing regulatory "interference" with that process—the Treasury adopts what may be viewed as a structural approach. Many of the Treasury's various recommendations target, directly or indirectly, the organizational and operational "walls" that currently prevent or slow down FinTech companies' full-scale entry into the banking sector.

Thus, the Treasury Report strongly calls for financial regulators to "modernize"—or, more precisely, to relax or remove—some of the key rules and regulations governing banking institutions' relationships with unaffiliated technology companies. The unstated goal of the Treasury's "modernization" strategy is to enable regulated banks to form large-scale de facto partnerships with technology companies, without subjecting the latter to bank-like oversight.

Three examples of this deregulatory approach are particularly noteworthy. Thus, the Treasury Report lists a variety of specific recommendations that seek to:

1. enable banking institutions to enter into open-ended, large-scale data-sharing and information-management partnerships with technology companies;

[7] See, e.g., Id. at 17–19.
[8] Id. at 17.

2. enable mutual equity investments and direct affiliations between banks and nonbank technology companies; and
3. facilitate "rent-a-charter" arrangements allowing online marketplace lenders to take advantage of national banks' exemptions from State usury laws.

These recommendations raise a number of potentially significant public policy concerns that do not receive attention in the Report. In broad terms, these policy concerns arise in three interconnected but conceptually separate areas:

1. consumer financial data privacy and safety;
2. market structure and potential concentration of economic power; and
3. systemic financial stability and economic growth

Below, I will examine each of these high-level public policy issues—or systemic concerns—in the context of the three groups of Treasury recommendations outlined above.

Systemic Concern Number One: Consumer Protection

The Treasury Report advocates for a significant relaxation, if not elimination, of the existing rules governing banking institutions' relationships with third-party vendors, in order to make it easier for regulated banks to form large-scale data-sharing and data-management partnerships with data aggregators and cloud service providers. [9]

Data aggregators—or data miners—are technology companies that collect and "share" (i.e., sell to interested businesses) vast amounts of online business and personal user data. So far, banking institutions have been reluctant to share their customers' financial information—including personal bank account types and balances, history of late fees and charges, detailed transaction records, and so forth—with unaffiliated data aggregators. Bound by their legal and regulatory obligations to safeguard customer information handled by third-party vendors, banks typically insist on controlling their bilateral relationships with individual data aggregators and often impose unilateral restrictions on their access to banks' customer data.

The Treasury Report views this situation as an example of undesirable regulatory obstacles to financial innovation and, accordingly, calls for a concerted regulatory effort to allow data aggregators a greater direct access to banking customers' financial data. The Report maintains that it is critical to ease legal and regulatory requirements that currently "hold back" financial institutions from entering in unrestricted data-sharing agreements with data aggregators. In particular, the Report calls for a universal adoption of Application Programming Interfaces (APIs) that would give data aggregators direct access to customer account and transaction data in possession of either any particular bank or all participating financial institutions. [10] Relieving banks from legal liability for third-party service providers' handling of customer data is key to this industrywide shift to APIs that is, in turn, critical to scaling up the flow of financial information from banks to data aggregators. [11]

The Treasury Report adopts the same approach to promoting large-scale partnering between banks and cloud computing service providers, The Treasury recommends that Federal financial regulators "modernize their requirements and guidance (e.g., vendor oversight)" to reduce regulatory barriers to large-scale migration of banks' data and information management activities to the cloud managed by third parties. [12] As the Report emphasizes, facilitating a massive shift to cloud computing would "increase the speed of innovation" in the financial sector. [13] Enabling banks and other regulated financial institutions to outsource their integrated data management and information technology functions to large cloud service providers, without exposing themselves to potentially extensive liability, is critical to this industrywide shift. [14]

To justify shielding banks from liability—among other things, by relaxing existing bank service provider regulations—the Treasury points to banks' efficiency gains and their customers' greater convenience and freedom of choice. The basic claim is that allowing unaffiliated tech companies to access, host, and manage bank data will (1) render financial services faster and cheaper for all consumers; and (2) give consumers unfettered control over their own financial data and their own financial affairs.

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[9] Id. at 73–77.
[10] Id. at 26–27.
[11] Id. at 73–77.
[12] Id. at 52.
[13] Id. at 49.
[14] Id. at 49–50.

There is no doubt that wholesale outsourcing of banks' customer and enterprise data storage and management to specialized technology companies would greatly reduce banks' operating costs and regulatory compliance headaches—and even enhance banks' revenues by enabling them to charge data aggregators for direct feeds of their customers' account data. It would also potentially enable individuals to access their bank accounts and other financial records via the same device they use for downloading music and rating restaurants. As the Report emphasizes, data-sharing through APIs would create a seamlessly integrated virtual data management space for individuals seeking this kind of click-through convenience.

However, the Treasury Report ignores potentially significant public harms of allowing an industrywide wholesale migration of core bank activities and highly sensitive financial data to the cloud and/or data aggregation platforms run by third parties. What is breezily portrayed as "financial data freedom" for consumers, in practice, may lead to potentially irreversible erosion of consumer rights and meaningful freedom of choice in the financial marketplace.

While it is difficult to present a comprehensive list of potential harms to consumers likely to result from the proposed data-sharing expansion, two basic issues deserve the Committee's consideration.

Privacy and Safety of Bank Customers' Financial Data

One reason for concern is that, despite the attractive rhetoric of "financial data freedom," an easy and direct access to banking institutions' data creates both the opportunity and the incentive for tech platform companies to engage in unauthorized commercial uses of bank customers' personal data.

Giving consumers "unfettered" access to their personal financial data, in the way advocated in the Treasury Report, would simultaneously give technology platform operators an equally unfettered access to the same data. These platform operators, however, are not regulated or supervised in the interest of consumer financial privacy as banks currently are.[15] Unlike banks, these companies are not required to maintain any particular levels of liquid assets or equity capital to ensure their safety and soundness. They don't have any explicit legal obligations to make customers whole in case of unauthorized withdrawals of money from customers' accounts. They don't have a corps of dedicated Federal and State agency staff—such as bank examiners—monitoring closely their daily operations for compliance with the applicable consumer protection and business conduct standards. In other words, these companies are regular private entities seeking to maximize their own private profits in a free capitalist market, governed by the basic principle of "caveat emptor" ("buyer, beware"). In this sense, they are not fundamentally different from used car salesmen.

Unlike used car salesmen, however, these tech platform companies will now be able to get direct access to your bank account and transaction data—and thus invisibly monitor your earnings and your expenses, your daily Starbucks coffee purchases and your annual political campaign contributions. That will give these professional information merchants an extraordinary advantage over you, the consumer. They will be able to "harvest" a valuable asset—your personal financial information—without paying you for it. They can then use it to make you buy the products they want to sell you. They can also sell your financial information to other salesmen who can, in turn, use it to make you buy what they want to sell you. And all of this "free commerce" can happen without your knowledge or informed consent. In fact, the only action required on the part of an individual to become a captive participant in this spiral of "free commerce" may be as simple as opening a deposit account at a local bank—and perhaps signing a boilerplate "consent" form.[16]

If this is a plausible hypothetical, the Treasury's proposed method of "embracing digitization" by relaxing existing regulatory constraints on banks' data-sharing has to be subjected to the strictest scrutiny. Instead of giving consumers meaningful "financial data freedom," it would give a massive gift of "free financial data" to data aggregators, cloud providers, various FinTech companies, and other businesses set up to capitalize on it. This is a deeply troubling prospect. As a recent study found, "the FinTech ecosystem is predicated on little to no privacy protections for consumer data housed outside regulated financial institutions."[17] But it is also intuitively

[15] See Karen Petrou, "The Crisis Next Time: The Risk of New-Age FinTech and Last-Crisis Financial Regulation" (Sept. 6, 2018), available at *http://www.fedfin.com/images/stories/client—reports/FedFin%20Policy%20Paper%20on%20The%20Risk%20of%20New-Age%20Fintech%20and%20Last-Crisis%20Financial%20Regulation.pdf.*

[16] Treasury Report, at 26.

[17] Petrou, supra note 15, at 3.

easy to understand the obvious dangers of allowing large tech platform companies such an easy access to bank customers' personal financial data. A strong public reaction to the recent news of Facebook—one of the world's largest and most notorious data aggregators—requesting access to large banks' customer data shows that consumers care deeply about keeping their financial information private, safe, and secure from all manner of unauthorized use.[18]

The Treasury Report does not address the heightened risk of unauthorized commercial uses of consumer data by tech platforms allowed to access it. Instead, it confines the discussion to issues of data security, or unauthorized access to data.

While acknowledging the importance of data protection in general terms, the Report generally seems content leaving the necessary adjustments to the private sector. Thus, it refers to the fact that the Federal Trade Commission (FTC) imposes certain information security requirements on data aggregators that are "significantly engaged in financial services," and are therefore subject to its so-called Safeguards Rule.[19] In the Treasury's view, that rule "appropriately addresses" all concerns about the security of customers' financial information managed by data aggregators and other FinTech firms.[20] Accordingly, the conclusion is that no further legislative or regulatory action is needed in order to bolster consumer data protection. It is not clear, however, to what extent the FTC's Safeguards Rule is sufficiently effective in practice. The Rule may not even apply to giant platform conglomerates whose financial activities do not technically constitute a "significant" portion of their overall operations.[21] Moreover, a recent massive data security breach at Equifax, which affected over 143 million people, is a vivid example of what can happen even on the FTC's watch.[22]

Of course, any meaningful discussion of data security has to address the critical issue of apportioning liability for security breaches. While the Treasury acknowledges the importance of this issue, it does not provide a clear answer to the fundamental question: Who will be liable to the consumer whose bank account is hacked? It seems clear that, as a practical matter, the only way banks would be willing to share their customer data with tech platforms is if they are not held liable for the platform operators' failures to protect the data. But, if banks are not liable, then who is going to make the account holder whole? Unless this question has a clear—and satisfactory—answer, the notion of "facilitating innovation" through unrestricted data-sharing is inimical to the objective of protecting consumers' interests.

Predatory and Discriminatory Pricing of Financial Services

The Report's rhetoric of consumer choice and financial data freedom implies the existence of a perfectly competitive and transparent market in which individual consumers have the power to choose the best FinTech service provider. Reality, however, is far more complicated and a lot less benign.

In particular, the market for cloud computing and data analytics is both highly concentrated and inherently opaque. Only four megatech companies currently dominate the worldwide market for cloud services: Amazon, Microsoft, Alibaba, and Google.[23] These four "hyperscale" service providers hold approximately 73 percent of the global cloud infrastructure services.[24] Apple, Amazon, Google, Microsoft, and Facebook—five of the largest publicly traded U.S. companies by market capitalizations—are the pioneers of megascale data aggregation and "integral drivers of the digital economy" as a whole.[25] Even though the Treasury Report refers to data aggregators and cloud service providers in generic terms, it is these megacompanies that define the dynamics in the tech sector.

It is no coincidence that today's giant technology conglomerates are aggressively growing, diversifying, and continuously expanding their market shares. As recent studies show, this constant quest for size and market power is the built-in economic imperative in this business so intimately dependent on network effects.[26] These

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[18] See Emily Glazer et al., "Facebook to Banks: Give Us Your Data; We'll Give You Our Users", *Wall St. J.* (Aug. 6, 2018).

[19] Treasury Report, at 38.

[20] Id. at 39.

[21] See Petrou, supra note 15, at 5.

[22] See *https://www.ftc.gov/equifax-data-breach.*

[23] "Gartner Says Worldwide IaaS Public Cloud Services Market Grew 29.5 Percent in 2017", Press Release (Aug. 1, 2008), available at *https://www.gartner.com/en/newsroom/press-releases/2018-08-01-gartner-says-worldwide-iaas-public-cloud-services-market-grew-30-percent-in-2017.*

[24] Id.

[25] Treasury Report, at 23.

[26] See, e.g., John M. Newman, "Digital Antitrust" (June 22, 2018), available at *https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3201004*; Lina Khan, "Amazon's Antitrust Par-

companies' critical reliance on complex proprietary analytical tools renders their business models, and the markets in which they operate, fundamentally nontransparent. Put simply, nobody really knows what exactly these companies can see or what they can do with the data they touch.

In this context, the Treasury's proposed strategy of enabling megatech companies to "get inside" banks' customer data raises a number of significant consumer protection concerns. If that happens, the dominant players in the financial data and services market will be perfectly positioned to abuse their enormous market power, among other things, by engaging in predatory or unfair pricing of financial products and consumer discrimination.

The basic blueprint for such abuses is already there. For example, Amazon's unprecedented market power in online commerce and command of digitized consumer data enable it to adjust its prices almost instantaneously, in response to fluctuations in current demand for specific goods.[27] For example, if more people are buying a particular brand of baby food in the morning, Amazon can raise its price by noon.[28] This type of "dynamic pricing" is difficult for any outsider to detect, as only Amazon has control of its algorithms and data. This algorithmic opacity makes consumers extremely vulnerable to predatory or unfair pricing, and not only by Amazon but also by other companies widely emulating its practices.[29]

In the context of financial services, this technical capacity for nontransparent "dynamic pricing" can easily translate into the highly questionable practice of "microtargeting" consumers. Amazon, Google, and other FinTech companies will be able to use the vast amounts of data gained from monitoring consumers' behavioral patterns and commercial transactions—and now the detailed real-time bank account data—to "up-price" financial products and services offered to individual consumers.[30] In essence, they will be able to charge individual borrowers not the fair market price but the maximum price each of them is able to pay.

This microtargeting may be presented to the public under the benign guise of "product customization." In practice, however, it will effectively destroy consumers' ability to make informed decisions and to gauge whether they are being overcharged, underserved, or even entirely excluded from certain product markets. The opacity of the pricing process, the service provider's control of the customer's data, and the practical difficulty of switching providers will fundamentally skew the balance of power in favor of the service provider.[31]

Importantly, the same factors will also make it difficult, if not impossible, for any regulatory agencies to detect and punish abusive behavior in financial markets. The growing deficit of regulatory capacity is likely to leave consumers to fend for themselves—precisely at a time when they acutely need Government protection. This is particularly poignant, given the current efforts to weaken the Bureau of Consumer Financial Protection and to limit its enforcement capabilities.[32]

In sum, simply relaxing existing bank regulations in order to allow wholesale migration of the highly sensitive and valuable financial information currently controlled by banks to data aggregators, cloud providers, and other FinTech companies would expose consumers to potentially massive data privacy and safety risks. Rather than gaining meaningful control over their personal financial data, American consumers will be an easy target for unscrupulous salesmen of the digital era. A prudent public policy approach to safe and secure financial data-sharing in the digital age requires a deeper and more balanced analysis of these risks, as well as the means of preempting them.

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adox", 126 *Yale L. J.* 710 (2017); Frank Pasquale, "Paradoxes of Digital Antitrust" (2013), available at *https://jolt.law.harvard.edu/assets/misc/Pasquale.pdf.*

[27] Alberto Cavallo, "More Amazon Effects: Online Competition and Pricing Behaviors", Harvard Business School and NBER (Aug. 10, 2018), available at *https://kansascityfed.org//media/files/publicat/sympos/2018/papersandhandouts/825180810cavallopaper.pdf?la=en.*

[28] David Dayen, "Does Amazon Have More Power Than the Federal Reserve?" *New Republic* (Aug. 28, 2018), available at *https://newrepublic.com/article/150938/amazon-power-federal-reserve.*

[29] Id.; Rana Foroohar, "Amazon's Pricing Tactic Is a Trap for Buyers and Sellers Alike", *FT.Com* (Sept. 2, 2018).

[30] See Petrou, supra note 15, at 4.

[31] See Foroohar, supra note 29.

[32] See Renae Merle, "Trump Administration Strips Consumer Watchdog Office of Enforcement Powers in Lending Discrimination Cases", *Wash. Post* (Feb. 1, 2018), available at *https://www.washingtonpost.com/news/business/wp/2018/02/01/trump-administration-strips-consumer-watchdog-office-of-enforcement-powers-against-financial-firms-in-lending-discrimination-cases/?utm_term=.4c83cde19b28.*

Systemic Concern Number Two: Structural Shifts in the Economy

Under the headings of "aligning" and "modernizing" the regulatory framework, the Treasury Report makes a number of specific recommendations intended to remove or relax the existing restrictions on permissible business activities and organizational affiliations of banking organizations. While framed as a narrowly technical issue, this effort goes directly to the long-standing U.S. policy of separation of banking from commerce. It also raises a broader spectrum of concerns related to potentially far-reaching structural shifts in the U.S. economy.

The principle of separation of banking and commerce is one of the core principles underlying and shaping the elaborate regulatory regime applicable to all U.S. banking organizations.[33] Under the National Bank Act of 1863, U.S. commercial banks generally are not permitted to conduct any activities that fall outside the statutory concept of "the business of banking."[34] Moreover, under the Bank Holding Company Act of 1956 (the BHC Act), bank holding companies (BHCs)—companies that own or "control" U.S. banks—are generally restricted in their ability to engage in any business activities other than banking, managing banks, or certain activities "closely related" to banking.[35]

Since the 1980s, the scope of banks' and BHCs' permissible activities has been steadily and gradually expanding.[36] The Office of the Comptroller of the Currency (OCC) has been especially aggressive in its interpretations of the statutory term "business of banking" to allow banks to engage, among other things, in data storage and certain software-related activities.[37] In 1999, Congress passed the Gramm–Leach–Bliley Act (the GLB Act), which partially repealed the Glass–Steagall Act and authorized certain qualifying BHCs to become "financial holding companies" (FHCs) and to conduct a wide range of financial and even some commercial activities.[38]

These developments notwithstanding, however, U.S. banks' and BHCs' activities, investments, and organizational affiliations remain subject to significant limitations. Citing with approval the OCC's aggressively expansive approach, the Treasury Report recommends that all banking regulators interpret banking organizations' scope of activities "in a harmonized manner as permitted by law wherever possible and in a manner that recognizes the positive impact that changes in technology and data can have in the delivery of financial services."[39]

The Treasury also recommends that the Federal Reserve "consider how to reassess" the definition of "control" in the BHC Act, in order to make it easier for banking institutions and FinTech companies invest in each other's equity.[40] The BHC Act defines "control" in deliberately broad terms: in addition to specifying a quantitative threshold (direct or indirect ownership of 25 percent or more of any class of voting securities), it grants the Federal Reserve discretion to make the requisite findings of "controlling influence" in a wide range of circumstances.[41] The Treasury Report criticizes the Federal Reserve's accumulated interpretations of "control" as "not sufficiently transparent" and thus discouraging—instead of facilitating—the formation of extensive business partnerships and close organizational relationships between BHCs and FinTech companies. The practical worry here is that unregulated technology companies may be deemed either to "control" a U.S. bank or to be "controlled" by a BHC—and thus subject to the BHC Act's activity restrictions and supervisory oversight.[42]

Although the Treasury does not explicitly direct the Federal Reserve to adopt any specific definition of "control," the main thrust of its recommendation is clear: a properly "modernized" definition should be significantly narrowed and uniformly applied. In contrast to the Treasury's usual calls for "tailored" FinTech regulation, the Federal Reserve's tailoring of "control" determinations to the circumstances of each individual case is deemed undesirable as hindering bank partnerships with and acquisitions of (and by) nonbank technology companies.

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[33] See Bernard Shull, "Banking and Commerce in the United States", 18 *J. Banking and Fin.* 255 (1994); Bernard Shull, "The Separation of Banking and Commerce in the United States: an Examination of the Principal Issues", 8 *Fin. Markets, Inst. and Instr.* 1 (Aug. 1999).

[34] 12 U.S.C. §24 (Seventh).

[35] 12 U.S.C. §§1841-43.

[36] See Saule T. Omarova, "The Quiet Metamorphosis: How Derivatives Changed the 'Business of Banking'" 63 *U. Miami L. Rev.* 1041 (2009); Saule T. Omarova, "The Merchants of Wall Street: Banking, Commerce, and Commodities", 98 *Minn. L. Rev.* 265 (2013).

[37] Id.

[38] 12 U.S.C. §1843(k).

[39] Treasury Report, at 80.

[40] Id.

[41] 12 U.S.C. §1841(a).

[42] Treasury Report, at 80.

Separation of Banking and Commerce

Adopting a systematic policy of aggressively pushing the legal and statutory boundaries of bank-permissible business activities and affiliations, as advocated by the Treasury, will significantly undercut—if not completely incapacitate—the operation of the foundational U.S. principle of separation of banking and commerce. In this sense, it will weaken the overall integrity and efficacy of the U.S. bank regulation and supervision.

It is important to remember why the entire system of U.S. bank and BHC regulation is designed to keep institutions engaged in deposit-taking and commercial lending activities from conducting, directly or through some business combination, any significant nonfinancial activities, or from holding significant interests in any general commercial enterprise. There are three main public policy reasons for maintaining this legal wall between the "business of banking" and purely commercial businesses: (1) preserving the safety and soundness of federally insured depository institutions; (2) eliminating potential conflicts of interest and ensuring a fair and efficient flow of credit to productive economic enterprise; and (3) preventing excessive concentration of financial and economic power in the financial sector.[43]

Of course, each of these traditional concerns may be more or less pronounced in the context of a particular commercial activity. It is also clear that banks' involvement in certain nonfinancial activities may—and often does—produce financial benefits to their clients and, indirectly, to society as a whole. Yet, after decades of unquestioning acceptance of private firms' self-interested depiction of such benefits, it is critical that policymakers fully address and appreciate potential social costs of mixing banking and commerce—especially, digital commerce.

The key point here is simple: allowing banks and BHCs to form wide-ranging business partnerships with technology firms—either through global contractual arrangements or through outright combinations—would critically undermine all of the public policy goals at the heart of the U.S. bank regulation.

For example, it would expose banking institutions to a wide variety of nontypical and potentially excessive economic, operational, and legal risks associated with tech companies' rapidly evolving commercial activities. Banks are "special" business actors in that they perform critical public functions, enjoy direct public support, and are inherently vulnerable to runs that can trigger systemic financial crises. For these reasons, banks' safety and soundness remains the cornerstone of bank regulation and supervision.[44] Expanding banking entities' economic activities to encompass global e-commerce, "big data" management, and AI development will diversify and magnify not only their potential revenues but also their potential losses and vulnerabilities. It will also render banking organizations' internal governance and regulatory oversight far more challenging, if not outright impossible, propositions.

Furthermore, it would give rise to new patterns of conflicts of interest, potentially systematic misallocation of credit, and other cross-sectoral abuses of market power. Some of these abuses of market power are discussed above, in the context of consumer protection. However, this type of bank-tech conglomeration would also pose an immediate and tangible threat to all other businesses, especially those competing with banks' technology affiliates or partners. These types of structurally determined distortion in the economywide credit flows would critically impede economic growth and cause a host of socio-economic and political problems.

Market Structure, Antitrust, and "Too Big To Fail" Concerns

Perhaps the most far-reaching potential consequence of opening the door for direct cross-sectoral acquisitions and affiliations between banking institutions and tech firms is the dangerous increase in the overall concentration of the economic and political power likely to result from it.

The U.S. financial services industry is already heavily concentrated. The passage of the GLB Act, which officially removed the long-standing prohibition on affiliations between commercial and investment banks, has elevated the pace of industry consolidation to a qualitatively new level.[45] The level of industry concentration increased further in the wake of the global financial crisis of 2008, so that the top

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[43] See Omarova, "The Merchants of Wall Street", supra note 36, at 274–278.

[44] See E. Gerald Corrigan, "Are Banks Special?" 1982 Fed. Res. Bank of Minn. Ann. Rep., available at *http://www.minneapolisfed.org/pubs/ar/ar1982a.cfm*. For a systematic exposition of banks' special function as sovereign public's "franchisees," see Robert C. Hockett and Saule T. Omarova, "The Finance Franchise", 102 *Cornell L. Rev.* 1143 (2017).

[45] See Arthur E. Wilmarth, Jr., "The Transformation of the U.S. Financial Services Industry, 1975–2000: Competition, Consolidation, and Increased Risks", 2002 *U. Ill. L. Rev.* 215 (2002).

five banks in the U.S. now control approximately half of all assets in the sector.[46] Large BHCs control over 80 percent of all banking assets.[47]

The same trend is strongly evident in the tech sector. Despite the great number and diversity of what we call "technology" companies, a few giants at the core of the tech industry undoubtedly dominate it. Thus, only two companies, Apple and Google, currently provide the software for 99 percent of all smartphones, the indispensable devices for mobile payments.[48] Facebook and Google capture between 59 and 73 cents of every dollar spent on online advertising in the U.S.[49] Amazon takes 49 cents of every e-commerce dollar in the U.S.[50] This dominance is clearly reflected in the stock markets. Earlier this year, both Apple and Amazon exceeded $1 trillion in market capitalization. And the largest tech companies—including Apple, Amazon, Facebook, and Google—lead the longest stock market rally in decades.[51]

It is against this background that the Treasury Report's seemingly low-key, technocratic recommendation to "correct" or "clarify" a specific regulatory interpretation of the statutory definition of "control" in the BHC Act should be evaluated.

The existing body of the Federal Reserve's interpretations of what constitutes "control" for purposes of the BHC Act is fundamentally fact-driven and thus inevitably complex. While that may complicate private firms' efforts to structure their investments so as to avoid being subject to the BHC Act, it preserves the necessary flexibility enabling the Federal Reserve to safeguard the principles underlying the Act. This is especially critical in light of the fact that the BHC Act was originally designed to operate as an antitrust, antimonopoly law.[52]

By contrast, what the Treasury calls "a simpler and more transparent standard to facilitate innovation-related investments" would effectively enable large U.S. financial holding companies to take significant equity stakes in various FinTech ventures, alongside large tech companies. It would also enable the tech giants to acquire significant equity stakes in U.S. banks and BHCs of varying sizes, without becoming subject to BHC regulation. The Treasury Report carefully frames its recommendations to create an impression that such a regulatory pullback would make financial markets more efficient and competitive by enabling a myriad of small investments by a myriad of banks in a myriad of competing tech companies—and vice versa. What remains unsaid, however, is that the dominant players in both markets—including JPMorgan Chase, Citigroup, Bank of America, Goldman Sachs, Morgan Stanley, Wells Fargo, Facebook, Amazon, Google, Apple, Microsoft, and IBM—will also be able to take advantage of such explicitly permissive regulatory standards. Given the importance of scale and network effects for both tech platforms and financial institutions, they will be remiss not to.

Thus, in practice, "simplifying" the Federal Reserve's interpretation of the BHC Act's "control" requirements for purposes of "facilitating FinTech innovation" is likely to trigger a wave of unprecedented cross-sectoral consolidation. Because of the 25 percent threshold built into the BHC Act's definition of "control," this new-generation consolidation wave will likely take new transactional forms, potentially resulting in a Byzantine system of corporate ownership and de facto management interlocks. In this web of formal and informal corporate control linkages, detecting and punishing collusive behavior and other abuses of market power will be even more difficult than it is today.

One additional point bears emphasis here. In both sectors, companies' size and market share are key to profitability and success. In the financial sector, the quest for scale and scope is also driven by the presence of the bank public subsidy. The well-known phenomenon of "too big to fail"—a de facto suspension of market discipline with respect to systemically important entities—presents one of the greatest public policy challenges in the financial sector.[53] Drastically curtailing the regime of separation of banking from commerce would facilitate a potentially massive trans-

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[46] *https://fred.stlouisfed.org/series/DDOI06USA156NWDB*

[47] See NAFCU, "Modernizing Financial Services: The Glass–Steagall Act Revisited" (2018), at 14, available at *http://stilltoobigtofail.org/wp-content/uploads/2018/09/Glass-Steagall-Act-White-Paper_R4.pdf.*

[48] See Matt Phillips, "Apple's $1 Trillion Milestone Reflects Rise of Powerful Megacompanies", *N.Y. Times* (Aug. 2, 2018).

[49] See id.; Lina M. Khan, "Sources of Tech Platform Power", 2 *Geo. L. Tech. Rev*. 325, 326 (2018).

[50] See David Streitfeld, "Amazon Hits $1,000,000,000,000 in Value, Following Apple", *N.Y. Times* (Sept.4, 2018).

[51] See Phillips, supra note 48.

[52] See Omarova, "The Merchants of Wall Street", supra note 36, at 276–277.

[53] See Matt Egan, "Too-Big-To-Fail Banks Keep Getting Better", *CNN Money* (Nov. 21, 2017), available at *https://money.cnn.com/2017/11/21/investing/banks-too-big-to-fail-jpmorgan-bank-of-america/index.html.*

fer of banks' public subsidy to the tech sector. In that sense, it is virtually guaranteed to take the "too big to fail" problem to an entirely different—perhaps even unimaginable—level. In the next crisis, the sheer scale of the Government bailouts required to keep the hypersized FinTech conglomerates from failing might make the taxpayer cost of saving Wall Street in the last one look like small change.

Of course, money is not the only thing that matters to the American public in this scenario. The increasing concentration of economic power in a small club of corporate giants is a direct threat to American democracy.[54] It perpetuates and exacerbates deep socio-economic inequality, which inevitably undermines political order premised on ideals of equal participation and voice. Big corporations' ability to "buy" political influence fundamentally corrupts political process and corrodes public confidence in the democratic system as a whole.[55] This is an unacceptably high societal price for the personal convenience of accessing one's bank accounts and digital wallets via a single iPhone click.

In sum, it is critical to keep in mind that, without proactive and appropriately applied public oversight, data digitization, cloud computing, and other seemingly value-neutral and science-driven FinTech innovations may operate as hidden channels for the formation of economywide FinTech platform conglomerates.

Systemic Concern Number Three: Financial Stability and Economic Growth

The Treasury Report uses a direct reference to the "bank partnership model" in its discussion of marketplace lending. Among other things, the Treasury makes a very specific recommendation for Federal legislation overruling the Second Circuit's decision in Madden v. Midland Landing LLC, which held that the National Bank Act did not preempt State usury rules with respect to the interest charged by a third-party nonbank purchaser of loans from a national bank.[56]

The Madden decision directly affects marketplace lenders operating under the so-called rent-a-charter model, in which the online lender markets the loans and runs its proprietary algorithms but the actual loan is initially extended and funded by a chartered bank. The bank typically holds the loan for a few days and then sells it back to the online lender.[57] In effect, the online lender buys the originating bank's ability to "export" its home-State's favorable (or nonexistent) usury rate nationwide. In this sense, the bank is "renting out" its bank charter—or, more accurately, selling a special legal privilege the Government grants exclusively to chartered banks—to an entity that does not qualify for a bank charter and is not entitled to any privileges that come with it.[58]

The "rent-a-charter" model is not a recent invention; it was widely used by predatory payday lenders and subprime mortgage companies in the run-up to 2008.[59] At the time, Federal bank regulators did not interfere with this unseemly charter-arbitrage practice in the name of promoting "financial innovation," "freedom of consumer choice," and "access to credit" for high-risk/low-income borrowers. The OCC's aggressive Federal preemption strategy, the Federal Reserve's laxity, and the absence of a dedicated Federal financial consumer protection agency contributed to the rampant growth of subprime debt that ultimately triggered a major financial crisis.[60]

In this context, the Treasury's insistence that Congress legislatively overrule Madden brings into bold relief the broader concerns about systemic financial stability and the threat of recurring financial crises. All too often, the familiar rhetoric of "facilitating consumer access to cheap credit" obscures the underlying systemwide dynamics that drive the emergence and growth of specific "innovations." The Treas-

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[54] See Omarova, "The Merchants of Wall Street", supra note 36, at 349–351; Julie Cohen, "Technology, Political Economy, and The Role(s) of Law" (June 8, 2018), available at *https://lpeblog.org/2018/06/08/technology-political-economy-and-the-roles-of-law/*.

[55] See generally Rana Foroohar, "A Light Shines on the Concentration of Power in Silicon Valley", *FT.Com* (July 22, 2018); Buttonwood, "Political Power Follows Economic Power", *Economist.com* (Feb. 3, 2016), available at *https://www.economist.com/buttonwoods-notebook/2016/02/03/political-power-follows-economic-power*.

[56] Madden v. Midland Funding, LLC, 786 F. 3d 246 (2d Cir. 2015).

[57] See Michael S. Barr, et al., "Financial Regulation: Law and Policy" 185 (2nd ed., 2018).

[58] For a discussion of why bank charters are special and different from regular corporate charters, see Robert C. Hockett and Saule T. Omarova, "'Special', Vestigial, or Visionary? What Bank Regulation Tells Us About the Corporation—and Vice Versa", 39 *Seattle U. L. Rev.* 453 (2016).

[59] See Consumer Federation of America and U.S. Public Interest Research Group, "Rent-A-Bank Payday Lending: How Banks Help Payday Lenders Evade State Consumer Protections" (Nov. 2001), available at *https://consumerfed.org/pdfs/paydayreport.pdf*.

[60] See, e.g., Kathleen C. Engel and Patricia A. Mccoy, "The Subprime Virus: Reckless Credit, Regulatory Failure and Next Steps" (2011).

ury Report's normatively inflected rhetoric also diverts attention from the significant potential impact of proposed deregulatory measures on the financial markets as a whole. To avoid repeating the costly mistakes of the pre-2008 period, therefore, policymakers must look behind the Report's technocratic gloss and examine FinTech developments from a systemic, public interest-driven perspective.

Financial Asset Speculation in the Digitized Marketplace

Contrary to the Treasury Report's baseline narrative, FinTech is not simply a matter of applying computer and information science to financial transactions and finding "win–win" technical solutions to various market "frictions." It is trivially true that new technological tools are designed to make financial transactions faster, cheaper, and easier to use and adjust to transacting parties' individual needs and preferences. But that is only part of the story. The rise of FinTech is an integral part, and a logical stage in the development, of the broader financial system. Therefore, FinTech's overall normative significance cannot be simply postulated on the basis of its intended microtransactional efficiencies. It has to be assessed in the context of the financial system's stability and ability to perform its core social function: effectively and reliably channeling capital flows to their most productive uses in the real, i.e., nonfinancial, economy.[61]

From this systemic perspective, the rapid digitization of data and financial services presents a far more complex public policy challenge than the Treasury Report is willing to acknowledge. FinTech innovations are driven not only—and perhaps not even mainly—by the financial institutions' and tech companies' desire to improve retail financial services. Despite the consumer-centric rhetoric surrounding FinTech, digital technologies are likely to have their greatest systemic impact in the highly volatile and speculative secondary financial markets dominated by professional traders, dealers, and institutional investors. Fixing the focus of policy discussions on the expected benefits of FinTech to retail consumers, however, diverts attention from potentially crucial developments in wholesale financial markets. It accordingly creates a dangerous blind spot for policymakers and regulators.

The pre-2008 subprime mortgage and securitization boom provides a vivid illustration of just how dangerous it can be. It is well-known that the rapid growth of risky subprime mortgage lending in the early 2000s—a predominantly retail market phenomenon—was fundamentally driven by the insatiable demand on the part of yield-hungry institutional investors for tradable asset-backed securities. Subprime mortgage loans served as the perfect raw material for the creation of high-yielding yet highly (and wrongly) rated mortgage-backed securities (MBS), collateralized debt obligations (CDOs), and other complex structured products.[62] As speculative demand for these products grew, mortgage lenders used increasingly deceptive and discriminatory tactics to generate greater volumes of such raw material, among other things, by targeting the most vulnerable borrower populations.[63]

Ironically, in the public arena, these predatory subprime loans were often touted as a great benefit for low-income borrowers. This is how a senior executive of now infamous Countrywide Financial described his company's subprime lending activities to Congress in early 2004, a year in which some of the worst subprime mortgages were originated:

> "[. . .] Countrywide entered the nonprime lending market in 1996 as part of our effort to make homeownership possible for the largest number of American families and individuals. We believed then, as we believe now, that nonprime lending is a natural extension of our commitment to bring Americans who have traditionally been outside mainstream mortgage markets into their first homes. Our nonprime lending programs also have helped these families and individuals build equity and use this equity to send their children to colleges, start their own businesses, and gain control over their financial destiny."[64]

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[61] For an in-depth analysis of the systemic significance of FinTech, see Saule T. Omarova, "New Tech v. New Deal: FinTech As a Systemic Phenomenon", 36 *Yale J. Reg.* (forthcoming 2019), available at *https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3224393.*

[62] See generally Engel and McCoy, supra note 60; "Fin. Crisis Inquiry Comm'n, The Financial Crisis Inquiry Report: Final Report of the National Commission on the Causes of Financial and Economic Crisis in the United States" (2011), *https://www.gpo.gov/fdsys/pkg/GPO-FCIC.pdf*; S. Permanent Subcomm. on Investigations, 112th Cong., "Wall Street and the Financial Crisis: Anatomy of a Financial Collapse" (2011), *http://hsgac.senate.gov/public/__files/Financial_Crisis/FinancialCrisisReport.pdf.*

[63] Id.

[64] Testimony of Sandy Samuels, Senior Managing Director and Chief Legal Officer of Countrywide Financial Corporation and the Housing Policy Council of the Financial Services Roundtable before the Subcommittees on Financial Institutions and Housing, U.S. House of Representatives

> "Nonprime products give borrowers more choices and make credit more readily available, because we and other lenders can price according to the level of risk."[65]

Millions of Americans who either lost their homes in the crisis or are forced to carry the heavy burden of underwater mortgage debt would strongly disagree.[66]

In reality, of course, Countrywide flooded the market with risky loans not because it cared for its poor borrowers' economic rights, but because it was reaping huge profits in the wholesale securitization markets. Its executive's remarkably self-serving statements illustrate how the financial industry used—indeed abused—consumers not only as the unwitting captive source of fuel for its high-stakes speculation game, but also as the "sympathetic beneficiary" legitimizing and shielding that game from public scrutiny.

Today, similar consumer-centric rhetoric is being deployed to justify various deregulatory moves, among other things, in the context of FinTech innovation. It is, of course, too early to draw definitive conclusions as to what exactly this rhetoric may be obscuring from policymakers' and the broader public's view. The recent history tells us, however, that whenever a powerful private industry demands deregulation in the name of consumers' "freedom of choice" or "access to credit," something a lot bigger and much less altruistic is driving these demands. It is, therefore, both timely and necessary to start identifying some of the ways in which FinTech is likely to impact the "big-picture" issues related to systemic financial stability.

The basic point here is simple: In the current environment of global investment capital glut, the rapid digitization of financial data and transactions is bound to amplify the underlying structural incentives for excessive speculation in secondary markets for financial instruments. By making financial transactions infinitely faster, cheaper, and easier to use and to customize, FinTech innovations potentially empower wholesale market participants to engage in financial asset speculation on an unprecedented level. Armed with new digital tools, financial and FinTech firms will be able to synthesize potentially endless chains of virtual assets, tradable in potentially infinitely scalable virtual markets. This FinTech-driven qualitative growth in the volume and velocity of speculative trading, in turn, potentially amplifies the financial system's vulnerability to sudden shocks and cascading loss effects. In short, a fully digitized and frictionless financial marketplace is bound to grow not only much bigger and faster but also more complex, opaque, and volatile.[67]

It is worth emphasizing that advances in technology are increasingly enabling private market participants to create tradable cryptoassets effectively out of thin air. These cryptoassets—digital tokens or bits of data representing some value—can have such an attenuated connection to productive activity in the real economy as to be practically untethered from it. By potentially rendering the financial system entirely self-referential, this type of unchecked private sector "innovation" can fundamentally undermine—rather than promote—the long-term growth on the part of the American economy. On a macrolevel, therefore, the key risk posed by FinTech lies in its—still not fully known—potential to exacerbate the financial system's dysfunctional tendency toward unsustainably self-referential growth.[68] (For a detailed discussion of these and related issues, see Appendix to this testimony.)

Regulatory and Supervisory Capacity

Understanding some of the potentially destabilizing systemic effects of unchecked FinTech innovation brings into a sharp relief the crucial importance of strengthening the capacity of the relevant regulatory agencies to effectively oversee this process.

FinTech's ability to bring about massive increases in the volume and velocity of speculative trading in financial assets inevitably magnifies the systemic role of—and amplifies the pressure on—central banks and other public instrumentalities charged with ensuring financial and macroeconomic stability. Hyperfast, hyperexpansive financial markets require a hyperfast and hypercapacious public actor of "last resort"—one of the central bank's core functions. Similarly, substantial new risks to consumers, posed by the digitization of personal financial data and the rise of the digital platform economy, dramatically elevate the role of Government agencies in protecting consumers' data privacy and safety. And, of course, the growing concern

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(March 30, 2004), available at *https://www.gpo.gov/fdsys/pkg/CHRG-108hhrg94689/pdf/CHRG-108hhrg94689.pdf.*

[65] Id.

[66] See Robert C. Hockett, "Accidental Suicide Pacts and Creditor Collective Action Problems", 98 *Cornell L. Rev.* 55 (2013).

[67] For a detailed discussion, see Omarova, supra note 61.

[68] Id.

with potentially excessive concentrations of economic and political power in the hands of hypersized FinTech conglomerates underscores the need for a far more proactive approach to Government enforcement of antitrust principles.

This, however, runs contrary to the Treasury Report's overall deregulatory strategy and the emphasis on an inherently passive and accommodative regulatory posture. As a general matter, the Report supports, and even insists on, proactive—or "agile"—regulatory action only where such action is necessary to "expedite regulatory relief" under existing laws in order to facilitate private experimentation with new digital technology.

The Treasury's recommendation to form a State and Federal "regulatory sandbox" should be read in this normative context.[69] Several foreign jurisdictions, including Singapore and the United Kingdom, have already established such regulatory sandboxes, which essentially refer to the practice of allowing certain FinTech companies to operate for a period of time without having to comply with various otherwise applicable laws and regulations. The purpose of this arrangement is to conduct a controlled test of FinTech products, which should then help the regulators decide how beneficial and safe these products are for the rest of the market.

The idea of a regulatory sandbox as a way to generate usable empirical data for better regulatory decision making is not necessarily a bad one. In each particular case, however, the efficacy of this effort depends fundamentally on the specific design features of the "sandbox." Thus, if the specific assessment criteria for FinTech products in the "sandbox" are insufficiently capturing potentially problematic effects of these products on consumer interests or systemic financial stability, the resulting data will not be a reliable indicator of how that product will fare outside the "sandbox." Furthermore, some of the most significant systemic implications of a particular product may be inherently impossible or difficult to test in a controlled "sandbox" environment.[70]

In any event, a "regulatory sandbox" is not a substitute for a well-coordinated and well-resourced regulatory apparatus, capable of devising and dynamically implementing a comprehensive and balanced approach to overseeing FinTech activities. In this moment of great change in financial markets, the American public needs such an apparatus: it needs capable regulators and supervisors who show their true "agility" by staying in front of, rather than behind or away from, the market.

For all of the foregoing reasons, I urge the Committee to apply the healthy dose of skepticism to the Treasury Report's and the interested industry actors' consumer-centric rhetoric and deregulatory demands. The systemic significance of FinTech innovations must be assessed in the broader public policy context, with a special focus on the need to protect American consumers from abusive market practices on the part of megasized corporate conglomerates, to safeguard the structural integrity of the U.S. financial market, and to ensure long-term systemic stability and sustainable growth of the Nation's economy. Technology is not an end in and of itself, it is merely a tool: it can be used to improve our collective future or to destroy it. The Committee's task is to ensure that the latter does not happen, while everybody is looking the other way.

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[69] Treasury Report, at 168.

[70] See, e.g., Hilary Allen, "A U.S. Regulatory Sandbox?" (Feb. 2018), available at *file:///C:/Users/sto24/Downloads/SSRN-id3056993.pdf.*

NEW TECH v. NEW DEAL: FINTECH AS A SYSTEMIC PHENOMENON

Saule T. Omarova[*]

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INTRODUCTION

"Fintech," a popular term referring to the wide universe of innovative technology-enabled financial services, is by far the hottest topic in today's finance.[1] Fintech is visibly changing the way we conduct financial transactions and use financial services: volatile cryptocurrencies are becoming a mainstream trading asset, companies are raising capital by issuing digital tokens instead of securities, and robots are advising people on some of the most important financial decisions of their lives.[2] Less visibly, however, fintech is also beginning to change the way we *think* about finance. Increasingly ubiquitous, the fintech phenomenon is gradually reframing our understanding of the financial system in seemingly objective, science-driven terms, as yet another sphere of targeted application of information technologies and computer analytics.

This emerging narrative of finance is seductive in its simplifying elegance. It focuses on concrete *transactional* aspects of finance, rather than its inherently complex *systemic* dynamics. Targeting solutions for identified and isolated frictions in financial market transactions, fintech embodies an inherently micro- rather than macro-level view of the financial system. It deals with clearly functionally defined, programmable (and thus controllable) business processes and tools, rather than difficult normative judgments and policy tradeoffs. Yet, the fintech narrative also has distinct undertones of a *social* revolution in its broader aspirations to rebuild financial markets on principles of mutuality, cooperation, and inclusiveness. In that sense, its implicit promise is to redefine not only how we transact with one another, but also who we are as a community: new technology will succeed where old politics failed.

What should we make of this emerging narrative? Does fintech signify a genuine revolutionary shift in the fundamental dynamics of finance? And, if

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[1] *See, e.g.,* Garrett Baldwin, *The Top 10 Trends in Fintech,* FUTURES MAGAZINE (April 15, 2016), *available at* http://www.futuresmag.com/2016/04/15/top-10-trends-fintech ("No term is more ubiquitous in today's financial media than fintech."); Bob Pisani, *Here's Where Fintech Is Heading Next*, CNBC (June 6, 2016), *available at* https://www.cnbc.com/2016/06/06/heres-where-fintech-is-heading-next.html ("The interaction between finance and technology, or "fintech," remains a hot topic."); Daniel Newman, *Top 5 Digital Transformation Trends in Financial Services*, FORBES (May 9, 2017), *available at* https://www.forbes.com/sites/danielnewman/2017/05/09/top-5-digital-transformation-trends-in-financial-services/#75cd2c1e204c. ("If it feels like this change is fast and furious, you're right.").

[2] For example, in 2017, an influential industry report identified seventeen distinct "fintech services" offered by a wide array of providers in such areas as "money transfer and payments, financial planning, savings and investment, borrowing, and insurance." Ernst & Young, *EY FinTech Adoption Index 2017: The Rapid Emergence of FinTech*, at 6, *available at* http://www.ey.com/Publication/vwLUAssets/ey-fintech-adoption-index-2017/$FILE/ey-fintech-adoption-index-2017.pdf

so, what are the nature and potential implications of this fintech revolution? Is it capable of delivering the ultimate, normatively neutral and politically uncontestable, cure for the financial system's underlying dysfunctions?

The purpose of this Article is not to provide definitive answers to these questions. Rather, it is to propose a general conceptual framework within which they should be addressed. Much has already been, and continues to be, written about the rise of fintech and its growing impact on financial markets and regulation.[3] Legal scholars, in particular, are increasingly interested in various legal and regulatory challenges posed by the new technological advances in finance.[4] Some of the most valuable insights to date have come from the literature examining specific legal, economic, or operational aspects of individual fintech applications.[5] Alongside these targeted legal analyses,

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[3] For a small sample, see U.S. Dept. of the Treasury, *Report to President Trump: A Financial System that Creates Economic Opportunities: Nonbank Financials, Fintech, and Innovation* (July 2018), *available at* https://home.treasury.gov/sites/default/files/2018-07/A-Financial-System-that-Creates-Economic-Opportunities---Nonbank-Financi....pdf [hereinafter, *Treasury Report*]; John Schindler, *FinTech and Financial Innovation: Drivers and Depth*, Finance & Economics Discussion Series Paper 2017-081, Board of Governors of the Federal Reserve System (2017), *available at* https://www.federalreserve.gov/econres/feds/files/2017081pap.pdf; Financial Stability Board, *Financial Stability Implications from Fintech* (27 June 2017), *available at* http://www.fsb.org/wp-content/uploads/R270617.pdf; Financial Stability Board, *Fintech* Credit: Market Structure, Business Models and Financial Stability Implications (22 May 2017), *available at* http://www.fsb.org/wp-content/uploads/CGFS-FSB-Report-on-FinTech-Credit.pdf; WORLD ECONOMIC FORUM, REALIZING THE POTENTIAL OF BLOCKCHAIN: A MULTISTAKEHOLDER APPROACH TO THE STEWARDSHIP OF BLOCKCHAIN AND CRYPTOCURRENCIES (June 2017), *available at* http://www3.weforum.org/docs/WEF_Realizing_Potential_Blockchain.pdf.

[4] For a sample of the rapidly growing legal scholarship on these issues, see Iris H-Y Chiu, *Fintech and Disruptive Business Models in Financial Products, Intermediation, and Market-Policy Implications for Financial Regulators*, 21 J. TECH. L. & POL'Y 55 (2016); Douglas W. Arner, Janos Barberis, & Ross P. Buckley, *The Evolution of Fintech: A New Post-Crisis Paradigm?* 47 GEO. J. INT'L L. 1271 (2016); Douglas W. Arner, Janos Barberis, & Ross P. Buckley, *FinTech, RegTech, and Reconceptualization of Financial Regulation* 37 NW. J. INT'L L. & BUS. 371 (2017); Dirk A. Zetzsche, Ross P. Buckley, Douglas W. Arner, Janos N. Barberis, *From FinTech to TechFin: The Regulatory Challenges of Data-Driven Finance*, EBI Working Paper Series No. 6 (2017); Chris Brummer & Yesha Yadav, *The Fintech Trilemma,* Vanderbilt Law Res. Paper no. 17-46 (2017), *available at* https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3054770; Tom Baker & Benedict G. C. Dellaert, *Regulating Robo Advice Across the Financial Services Industry*, 103 IOWA L. REV. (forthcoming 2018); William J. Magnuson, *Regulating Fintech*, VAND. L. REV. (forthcoming 2017); Rory Van Loo, *Making Innovation More Competitive: The Case of Fintech,* 65 UCLA L. REV (2017).

[5] *See, e.g.,* John Armour & Luca Enriques, *The Promise and Perils of Crowdfunding: Between Corporate Finance and Consumer Contracts,* ECGI Working Paper No. 366/2017 (2017), *available at* https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3035247; Jeanne Schroeder, *Bitcoin and the Uniform Commercial Code*, 24 U. MIAMI BUS. L. REV. 1 (2016);

there is a rapidly expanding body of scholarship that attempts to take a broader inventory of issues fintech raises for lawmakers and financial regulators.[6] This literature helpfully identifies certain key considerations the regulators should "keep in mind" as they address such issues in practice and discusses innovative ways for regulators to "stay on top" of technological change. Yet, it stops short of offering a coherent conceptual account of fintech as a systemic phenomenon. As the list of identified regulatory concerns and considerations grows longer and more detailed, however, the need for an overarching conceptual framework within which to analyze the role of technology in finance becomes increasingly pressing.[7]

Aiming to fill this gap in the existing literature, this Article takes a deeper and more encompassing *systemic* view of fintech, both as a financial market phenomenon and as a regulatory challenge. It takes a position that, in order to make real sense of technological changes "disrupting" today's financial markets and regulations, it is necessary to broaden the analytical and normative lens beyond the immediate economic and legal effects of specific fintech applications. At bottom, an inquiry into the nature and dynamics of the "fintech revolution" is, and should be, an integral part of the broader inquiry into the nature and dynamics of *finance itself*. The latter, in turn, is, and should be, a fundamentally normative inquiry into the social function – and, by extension, dysfunction – of modern finance. Therefore, the Article posits, the role of technology in finance cannot be properly assessed, or even understood, without explicitly addressing the underlying questions about the role of today's finance in the broader socio-economic system.

The emerging fintech narrative in its present form, however, tends to mask this underlying continuity. The newly empowered and fashionable notion of "finance as technology" is threatening to eclipse that of "finance as

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Angela Walch, *The Bitcoin Blockchain as Financial Market Infrastructure: A Consideration of Operational Risk*, 18 J. LEG. & PUB. POL'Y 837 (2015); Adam J. Levitin, *Pandora's Digital Box: The Promise and Perils of Digital Wallets*, 166 U. PENN. L. REV. (2017).

[6] *See* sources cited *supra* note 4. For analyses focusing on financial regulators' attempts to encourage technological innovation and to develop their own technological capabilities, see Hilary J. Allen, *A US Regulatory Sandbox?, available at* https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3056993; Rory Van Loo, *Rise of The Digital Regulator*, 66 DUKE L. J. 1267 (2017). A somewhat distinct thread in this literature focuses more narrowly on fintech-related changes in the familiar patterns of transactional "intermediation" in various contexts. *See* Benjamin Geva, *Disintermediating Electronic Payments: Digital Cash and Virtual Currencies,* 31 J. INT'L BANKING L. & REG. 661 (2017); Kathryn Judge, *The Future of Direct Finance: The Diverging Paths of Peer-to-Peer Lending and Kickstarter*, 50 WAKE FOREST L. REV. 603 (2015).

[7] For a recent review of the emerging economic research on fintech, see Peter Gomber, Jascha-Alexander Koch, Michael Siering, *Digital Finance and Fintech: Current Research and Future Research Directions*, J. BUS. ECON. (2017). As this review shows, there are presently significant gaps in the economic literature on the subject.

public policy." This Article seeks to reintegrate these two concepts, both as a matter of descriptive accuracy and as a normative matter. Technology enables and drives financial transactions, but so does public policy embodied in financial laws and regulations. On a micro-level, finance often appears primarily, if not purely, transactional: a matter of individualized private exchange among market actors. On a macro-level, however, modern finance is a matter not only of great public importance but also of great public involvement.[8] The rise of fintech throws into sharp relief this essential hybridity of modern finance and exposes some of the deepest normative tensions underlying it.

The Article argues that, from this systemic perspective, the fintech phenomenon has a broader significance than a "disruption" in the prevailing modes of, or institutional channels for, delivery of specific financial services. Its arrival marks a potentially decisive shift in the fundamental political arrangement underlying the operation of the modern financial system, as it currently exists in most advanced markets. Not surprisingly, that arrangement is most easily discernable in the U.S. that, for the most part of the last hundred years or so, has been the world's leader in developing not only large-scale capital markets but also the sophisticated legal and regulatory apparatus for a sustained and systematic oversight of financial markets and institutions. The U.S. system of financial sector regulation took shape during the New Deal era, as part of a concerted government response to the economic and political fallout from the stock market crash of 1929 and the Great Depression that followed it.[9] Today's elaborate scheme of U.S. financial regulation and supervision, directly or indirectly replicated around the world, continues to rest on the fundamental norms and policy principles at the core of the New Deal reforms.[10] These deep underlying norms and principles form what this Article calls the New Deal settlement in the sphere of finance.

As discussed below, the New Deal settlement reflects certain politically derived judgments about the optimal balance of private freedom and public control in the financial market.[11] Under this paradigm, private market actors

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[8] For an in-depth theoretical account of the fundamental hybridity of modern finance as a public-private enterprise, see Robert C. Hockett & Saule T. Omarova, *The Finance Franchise*, 102 CORNELL L. REV. 1143 (2017) [hereinafter, "*Finance Franchise*"].

[9] *See* Saule T. Omarova, *One Step Forward, Two Steps Back? The Institutional Structure of U.S. Financial Services Regulation After the Crisis of 2008*, in ROBIN HUI HUANG & DIRK SCHOENMAKER (EDS.), INSTITUTIONAL STRUCTURE OF FINANCIAL REGULATION: THEORIES AND INTERNATIONAL EXPERIENCES 137 (2014)) [hereinafter, "*Institutional Structure*"] (detailing the institutional legacy of the New Deal in the financial sector).

[10] *See* Saule T. Omarova, *The Dodd-Frank Act: A New Deal for A New Age?* 15 N.C. BANKING INST. 83 (2011) [hereinafter, *"A New Deal for A New Age?"*] (analyzing the key elements of the regulatory philosophy in the financial sector).

[11] For a discussion of the New Deal settlement's core features, see *infra* Part I.B.

retain control over substantive decisions on how to allocate financial capital to various productive uses – and thus the power to determine the overall volume and structure of financial claims in the system. The public, on the other hand, bears the primary responsibility for maintaining the overall stability of the financial system and enabling markets to function smoothly and efficiently. Government regulation is the indispensable mechanism through which the public manages the moral hazard built into this arrangement: in essence, regulation constrains market participants' ability to generate excessive system-wide risks in pursuit of private profits.[12]

An inherently unstable and contestable nature of this balance is the source of the fundamental tension at the core of the New Deal settlement. In an important sense, the entire history of U.S. financial markets and regulation since the New Deal era has been the history of continuous renegotiation and readjustment of this public-private boundary, driven by private market actors' continuous efforts to expand their freedom to create and trade financial claims.

To elucidate these deep-seated systemic dynamics, the Article deliberately shifts the analytical focus from primary markets, in which firms raise capital by issuing financial claims, to secondary markets in which such claims are traded. Despite legislators' and regulators' continuing preoccupation with "capital formation" in primary markets, the financial system's center of gravity has long shifted to secondary markets.[13] Secondary markets in financial assets currently dwarf primary markets in terms of size, complexity, and systemic significance.[14] Secondary markets also operate as the principal sites of relentless financial "innovation" and chronic over-generation of systemic risk.[15] The key to understanding what drives today's complex financial system, therefore, is to understand what drives the continuous growth and proliferation of secondary markets.

Operationalizing this insight, the Article identifies the core mechanisms and techniques that enable private actors to create and grow – continuously and virtually unconstrained – secondary markets for financial risk trading. It argues that the growth of financial markets is best understood by reference to two interrelated system-wide transactional practices: (1) continuous *synthesizing* of new tradable financial assets, and (2) *scaling up* the volume and velocity of trading activity in financial markets. The Article breaks down these phenomena further by showing how private market actors pursue these overarching objectives via four principal mechanisms: pooling and layering

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[12] *See id.*
[13] *See infra* Part II.A.
[14] *See infra* notes 92-93 and accompanying text.
[15] *Id.*

of claims, and acceleration and compression of trades.[16]

System-wide deployment of these transaction meta-technologies – pooling, layering, acceleration, and compression – enables the constant growth and complexification of the financial market. By the same token, it magnifies the extent and urgency of the public's obligation to accommodate privately created claims and to manage macro-financial risks. Critically, however, the public side is not always able to keep up with these increased demands by expanding its regulatory oversight capabilities. In fact, private actors' very success in synthesizing financial assets and scaling up trading activities often depends on the lack or inefficacy of regulatory controls – a familiar story aptly illustrated by financial market developments since the early 1980s and the global financial crisis these developments brought about.[17]

This Article examines the rise of fintech in the context of this decades-long process of gradual erosion of the New Deal settlement. It posits that deciphering the meaning of "fintech revolution" as a *macro*-financial, *systemic* phenomenon requires a deeper understanding of how specific fintech applications impact the public's capacity to maintain the stability of the macro-environment. Fintech may present a unique opportunity to correct the increasingly problematic imbalance between private misallocation of credit and the public's ability to modulate credit aggregates – or it may further intensify that imbalance.[18]

Reframing the inquiry along these dimensions, the Article argues that the more established fintech applications to date are already exhibiting signs of skewing the balance further in favor of private actors' unrestrained freedom to generate – and over-generate – financial risk. While it may be too early to draw definitive conclusions, the recent advances in computing power, cryptography, data analytics, and machine learning appear poised to amplify the long-lasting systemically destabilizing trends in the financial market. As shown below, new technological tools enable private market participants to engage in the continuous synthesizing of crypto-assets that are (a) untethered from, and thus unconstrained by, any productive activity in the real economy, and (b) tradable in potentially infinitely scalable virtual markets. What is commonly seen as the key micro-level advantage of fintech – its ability to eliminate transactional "frictions" and to circumvent traditional market boundaries – also operates to amplify the system's capacity to fuel financial

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[16] *See infra* Part II.B.2.

[17] *See infra* Part I.C.

[18] *See Finance Franchise, supra* note 8. For a detailed theoretical and historically-grounded post-crisis account of the importance of structural, as opposed to individual or firm-level, incentives for financial risk-taking, see Robert C. Hockett, *A Fixer-Upper for Finance*, 87 WASH. U. L. REV. 1213 (2010) [hereinafter, *Fixer-Upper*].

speculation on an unprecedented scale.[19] On a macro-level, therefore, the key risk posed by fintech lies in its – still not fully known – potential to exacerbate the financial system's dysfunctional tendency toward unsustainably self-referential growth.[20]

From this perspective, the onset of the fintech era marks a crucial political moment. Invisibly, the new technology is "disrupting" the New Deal settlement in finance. The nearly century-old arrangement that rigidly separated credit generation and allocation (an exclusively *private right*) from credit modulation and accommodation (an explicitly *public responsibility*) appears increasingly ill-suited for ensuring systemic stability in the emergent world of frictionless crypto-speculation.[21] Accordingly, in trying to make sense of specific technological advances, we must not lose sight of the ultimate systemic challenge rising in their background: the growing need to rethink the current public-private boundary in finance.[22]

The Article is organized as follows. Part I provides a brief overview of recent fintech developments and places them in the context of what I call the New Deal settlement in finance. It outlines the defining features of this political settlement and traces the process of its gradual erosion in recent decades. Delving deeper into this process, Part II advances a novel conceptual framework for understanding the fundamental dynamics of secondary markets in financial instruments. It offers a preliminary taxonomy of principal mechanisms – or system-level transaction meta-technologies – that enable private market actors to engage in continuous synthesizing of tradable assets and scaling up of trading activities. Finally, Part III examines specific fintech applications – Bitcoin, distributed ledger technology, marketplace lending, initial coin offerings (ICOs), and robo-advising – from the perspective of their potential to amplify the operation of these core financial market mechanisms. It concludes by drawing out some of the key systemic implications of these new technologies and, accordingly, redefining fintech as a public policy challenge of the highest order.

I. FINTECH AS A CHALLENGE TO THE NEW DEAL SETTLEMENT

A. Fintech: A Preliminary Overview

"Fintech" is an umbrella term that refers to a variety of digital technologies applied to the provision of financial services and, more generally, developments in the financial sector. Perhaps the most immediately recognizable symbol of the fintech era is the rise of private

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[19] For a detailed discussion, see *infra* Part III.

[20] *See infra* Part III.C.

[21] *Id.*

[22] For a comprehensive theoretical and normative account of the core public-private dynamics in finance, see *Finance Franchise, supra* note 8.

cryptocurrencies, defined generally as "any form of currency that only exists digitally, that usually has no central issuing or regulating authority but instead uses a decentralized system to record transactions and manage the issuance of new units, and that relies on cryptography to prevent counterfeiting and fraudulent transactions."[23] Bitcoin is the first cryptocurrency to date that went mainstream, albeit as an investment asset rather than a viable substitute for fiat money.[24] The Bitcoin network is built on blockchain technology, which uses a complex algorithm to allow decentralized verification and recording of each transaction in a publicly viewable distributed ledger.[25]

Importantly, the blockchain – or, more broadly, distributed ledger – technology potentially allows for a wider range of uses outside simply supporting specific cryptocurrencies. Thus, Ethereum, a blockchain platform designed to host an unlimited number of project-specific third-party applications, enables what is now known as "smart contracts" to automate the execution of a wide variety of transactions, including the ongoing performance of transacting parties' obligations.[26] Among other things, "smart contract" algorithms can automatically disburse payments or transfer title to assets, upon the verified occurrence of specified triggering events.[27] Corporate dividends, interest payments, insurance payouts, and derivatives collateral management are some of the areas in which smart contracts potentially offer the most easily discernable optimization benefits.

Smart contracts also enable so-called "initial coin offerings," or ICOs, in which various firms raise capital online by issuing digital tokens, or "coins," that carry various rights with respect to some future digital product or service the issuing firms intend to finance and develop.[28] An ICO is essentially a new form of crowdfunding that, ideally, enables tech startups to raise funds directly from their user communities.[29] Another form of digital crowdfunding

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[23] Merriam-Webster, *Cryptocurrency*, *available at* https://www.merriam-webster.com/dictionary/cryptocurrency. It is notoriously difficult to draw precise definitional boundaries among different categories of crypto-currencies, crypto-assets, tokens, coins, etc. *See* Hinge, *infra* note 158 (highlighting definitional difficulties).

[24] For a detailed discussion of Bitcoin, see *infra* Part III.A.1.

[25] *See id.*

[26] The term "smart contract" has no clear and uniformly accepted definition. Depending on context, it may refer either to a computer code stored, verified, and executed on a blockchain, or to a specific application of that code as an effective substitute for a legal contract. *See* Josh Start, *Making Sense of Blockchain Smart Contracts*, COINDESK.COM (June 4, 2016), *available at* https://www.coindesk.com/making-sense-smart-contracts/.

[27] *Id.*

[28] Many ICOs are functionally equivalent to securities offerings without the mandatory disclosure and other investor-protection features required under U.S. securities laws. Accordingly, the applicability of federal securities laws and regulations to ICOs has been one of the hottest legal issues in the fintech space since 2016. *See infra* Part III.B.1.

[29] *See infra* note 208 and accompanying text.

is peer-to-peer, or marketplace, lending.[30] The original idea behind today's marketplace lending platforms – LendingClub, SoFi, and others – was to bring together individual and small-business borrowers and lenders, in order to create a truly decentralized and direct credit market.[31] Not surprisingly, marketplace lending is often portrayed as a tool of "democratizing" finance by eliminating the need for banks and other financial intermediaries and by expanding access to credit.

The same "democratizing" impulse is commonly ascribed to the increasingly popular practice of robo-advising.[32] Robo-advising denotes providing online financial advice with minimal or no human participation, using algorithmic asset allocation and trading models.[33] Financial institutions' ability to replace expensive human advisors with cost-effective computer codes is seen as the tool of broadening access to previously exclusive wealth management services: everyone can invest in capital markets with robo-advisors' help.[34]

As this brief overview shows, all of the currently existing fintech applications – cryptocurrencies, blockchain technologies, smart contracts, digital crowdfunding, and robo-advising – explicitly promise to "revolutionize" provision of financial services. New digital technology unlocks new possibilities for a fully frictionless transacting in a completely virtualized world, without the costs and delays associated with the use of professional financial intermediaries operating under multiple jurisdictions' rules. By making financial transactions infinitely faster, easier, and cheaper, fintech also offers new opportunities for financial inclusion and expanded access to financial services. In this sense, new technology seems poised to "revolutionize" finance not only as a matter of *transactional* efficiency but also as a matter of *political* economy.

Yet, built into this narrative is a crucial presumption – sometimes explicit but often implicit – that the unfolding fintech "revolution" is a politically and normatively neutral phenomenon, a "win-win" situation not involving hard public policy choices and trade-offs. The prevailing attitude is to treat most of the problems commonly discussed in connection with fintech – cybersecurity concerns, network governance lapses, legal uncertainty, or

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[30] Marketplace lending is defined broadly as "any practice of pairing borrowers and lenders through the use of an online platform without a traditional bank intermediary." FDIC, *Marketplace Lending*, SUP. INSIGHTS (Winter 2015), *available at* https://www.fdic.gov/regulations/examinations/supervisory/insights/siwin15/si_winter2015-article02.pdf.

[31] For more on the evolution of marketplace lending, *see infra* notes 193-205 and accompanying text.

[32] For a discussion of robo-advising, *see infra* Part III.B.2.

[33] *See infra* note 221 and accompanying text,

[34] For a critical examination of this claim, see *infra* Part III.B.2.

regulatory gaps – much like natural "growing pains" accompanying society's triumphant march to a better future, benign temporary glitches ultimately resolvable through better coding or faster rule-writing.

Finance, however, is not politically or normatively neutral: money and power are two sides of the same coin. Finance is, and always will be, a matter of utmost and direct public policy significance. Financial arrangements are fundamentally shaped by, and in turn shape, broader economic and political structures and choices. "Virtualizing" financial transactions does not change this basic fact, only obscures it from view. Understanding the full significance of the fintech phenomenon, therefore, requires widening the lens beyond the immediate *micro*-transactional effects of new technology to encompass the essential dynamics of the financial system as a whole.

To this end, it is critical to start by reminding ourselves of the core political arrangement that determines the principal structure and operation of today's financial system. In the U.S. context, it may be referred to as the New Deal settlement in finance.

B. The New Deal Settlement in the Financial Sector

The New Deal era was the pivotal moment in the emergence and development of the entire system of modern U.S. financial sector regulation and supervision.[35] It was during this fateful period that Congress created a comprehensive system of disclosure-based federal securities regulation and a federal deposit insurance scheme, institutionalized the separation between banks and securities firms, and established numerous other legal and regulatory principles that continue to shape the operation of the U.S. financial system today.[36] The purpose of this Article, however, is not to recount the specific financial sector reforms of that turbulent era but to distill the overarching principles that informed, guided, and found expression in the multitude of such reforms. This is what I call the New Deal settlement in finance.[37]

The New Deal settlement reflects certain politically derived judgments about the optimal balance of private freedom and public control in the financial market. Several key features of the New Deal political settlement defined the substantive contours of the U.S. regulatory philosophy in the financial sector. At the highest level of generalization, the New Deal reforms institutionalized the broad concept of public interest – including public

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[35] *See* MICHAEL S. BARR, HOWELL E. JACKSON, MARGARET E. TAHYAR, FINANCIAL REGULATION: LAW AND POLICY 47-52 (2016).

[36] *See id.; Institutional Structure, supra* note 9.

[37] It is worth reiterating here that the Article concerns itself with the New Deal settlement only in the context of financial markets and regulation and not as a broader phenomenon in American political history and constitutional development.

representation and public enforcement – as a legitimate factor in the daily operation of financial markets. The new regulatory philosophy explicitly acknowledged the overarching need (i) to protect the public from abusive market practices (as opposed to letting all market participants fend for themselves), (ii) to ensure that private financial markets should strive to serve the public's needs (as opposed to private market participants' needs alone), and (iii) to take the lead role in maintaining the integrity and healthy functioning of financial markets (as opposed to letting markets self-regulate). In pushing the public-private line in finance in this thereto unprecedented way, the New Deal settlement was a political "disruption" of enormous significance.

Yet, it didn't push the line too far into the "public control" territory. The New Deal regulatory reforms left private actors firmly in control over substantive allocative decisions in financial markets, limiting the area of direct public control mainly to procedural and infrastructural support of the financial market's operations. With limited exceptions, the government's principal role was defined primarily as that of an outside regulator, the source and enforcer of the basic rules of fair play in financial markets.[38] It was envisioned as a largely exogenous force with a limited mandate to influence private market actors' decisions on channeling credit and investment flows to specific uses.[39] This principal delineation of public and private roles was reflected in and operationalized through such important regulatory choices as, for example, a deliberate rejection of merit-based financial product approval and a systematic preference for disclosure-based schemes.[40] To put it simply, as long as the risks associated with a particular financial product were adequately disclosed, the government had little power to prevent the risky product from entering the market.[41]

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[38] Of course, the New Deal era gave rise to many forms of direct government action inside, rather than merely outside, the ostensibly private financial markets. Perhaps the best example in this respect was the Reconstruction Finance Corporation (RFC), the once-powerful but now nearly-forgotten federal instrumentality that played a critical role in maintaining the functioning of the nation's financial markets during the Great Depression. The extraordinary nature of this exception, however, only underscores the general rule. For an in-depth analysis of the RFC's role and institutional legacy, see Robert C. Hockett & Saule T. Omarova, *Private Wealth and Public Goods: A Case for a National Investment Authority*, 43 J. CORP. L. 437 (2018) [hereinafter, *National Investment Authority*].

[39] *See* Robert C. Hockett & Saule T. Omarova, *Public Actors in Private Markets: Toward a Developmental Finance State*, 93 WASH. U. L. REV. 103, 113 (2015) [hereinafter, *Public Actors*]; Robert C. Hockett & Saule T. Omarova, *"Private" Means to "Public" Ends: Governments as Market Actors*, 15 THEORETICAL INQUIRIES IN L. 53, 54-55 (2014)

[40] For in-depth discussion of financial product approval as a form of macroprudential regulation, see Saule T. Omarova, *License to Deal: Mandatory Approval of Complex Financial Products*, 90 WASH. U. L. REV. 63 (2012).

[41] *See A New Deal for A New Age? supra* note 10, at 95-97.

As a result of this fundamental line-drawing between the public and private roles in finance, the New Deal regulatory paradigm had an inherently *micro-*, rather than *macro-*, focus. Because private market participants, with their informational advantages and individualized economic incentives, were presumed to be superior decision-makers "on the ground," their judgments on risks and returns of particular financial transactions and products were not to be substituted by those of the regulators. To the extent regulators' judgments are, and expected to be, driven by the generalized public interest considerations rather than by any specific transactional "efficiencies," however, this policy choice set the context for a systematic prioritizing of micro-transactional factors over macro-systemic ones, and of individual action over collective agency. It is implicitly assumed that, if the former is taken care of, the latter will necessarily follow.[42]

Accordingly, the New Deal paradigm focused expressly on regulating individual financial firms, licensed and supervised under clearly identified regimes, based on the types of products they offered and activities they engaged in.[43] The regulatory boundaries among financial institutions (banks, securities broker-dealers, insurers, etc.) and financial products (securities, banking products, insurance, commodity futures, etc.) were drawn in clear categorical terms.[44] The silo-based regulatory architecture, in which separate administrative agencies oversee formally separate financial sub-sectors under different statutory schemes, was an institutional embodiment of this approach.[45]

At the same time, the New Deal reforms have also institutionalized the public's role as an explicit market backstop "of last resort." Perhaps the most readily recognizable example of this public safety net is the comprehensive federal deposit insurance scheme administered by the Federal Deposit

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[42] This is a basic logical error known as the fallacy of composition. For a post-crisis theoretical and historically-grounded account of the importance of macro-, as opposed to micro-, dynamics in financial markets, *see generally* Robert Hockett, *A Fixer-Upper for Finance,* 87 WASH. U. L. REV. 1213 (2010); Robert Hockett, *Bretton Woods 1.0: A Constructive Retrieval for Sustainable Finance*, 16 N.Y.U. J. LEG. & PUB. POL'Y 401 (2013).

[43] *See Institutional Structure, supra* note 9. The canonical example of this regulatory philosophy was the Glass-Steagall Act, which established a system of strict separation between commercial banking and investment banking. Banking Act of 1933, Pub. L. No. 73-66, 48 Stat. 162 (1933).

[44] *See Institutional Structure, supra* note 9; GOVERNMENT ACCOUNTABILITY OFFICE, GAO-05-61, FINANCIAL REGULATION: INDUSTRY CHANGES PROMPT NEED TO RECONSIDER U.S. REGULATORY STRUCTURE (OCT. 2004); GROUP OF THIRTY, THE STRUCTURE OF FINANCIAL SUPERVISION: APPROACHES AND CHALLENGES IN A GLOBAL MARKETPLACE (2008); GOVERNMENT ACCOUNTABILITY OFFICE, GAO-13-180, FINANCIAL REGULATORY REFORM: FINANCIAL CRISIS LOSSES AND POTENTIAL IMPACTS OF THE DODD-FRANK ACT (JAN. 2013).

[45] *See id.*

Insurance Corporation (FDIC).[46] Another important example of the public's market-preserving role is the central bank's expanded emergency authority to prop up not only banks but also broader financial markets.[47] These political choices functionally transformed the government from a (presumably) exogenous rule-maker and enforcer into a direct financial market participant.[48] Furthermore, these choices explicitly put the government – the quintessential political actor, the ultimate collective agency – in charge of preserving the stable functioning of financial markets.[49]

In consequence, there was – and still is – deep tension at the heart of the New Deal regulatory paradigm: it vests substantive control over the allocation of risks and returns in financial markets in private actors operating on a micro-level, and assigns the responsibility for ensuring financial stability to public actors operating on a macro-level. Government regulation was designed to counteract and control the obvious moral hazard built into this system. In this sense, effective public oversight of financial markets and institutions was – and still is – critical to maintaining the New Deal political settlement. It is through close regulation and supervision of financial markets and institutions by specialized government agencies that the sovereign public was expected to keep profit-seeking private market participants from abusing their micro-level freedom to generate macro-level risks.

The fundamental problem with this approach is that, in practice, allocation and modulation of credit and money in the financial system are intimately connected: systemically destabilizing asset price booms are the direct effect of socially suboptimal allocative decisions by individual market participants.[50] The superficially neat functional separation of public and private, therefore, is inherently unstable. Beneath an intuitively clear division of functions, there are complex dynamics, conflicting interests, and ambiguous boundaries.

In effect, it may be said that the entire history of U.S. financial markets and regulation since the New Deal era has been the history of continuous

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[46] *See, generally,* 12 U.S.C. § 1811 et seq. The U.S. was the first jurisdiction to establish such a comprehensive deposit insurance regime.

[47] *See, e.g.,* Federal Reserve Act, Sec. 13(3), 12 U.S.C. § 344 (authorizing the Federal Reserve to provide emergency liquidity support to financial markets, subject to specified conditions). *See also,* Fed. Res. Bank of Minneapolis, *Lender of More than 'Last Resort'",* REGIONS (2002), *available at* https://www.minneapolisfed.org/publications/the-region/lender-of-more-than-last-resort.

[48] *See Public Actors, supra* note 39 (discussing the taxonomy of roles governments perform in their capacities as market actors).

[49] This essential hybridity is especially visible in the structure and operation of the modern banking system, which is best understood as a public-private partnership – or a franchise arrangement. For an in-depth analysis of how this arrangement works in practice, see *Finance Franchise, supra* note 8.

[50] *See id.*

renegotiation and readjustment of this delicate balance. Financial institutions and their clients, searching for higher profits and competitive edge, keep pushing the line toward greater private freedom to transact, to "complete" the perennially "incomplete" markets by creating and trading in new financial instruments.[51] They often do so by exploiting gaps and ambiguities in the existing laws and regulations and by deliberately structuring transactions to escape the application of unfriendly legal rules, a technique widely known under the label of "regulatory arbitrage."[52]

This constant injection of privately created risks into the financial system creates quantitatively and qualitatively new challenges from the viewpoint of systemic stability, predominantly the public's responsibility. Inexorably, the public is in a reactive posture: once capital allocation decisions are made by private actors operating on a micro-level, the macro-level modulation comes into play as a principally *ex post* response.[53] This fundamental logic both implicitly shapes, and is reflected in, the widely-shared assumptions about the basic dynamics of finance: we take for granted that markets "evolve" and "innovate" (the primary, active, positive value-creation side of the public-private equation), while regulators "respond" and "react" (the secondary, passive, negative harm-limitation side). These assumptions define both the policy and the discursive agenda: how financial regulators do, or should, *respond* to privately-driven financial innovation – and *adjust* regulatory tools and objectives to the new context – is one of the perennial questions that

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[51] A "complete system of markets" is one in which there is a market for every good. *See* Mark D. Flood, *An Introduction to Complete Markets*, FED. RES. BANK OF ST. LOUIS REVIEW 32, 32 (March-April 1991), *available at* https://files.stlouisfed.org/files/htdocs/publications/review/91/03/Markets_Mar_Apr1991.pdf. For the original theoretical account, see Kenneth J. Arrow & Gerad Debreu, *Existence of an Equilibrium for a Competitive Economy*, ECONOMETRICA 265 (1954).

[52] The literature on the nature and role of regulatory arbitrage in the financial services sector is too voluminous to cite here. The rise of today's derivatives and repo markets, and the growth of money market mutual funds, for example, were direct products of regulatory arbitrage and financial firms' desire to circumvent specific regulatory constraints on their activities. For a recent book-length account of these dynamics, see ERIK GERDING, LAW, BUBBLES, AND FINANCIAL REGULATION (2013).

[53] This is, of course, a generalization. The point here is not to say that every specific systemic stability enhancing measure is an *ex post* response to a specific transaction. Agency rules are prospective in their application. Banking regulation and supervision, in particular, involve regulatory agencies in private banks' balance-sheet management with the view toward preventing them from failure. Nevertheless, even in that context, the principal posture of the public oversight is not to substitute its own, public-interest based, substantive judgment for that of the bank's management in every instance when the bank is extending a loan or entering into a derivative contract. These types of direct credit-money allocation decisions are left to private bank managers. Regulatory limitations on individual banks' leverage, risk concentration, or liquidity position are designed to shape these choices only indirectly and, in this sense, are fundamentally reactive.

preoccupy scholars of financial markets and institutions.[54] What goes unnoticed, however, is that this seemingly objective description of "how the world works" is itself, to a great extent, a product of a normative choice as to the relative competencies of private and public actors in financial markets.[55]

C. Pre-Fintech Erosion of the New Deal Settlement: A Brief Recap

Technology plays a critical role in this process of continuous renegotiation and resetting of the public-private balance in finance.

It is well known, for example, that advances in computing and communications technology since the 1980s enabled the rapid growth of increasingly diverse and complex derivatives markets. Derivatives are bilateral contracts whose value is "derived" from that of some other underlying, or reference, asset.[56] Though the commonly encountered derivatives are linked to commodities, securities, interest or exchange rates, pretty much any quantifiable – and, importantly, fluctuating – value can serve as a reference asset.[57] Derivatives enable financial market participants both to hedge their existing or anticipated risks and to make essentially speculative bets. While simple derivatives appear to have been in use even in ancient times, it was only in the 1980s that financial firms were able to use their newly acquired technological capabilities to scale up derivatives trades and turn them into one of the fastest growing segments of global financial markets.[58]

A similar story unfolded in the market for securitized products.

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[54] For a recent book-length treatment of this subject, see CRISTIE FORD, INNOVATION AND THE STATE: FINANCE, REGULATION, AND JUSTICE (2017).

[55] For an in-depth discussion and critique of this traditional delineation of roles in finance, see *Public Actors*, *supra* note 39; *Finance Franchise, supra* note 8; *National Investment Authority*, *supra* note 38; Saule T. Omarova, *Bank Governance and Systemic Stability: The "Golden Share" Approach*, 68 ALA. L. REV. 1029 (2017) [hereinafter, *Golden Share*].

[56] *See generally* JOHN C. HULL, OPTIONS, FUTURES, AND OTHER DERIVATIVES (9th ed. 2014); R. STAFFORD JOHNSON, INTRODUCTION TO DERIVATIVES: OPTIONS, FUTURES, AND SWAPS 1–10 (2009).

[57] As a general rule, the more volatile the underlying asset's value, the more lucrative the related derivatives contract. Accordingly, derivatives contracts may be linked to things like inflation rates, natural catastrophes, or even financial market volatility itself.

[58] There is a voluminous body of scholarly and popular literature detailing the history, economic functions, legal status, institutional structure, and financial stability implications of derivatives markets instruments. For a small sample, see Mark J. Roe, *The Derivatives Market's Payment Priorities as Financial Crisis Accelerator*, 63 STAN. L. REV. 539 (2011); Lynn A. Stout, *Derivatives and the Legal Origin of the 2008 Credit Crisis*, 1 HARV. BUS. L. REV. 1 (2011); Dan Awrey, *The Mechanisms of Derivatives Market Efficiency*, 91 N.Y.U. L. REV. 1104 (2016); Saule T. Omarova, *The Quiet Metamorphosis: How Derivatives Changed the "Business of Banking,"* 63 MIAMI L. REV. 1041 (2009) [hereinafter, *The Quiet Metamorphosis*] .

"Securitization" generally refers to the practice of pooling revenue-generating assets, such as mortgage or credit card loans, and using the pooled assets as collateral backing the issuance of debt securities to investors.[59] While not a recent invention, securitization became a major market-driving phenomenon in the 1980s, in large part because the advances in technology enabled originators and securitizers of loans to create much larger and more complex pools of securitizable assets and to manage the risk-return structure of debt securities backed by such assets. By the early 2000s, the market for these "structured" asset-backed products – including highly complex multi-layered schemes such as "collateralized debt obligations" (CDOs) – grew to unprecedented levels.[60] Moreover, the growth of securitization was intimately connected to the growth of derivatives markets, mainly through the use of credit derivatives to structure asset-backed claims.[61]

Both derivatives and structured asset-backed products are heavily dependent on the capacity of their creators to run increasingly complicated computer models.[62] The principal economic function of these and many other complex financial products is to allow for isolating, pricing, and trading specific risk factors embedded in, or constituting, the same otherwise indivisible asset. This process of synthetically constructing tradable financial claims out of deconstructed traditional assets – shares of stock, loans, or commodities – requires sophisticated analytical tools and computing power. As a result, today's highly structured financial products – marketed and used as both risk-management and risk-taking tools – are also, to a great extent, *tech* products.[63]

Importantly, however, the technology that enabled derivatives and other structured finance transactions was proprietary in character, developed and owned by financial institutions dealing and trading in these markets. That rendered the tech component of complex financial products less visible and more subsumed in their overall economic functions and effects. The latter,

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[59] *See* Kenneth C. Kettering, *Securitization and Its Discontents: The Dynamics of Financial Product Development*, 29 CARDOZO L. REV. 1553, 1556 (2009); Jonathan C. Lipson, *Re: Defining Securitization*, 85 S. CAL. L. REV. 1229, 1257 (2012).

[60] *See generally*, FIN. CRISIS INQUIRY COMM'N, THE FINANCIAL CRISIS INQUIRY REPORT: FINAL REPORT OF THE NATIONAL COMMISSION ON THE CAUSES OF FINANCIAL AND ECONOMIC CRISIS IN THE UNITED STATES (2011), https://www.gpo.gov/fdsys/pkg/GPO-FCIC.pdf; S. PERMANENT SUBCOMM. ON INVESTIGATIONS, 112TH CONG., WALL STREET AND THE FINANCIAL CRISIS: ANATOMY OF A FINANCIAL COLLAPSE (2011), http://hsgac.senate.gov/public/_files/Financial_Crisis/FinancialCrisisReport.pdf.

[61] *See id.*

[62] *See* Erik F. Gerding, *Code, Crash, and Open Source: The Outsourcing of Financial Regulation to Risk Models and the Global Financial Crisis*, 84 WASH. L. REV. 127 (2009).

[63] Such familiar terns as terms as "financial engineering," "quants," "rocket scientists," and "legal technology" may, on some level, reflect an intuitive recognition of this underlying connection.

of course, were often inseparable from the legal or regulatory functions and effects. Complex financial products are economically attractive not only because they allow for a more fine-tuned, bespoke tailoring of risks and returns of financial investments but also because they often lower the costs of such investments by circumventing specific laws and regulations. Accordingly, regulatory arbitrage is a strong driver of "innovation" in financial markets.[64] Much of such innovation is, in fact, little more than a new way of avoiding regulatory limitations and compliance costs.[65] Deregulatory policy choices, both formal and informal, further magnify and support these strategic shifts of financial activities from the traditionally "well-lit" regulated areas to unregulated "shadows" of the same economic markets.[66]

This is in essence the familiar story of the emergence and growth of the controversial "shadow banking" sector.[67] The term "shadow banking" does not have a firmly defined meaning and refers generally to a variety of financial markets and activities that mimic the economic substance of bank-like credit-money creation without being subject to the same kind of regulatory oversight.[68] Both derivatives and securitization markets are routinely cited as key examples of shadow banking in action: in both of these

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[64] *See supra* note 52 and accompanying text.

[65] *See* FORD, *supra* note 54; Dan Awrey, *Complexity, Innovation and the Regulation of Modern Financial Markets*, 2 HARV. BUS. L. REV. 235 (2012) (discussing supply-side incentives for financial institutions to engage in socially suboptimal "innovation" as a means of generating short-term monopoly-like rents).

[66] For in-depth analyses of the hidden deregulation dynamics, see *The Quiet Metamorphosis*, *supra* note 58 (detailing how the national bank regulator, Office of the Comptroller of the Currency, used informal decision-making tools to expand deposit-taking institutions' powers to trade and deal in derivatives instruments); Saule T. Omarova, *From Gramm-Leach-Bliley to Dodd-Frank: the Unfulfilled Promise of Section 23A of the Federal Reserve Act*, 89 N. C. L. Rev.1683 (2011) (detailing how the Federal Reserve used its informal administrative powers to loosen important statutory restrictions on banks' transactions with affiliated entities). For a broader account of the deregulatory dynamics in financial bubble-bust cycles, see GERDING, *supra* note 52.

[67] There is a huge literature on shadow banking, especially in the post-2008 era when the term became synonymous with excessive systemic risk creation. For a small sample of this literature, see, e.g., Tobias Adrian & Hyun Song Shin, *The Shadow Banking System: Implications for Financial Regulation,* Fed. Res. Bank of NY Staff Report No. 382 (July 2009); Tobias Adrian, Adam B. Ashcraft, Nicola Cetorelli, Shadow Bank Monitoring, Fed. Res. Bank of NY Staff Report No. 638 (Sept. 2013); Gary Gorton & Andrew Metrick, *Regulating the Shadow Banking System*, Brookings Paper on Econ. Activity (2011); GERDING, *supra* note 52, at 395-470; Morgan Ricks, *Money and (Shadow) Banking: A Thought Experiment*, 31 REV. OF BANKING & FIN. L. 731 (2011-12).

[68] The term was coined by Paul McCulley. Paul McCulley, *Teton Reflections*, Global Central Bank Focus (PIMCO) (Sept. 1, 2007) at 2, *available at* http://easysite.commonwealth.com/EasySites/EasySite_Z3263Y/_uploads/Teton%20Reflections.pdf. *See also,* Bryan Noeth & Rajdeep Sengupta, *Is Shadow Banking Really Banking?* THE REGIONAL ECONOMIST, Fed. Res. Bank of St. Louis (October 2011), at 8-13.

markets, various regulated and unregulated financial institutions continuously generated ultimately unsustainable levels of leverage and risk.[69] This excessive risk-creation was at the root of the global financial crisis that began in 2008, when the elaborate system of complex structured products and derivatives sitting on top of risky subprime mortgages collapsed with a frightening speed.

This story is, of course, well known and widely written about. The interplay of "financial innovation" (i.e., technologically-enabled large-scale trading in derivatives and other structured financial products) with pervasive regulatory arbitrage (i.e., using transactional techniques to defy structural boundaries) and gradual deregulation (i.e., formally eliminating or informally loosening risk-limiting rules and conditions) eventually led to the world's worst systemic financial crisis in eighty years, followed by a prolonged global economic recession.[70]

A brief recap of this narrative, however, helps to highlight the more fundamental dynamics manifested in the rise of shadow banking: the gradual erosion of the New Deal settlement, as the contested public-private balance shifted toward an increasingly greater private freedom to make allocative decisions determining the types and levels of risk in the financial system, without the proportionately necessary increase in the public's ability to manage credit-money aggregates. Moreover, while the sphere of public control over financial risk-generation diminished, the scope and scale of public *accommodation* of privately created liabilities in financial markets – both old and new, well-lit and pitch-dark – dramatically increased over the same period.[71] The events of 2008-2009 sharply exposed the practical effects of this fundamental imbalance: privately created allocative distortions in financial markets led to unsustainable accumulations of risk and leverage in the system, and the public had to "clean up" the resulting mess. In this sense, the popular reference to "privatization of gains and socialization of losses"[72] aptly captures the dynamics of erosion of the New Deal settlement in the financial sector.

The Dodd-Frank Act, the most far-reaching legislative reform in the U.S. financial sector since the New Deal, was an effort to curb some of the most

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[69] *See* sources cited *supra* note 67. For a more targeted discussion of the specific mechanisms through which shadow banking amplified credit-money aggregates, see *Finance Franchise, supra* note 8 at 1175-1192.

[70] *See* sources cited *supra* note 67. GERDING, *supra* note 52, provides a comprehensive analysis of these trends in the pre-crisis decades.

[71] For a detailed analysis of this inevitable expansion of public accommodation, see *Finance Franchise, supra* note 8 at 1175-1192.

[72] *See, e.g.*, Joseph Stiglitz, *U.S. Does Not Have Capitalism Now*, CNBC.COM (19 Jan. 2010), *available at* https://www.cnbc.com/id/34921639.

visible manifestations of this imbalance.[73] The Act explicitly sought to reinsert public agency and public interest in finance, among other things, by articulating the overarching policy goal of protecting systemic financial stability and by institutionalizing system-wide oversight of the financial sector.[74] Yet, despite these important measures, the Dodd-Frank Act did not alter the substantive basis of the New Deal settlement, discussed above.[75] Thus, the old silo-based structure of the financial sector oversight remains almost entirely intact.[76] The new macroprudential regulatory regime essentially utilizes scaled up microprudential tools.[77] And, to the extent Dodd-Frank seeks to restrain potential risks posed by derivatives and other structured products, it does so only indirectly, through demanding greater disclosure, encouraging standardization and centralized clearing, and incentivizing more prudent risk underwriting by private parties.[78]

More generally, under the Dodd-Frank Act, the public still does not have any direct involvement in or control over allocation of financial capital, a traditional sphere of private dominance. In fact, by reconfirming this pre-crisis understanding of the relative competencies of private and public actors in financial markets, the Act further exacerbated the deep-seated tension within the New Deal paradigm.

D. Fintech and the New Deal Settlement: Reframing the Inquiry

It is in this context that the fintech "revolution" began to change, or "disrupt," the way financial transactions are conducted and financial services are delivered.[79] Its game-changing potential, however, extends beyond the pure transactional aspects of finance. This Article argues that fintech is emerging as a powerful new tool for resetting the current public-private balance in finance. Does it offer a unique opportunity to correct the structurally destabilizing imbalance between private generation of financial risk, on the one hand, and public accommodation of such privately-generated risk, on the other? Or will it operate to intensify this imbalance? If it is the latter, does that mean that fintech is going to be the proverbial last nail in the

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[73] Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010, Pub. L. 111-203, H.R. 4173 (signed into law July 21, 2010).

[74] *See* DAVID SKEEL, THE NEW FINANCIAL DEAL: UNDERSTANDING THE DODD-FRANK ACT AND ITS (UNINTENDED) CONSEQUENCES (2010); *A New Deal for A New Age? supra* note 10.

[75] *See supra* Part I.B.

[76] *See Institutional Structure, supra* note 9.

[77] *See* Robert Hockett, *The Macroprudential Turn: From Institutional 'Safety and Soundness' to Systematic 'Financial Stability' in Financial Supervision,* 9 VA. L. & BUS. REV. 201 (2015).

[78] *See, A New Deal for A New Age? supra* note 10, at 96-97; Awrey, *Mechanisms, supra* note 58.

[79] *See supra* Part I.A.

coffin of the New Deal settlement in finance?

These questions help to reframe the key inquiry into the nature and systemic impact of fintech. Ultimately, understanding fintech as a *systemic* phenomenon – as opposed to a mere collection of discrete finance-related applications of digital technology – requires analyzing whether, and how, specific fintech applications affect the public's capacity to maintain the stability of the macro-environment. This reframing allows to overcome the current fragmentation of the fintech debate by redirecting it away from the familiar but ultimately unproductive themes.[80] It also enables us to situate fintech in the broader analytical and normative context as an integral part of, or the latest phase in, the decades-long process of gradual renegotiation of the New Deal settlement in finance.

The fundamental continuity in this process is hard to miss. Despite its "disruptive" appearance, today's digital technology largely facilitates and amplifies certain long-standing trends in modern finance. In this sense, it is a continuation of the core pre-fintech dynamics in financial markets, whose cumulative effect to date has been the gradual "unsettling" of the New Deal settlement. At the same time, however, qualitatively new technological tools can elevate these built-in tensions to a qualitatively new level, potentially demanding a qualitatively new political settlement.

This means that fintech is properly conceptualized not so much as "revolutionizing" finance as providing new channels for the operation of the fundamental financial market dynamics predating it. From this perspective, it is important to resist the obvious temptation to focus on superficially novel, micro-transactional aspects of fintech. In the final analysis, the systemic significance of the unfolding fitech revolution is in its – not yet fully known – potential to redefine the basic patterns of interaction between the private and the public sides of modern finance.

Accordingly, the first step toward understanding fintech as a *systemic* rather than transactional, or *micro-level,* phenomenon is to re-examine from the new vantage point the underlying drivers of the changing public-private balance in finance. The project of decoding the fintech revolution, thus, begins with reassessing what we already know about the functioning, and *mal*-functioning, of financial markets and institutions, in light of what we are learning about new finance-related technologies.

So, what exactly do we know about the functional dynamics of finance?

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[80] One example of such a familiar theme is so-called "disintermediation" of incumbent financial institutions by fintech entrants. While these types of shift in the structure of specific market segments undeniably raise important regulatory issues, conceptualizing the broader fintech dynamics in terms of "disintermediation" is needlessly reductionist and unhelpful.

II. The Logic of Financial Innovation and Erosion of the New Deal

A. Focusing the Inquiry: Secondary Markets in Financial Instruments

As discussed above, one of the key features of the New Deal settlement in finance was that it left the critical task of credit- or capital-allocation to private market actors.[81] This is true despite the fact that federal laws and regulations impose limits on the ability of the least sophisticated, and therefore most vulnerable, financial market participants to invest in certain high-risk financial instruments.[82] These investor-protection measures operate primarily to draw the intra-sectoral lines separating more strictly regulated retail markets from institutional, or wholesale, markets subject to much lighter oversight. But they do not – nor were they ever intended to – put the regulators in charge of making specific investment choices on behalf of retail market participants. In retail as well as wholesale financial markets, private investors have the ultimate power to decide which financial instruments to buy – or which risks to take on – and at what price.

Private actors also decide which financial instruments to offer for sale to both retail and institutional investors. Companies issue securities and take out loans, banks offer deposit accounts, insurers sell insurance policies, asset managers set up funds, investment banks create structured products, and derivatives dealers stand ready to take the other side of swaps. The government does not control these decisions, as long as the relevant private parties make required disclosures and otherwise conduct their businesses in accordance with the applicable rules. The U.S. has no system of substantive risk assessment and regulatory pre-approval of individual financial products.[83]

Instead, under the terms of the New Deal political bargain, the government's principal role is to provide macro-stability, not only by regulating but also by directly backing private financial markets.[84] This public backup should not be confused with, or reduced to, what is simply its most visible and concrete manifestation: a government bailout of private firms. As argued elsewhere, public accommodation of privately created risks and liabilities is the defining dynamic in a modern financial system, one that

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[81] *See supra* notes 38-41 and accompanying text.

[82] For example, under the U.S. regime of securities regulation, retail investors are disallowed to invest in privately placed securities pursuant to the SEC Rule 144A, which limits permissible purchasers to institutional investors. *See* 17 CFR §240.144A. Similarly, retail investors cannot invest directly in hedge funds, private equity funds, or other funds exempt from registration and regulation as "investment companies" under the Investment Company Act of 1940. *See* 15 USC §80a-3(c)(7).

[83] *See supra* note 40 and accompanying text.

[84] *See supra* notes 46-49 and accompanying text.

can be traced throughout all of that system's interconnected layers.[85] Public accommodation is what ultimately enables financial flows on the systemic level and underwrites the growth of putatively private capital markets.[86]

Inevitably, however, public accommodation also creates powerful structural incentives for over-generation of financial risks by rent-seeking private parties.[87] It incentivizes the creation and proliferation of financial products – and the related growth of secondary markets in which such financial products are traded. This built-in incentive for constant reproduction and growth of secondary markets is a fundamental, and fundamentally underappreciated, driver of what is routinely understood as financial innovation.

Standard accounts of finance use primary markets as the archetypal setting in which "financial intermediation" takes place: the savers of money extend loans or invest in the equity of the users of funds, with the mediating help of a professional financial intermediary.[88] The intermediary – a bank, a securities dealer, or an investment fund – is said to "transform" all or some of the key risk attributes embedded in the transaction. This is what is typically described as maturity, liquidity, or credit risk transformation: a set of functions typically performed by banks, the quintessential "intermediaries," and replicated in part by non-bank financial institutions.[89]

This narrative, which remains the dominant intellectual framework for analyzing the financial system dynamics, is fundamentally misleading.[90] Among other things, it masks the independent significance, and indeed *de*

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[85] It is this public accommodation – often unseen or taken for granted – that fundamentally enables and underwrites the financial flows in the system: from the banking sector, through capital markets, to the outer edges of the constantly evolving "shadow banking." *See Finance Franchise, supra* note 8.

[86] *See id.*

[87] *See id.*

[88] This is, literally, a textbook understanding of "financial intermediation." *See* ZVI BODIE & ROBERT C. MERTON, FINANCE 22–23 (2000); KENT MATHEWS & JOHN THOMPSON, THE ECONOMICS OF BANKING 33 (2005); BARBARA CASU ET AL., INTRODUCTION TO BANKING 18 (2006); STUART I. GREENBAUM & ANJAN V. THAKOR, CONTEMPORARY FINANCIAL INTERMEDIATION 55–58 (2007); STEPHEN G. CECHETTI & KERMIT SCHOENHOLTZ, MONEY, BANKING, AND FINANCIAL MARKETS 39 (3rd ed., 2008); RICHARD SCOTT CARNELL ET AL., THE LAW OF FINANCIAL INSTITUTIONS 37 (5th ed., 2013).

[89] References to credit, maturity, and liquidity transformation as the core functional features of banking and, by extension, "shadow banking" are too ubiquitous to cite. What is interesting for the purposes of the present discussion is that this conceptual apparatus presupposes a specific purpose behind the intermediated transaction: moving capital from the investor-saver's hands into the hands of a productive user-entrepreneur. While not stated explicitly, an implicit presumption here is that the "user" is seeking funds for some legitimate economic use and not for a speculative financial reinvestment.

[90] For a detailed explanation of why the "financial intermediation" orthodoxy is fundamentally misleading, see *Finance Franchise, supra* note 8.

facto primacy, of secondary-market dynamics in the modern financial system. In primary market transactions, the entrepreneurial "users" of capital issue securities and incur loans primarily for the purpose of funding non-financial economic enterprise, thereby taking capital out of the financial system and putting it to productive use in the real, i.e., non-financial, economy.[91] This feature of primary markets operates as the key "safety valve" that keeps the financial system from outgrowing the economy's capacity to absorb capital at any given moment. In other words, primary markets' ability to generate financial claims, and thus financial risks, is inherently subject to certain externally-determined limits.

In the vast majority of real-life financial transactions, however, market players borrow and issue various financial claims in order to invest in *other* financial claims. Unlike one-off primary-market issuances used to fund companies' investments in *operating* assets, secondary-market transactions fund investments in *financial* assets. This seemingly trivial difference has critical consequences. Thus, largely as a result of the legal and financing technologies developed specifically for this purpose, there is no "natural" (i.e., independent from the operation of the financial market itself) limit on the volumes of financial claims – i.e., financial *labilities* – traded in secondary markets. In principle, an unlimited number of market participants can enter into an unlimited number of secondary-market transactions involving an unlimited variety of financial claims and liabilities. To the extent these privately created claims/liabilities are publicly accommodated, either directly or indirectly, they amplify – potentially indefinitely – both private market participants' rents and the public's aggregate risk exposure.

This basic relationship explains why today's secondary markets in financial instruments are the principal sites of both relentless transactional "innovation" and chronic over-generation of systemic risk. It also explains why secondary markets in financial assets currently dwarf primary markets in terms of size, complexity, and systemic significance.[92] This is both a structural and a functional imbalance. In theory, secondary markets' main function is to support and facilitate primary capital markets by providing liquidity, price discovery, and risk-shifting (including exit) opportunities for primary market participants. In practice, secondary market trading often

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[91] Of course, as business entities, financial institutions also raise capital by issuing securities in primary markets or borrowing money. The point here is that, in the standard picture of how capital markets operate, companies issue equity and raise debt in order to support or expand their "real-economy" business operations that generate jobs and wealth. This is the implicit normative justification for financial intermediation as a socially valuable activity. It is difficult to overestimate the significance of this implicit normative assumption.

[92] *See, e.g.,* World Federation of Exchanges, *2017 Full Year Market Highlights,* file:///C:/Users/sto24/Downloads/WFE%20FY%202017%20Market%20Highlights.pdf (providing statistical breakdown of annual trading volumes on global exchanges).

determines the terms and volumes of primary issuances of financial claims. The rapid rise of unsustainably risky subprime mortgage lending in the early 2000s, in response mainly to the rising demand for such loans as the raw material for MBSs and CDOs, provides a vivid example of these inverted dynamics.[93]

Inexplicably, however, the significance of this shift in the financial system's center of gravity – from capital-raising in primary markets to risk-trading in secondary markets – has not been fully appreciated and examined in the academic and policy discussions. Even in the post-crisis era, the "financial intermediation" discourse effortlessly glides over the fundamental differences between primary and secondary market dynamics, blending them together under the superficially descriptive labels of various balance-sheet "transformation" functions.[94] Within these discursive parameters, the principal focus of the mainstream policy debate is on potential means of fortifying financial intermediaries' balance sheets, whose inherent fragility is presumed to be a necessary feature of a thriving financial system. This normative and conceptual stance, in turn, heavily favors self-consciously technocratic approaches to both analyzing developments in financial markets and framing regulatory responses. Little, if any, attention is being paid to such "big" normative questions as the underlying causes of the persistent – and steadily increasing – tension between the public and private interests, roles, and respective competencies in the financial sphere. As a result, there is currently a conspicuous gap in our collective understanding of the efficacy and social desirability of combining *private freedom* to create tradable financial risk products with *public responsibility* to backstop secondary markets in which such products trade.

To fill that gap, and to develop a fuller and deeper understanding of the systemically destabilizing logic of "financial innovation," it is necessary to refocus the inquiry on the core dynamics in secondary markets for financial products. In doing so, it is important to move beyond the familiar descriptions of maturity or liquidity "transformations" appearing on, or off, various balance sheets. Instead of dissecting how various firms "intermediate" in various transactional contexts, we should shift our efforts toward identifying and examining the principal mechanisms and techniques that enable private actors to create and grow – continuously and virtually unconstrained –

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[93] *See* sources cited *supra* note 60; GARY GORTON, SLAPPED BY THE INVISIBLE HAND: THE PANIC OF 2007 (2008).

[94] "Maturity" or "liquidity" transformation is the same balance-sheet phenomenon in any transactional setting. In the canonic primary-market context of banking, this structural balance-sheet fragility is believed to serve a socially beneficial purpose, thus justifying an explicit public backup for banks. The same logic is then easily extended to the same types of balance-sheet fragility resulting from secondary-market activities.

secondary markets for financial risk trading.

B. The Mechanisms of Secondary Market Proliferation: A Preliminary Taxonomy

As argued above, the fundamental division of roles built into the New Deal settlement creates structural incentives for the disproportionate growth of secondary markets in tradable financial assets.[95] The bulk of these tradable assets are "produced" for reasons that have little to do with "capital formation" – or canonical capital allocation – in primary markets. To put it simply, financial products are bundles of financial risks and returns manufactured by financial institutions for sale to other market participants, mainly portfolio investors or managers.

From a *micro*-level transactional perspective, this is typically viewed as a valuable financial service. We are all familiar with the standard vocabulary that conveys this normative assessment in terms of "providing liquidity," "completing markets," "discovering prices," "enabling diversification and risk management," or "creating portfolio-enhancement opportunities." From a *macro*-level systemic perspective, the principal consequence of this continuous manufacturing of financial products is the continuous injection of privately-created financial risks into the system. Yet, we do not currently have a sufficiently extensive and well-established vocabulary to articulate this systemic perspective as a valid counterpoint to the dominant transactional view of financial markets' operation.[96]

Developing such a vocabulary is no easy task. It requires taking a fresh look at the familiar phenomena in an effort to identify important overarching trends and dynamics that were either unnoticed or unappreciated in previous accounts.[97] It requires a new narrative that helps to explain how, through which mechanisms, secondary markets in financial instruments are able to grow and proliferate.

There is, of course, a well-known (though not entirely uncontested) narrative of how various market "innovations" in recent decades – including money market mutual funds, wholesale derivatives and repo markets, and complex securitized products – emerged in response to, and were enabled by, specific legal and regulatory developments.[98] This Article neither replicates nor challenges that story. Instead, it seeks to take the analysis to a higher level of abstraction by drawing out the broader – more fundamental and unifying

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[95] *See supra* notes 85-93 and accompanying text.

[96] In our previous work, Robert Hockett and I have begun this project of developing a new conceptual vocabulary of modern finance as a systemic phenomenon. *See, e.g., Finance Franchise, supra* note 8; *Public Actors, supra* note 39; *Fixer-Upper, supra* note 18.

[97] *See id*.

[98] *See supra* Part I.C.

– dynamics behind these and many other developments. The purpose of this exercise is to develop a preliminary taxonomy of core dynamics operating in secondary markets for financial instruments.[99]

Inevitably, any attempt to construct such a taxonomy runs into definitional and boundary-drawing difficulties. The constant growth and complexification of financial markets is a multi-level process, with a seemingly infinite variety of "elements" and "factors" interacting in a seemingly infinite variety of ways. It is nearly impossible to isolate any specific such element or factor with surgical precision. It is nevertheless possible, and potentially more informative, to focus on the fundamental logic behind these factors.

1. The Market's *Modus Operandi*: Synthesizing and Scaling Up

At the most abstract level, the growth of financial markets is best understood by reference to two interrelated practices: (1) *synthesizing* financial assets, and (2) *scaling up* transactional activity. To put it simply, both the scope and the scale of financial markets increase when (1) more products can be purchased and sold, and (2) more trades can be made in these markets.

The practice of synthesizing financial assets typically involves creating new types of financial claims out of the existing ones. Some of the most basic and familiar examples include creating tradable stock indices, writing options on gold or shares of common stock, securitizing loans, and even setting up mutual funds. In all of these cases, a relatively small range of traditional financial assets – common stock, corporate bonds, loans, or commodities – serve as the base on which a potentially unlimited number of new types of financial claims are created. Importantly, the standard economic logic of supply and demand does not constrain this process. An increasing supply of tradable assets – or items on the menu of choices available to financial market participants – generates an increasing demand for them, which in turn incentivizes more asset-synthesizing.[100] And leverage plays the critical role in enabling this iterative supply-demand pattern.[101]

The resulting proliferation of tradable financial claims is itself an important measure, and a determinant, of the quantitative growth of financial markets. The concept and practice of "scaling up" – i.e., increasing the

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[99] For ease of reference, and unless otherwise specified, I will refer to secondary markets in financial instruments as simply "financial markets."

[100] *See* sources cited *supra* note 65.

[101] In that sense, today's high finance may be said to follow the Starbucks business model, in which the constant invention and marketing of new, intentionally and carefully differentiated, products creates its own demand. Just like the Starbucks designer-beverages, most complex financial products are made using the same basic ingredients. Leverage, of course, functions much like caffeine that keeps everyone coming back for more.

volume and velocity of transacting – is another fundamental determinant of such growth. Scaling up is achieved through a wide variety of means. Market infrastructure and transactional technologies are of special importance in this respect. For example, centralized trading platforms (formally registered exchanges, alternative trading networks, or dealer-run private pools), clearinghouses, and payments systems all enable far greater volumes of trading to take place at greater speeds than would otherwise be achievable. Similarly, greater standardization of financial instruments helps to increase the volume of trading, at times dramatically, as in the case of the International Swaps and Derivatives Association (ISDA) documentation for derivatives contracts.[102] The ISDA example also shows how targeted changes in the applicable legal regimes can effectively unlock the growth of entire markets for financial products.[103] Finally, algorithmic trading is perhaps the most readily available example of rapid rise in the velocity (and, by extension, volume) of transactions as a result of the sheer expansion in technological capacity.[104]

Synthesizing financial assets and scaling up financial transactions are two fundamentally *systemic* practices, universal modes of operation at the very core of financial markets' logical design. Not surprisingly, they both have profound structural implications. Thus, the introduction of new financial products often leads to the emergence of new specialized markets in which they are traded. New actors may enter these newly created markets, both on the sell and the buy sides, while the established financial institutions may assume new roles in them. New patterns of market concentration and systemic interdependencies take shape. Via the multitude of specific transactional channels through which the twin imperatives of synthesizing and scaling up operate, the financial market grows not only bigger and faster but also more structurally complex.

It is, of course, impossible and ultimately unnecessary to enumerate all of these specific channels. It is nevertheless helpful, for analytical purposes, to identify the key mechanisms market participants use to synthesize financial assets and to scale up financial transactions.

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[102] *See* https://www.isda.org/book/complete-isda-documentation-package/.

[103] This refers specifically to ISDA's successful campaign to secure preferential treatment of derivatives under the U.S. Bankruptcy Code, as well as under many other jurisdictions' insolvency laws. *See* Steven L. Schwarcz & Ori Sharon, *The Bankruptcy-Law Safe Harbor for Derivatives: A Path-Dependence Analysis,* 71 WASH. & LEE L. REV. 1715 (2014).

[104] For a general overview of algorithmic trading and issues it raises under U.S. securities laws, see, e.g., Steven R. McNamara, *The Law and Ethics of Algorithmic Trading*, 17 MINN. J. L. SCI. & TECH. 71 (2016); Yesha Yadav, *How Algorithmic Trading Undermines Efficiency in Capital Markets*, 68 VAND. L. REV. 1607 (2015).

2. The Four Mechanisms of Synthesizing Assets and Scaling Up Trading Activity

At first approximation, there are four such mechanisms that may be broadly – and inevitably somewhat imprecisely – termed "pooling," "layering," "acceleration", and "compression." These analytical categories refer not to any particular type of product or transaction but rather to system-level operational principles, or core techniques that enable financial markets' continuous reproduction and expansion. In this sense, each of these categories may be seen as a transactional meta-technology, an embedded system functionality supporting a wide variety of individual applications.

a. Pooling

Pooling and layering are closely related, though conceptually distinct, mechanisms of synthesizing financial assets and scaling up trading. As used here, "pooling" denotes the familiar technique of combining multiple financial assets with certain shared characteristics, for the purpose of creating a new set of financial claims backed by, or determined by reference to, the resulting asset pool. This is perhaps the most ubiquitous technique in finance. Indeed, the very corporate form is a device for pooling of various resources used to back the issuance of corporations' securities in the primary market.[105] Mutual funds and other collective investment vehicles are products of explicit pooling of other financial instruments – corporate stocks, bonds, and other claims issued in primary markets – in a portfolio used to back the issuance of fund shares to investors. Shares issued by individual funds, in turn, can be pooled in a so-called fund-of-funds (FoF) portfolio backing the issuance of the FoF shares.[106]

Benchmarking and creation of indices constitute a similarly ubiquitous, albeit less directly visible, system-level method of pooling securities issued in primary markets for purposes of synthesizing new tradable assets in secondary markets.[107] Among other things, major stock indices, like S&P500 or Wilshire 5000, are used as benchmarks for – and therefore enable the emergence of – a wide variety of mutual and exchange-traded funds that track their benchmark index values.[108]

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[105] For a reminder of the key differences between financial instruments issued, and financial transactions entered into, in primary and secondary financial markets, see *supra* Part II.A.

[106] *See, e g.*, Managed Funds Association, Fund of Funds, *available at* https://www.managedfunds.org/hedge-fund-investors/fund-of-funds/.

[107] For a discussion of the systemic function of benchmark prices and indices, see Robert C. Hockett & Saule T. Omarova, *Systemically Significant Prices*, 2 J. FIN. REG. 1 (2016).

[108] *See* Vladislav Sushko & Grant Turner, *The Implications of Passive Investing for Securities Markets*, BIS QUARTERLY REV. 113 (March 2018), *available at*

b. Layering

The last two examples of pooling – FoF and indices – also illustrate the role of another transaction meta-technology, which may be called layering. I use the term "layering" to refer to the technique of synthesizing financial assets in a manner that creates a chain of hierarchically linked claims, so that the performance of each new asset "layer" is determined by reference to the combined performance of pooled financial assets underlying it.

As this description makes clear, the layering technique often involves pooling, which makes these categories difficult to separate neatly. Nevertheless, as pooling is repeated in several consecutive rounds, the distinct systemic implications of the resulting multi-layered structure built on the same set of underlying claims become increasingly pronounced. It is easy to see, for instance, how shares in a particular investment fund can get bundled with other funds' shares in the first-layer FoF, whose shares in turn get bundled with other FoF shares in the second-layer FoF portfolio, whose shares then get bundled with yet another set of FoF shares in the third-layer FoF, and so on. At each level, an entirely new crop of tradable fund shares is created, regardless of whether or not there are any additional issuances of corporate securities in the primary market.

Securitization provides an even more vivid example of synthesizing new tradable assets via pooling and layering. In a typical securitization, a special purpose vehicle (SPV), which holds a portfolio of loans or other revenue-producing assets, issues tradable asset-backed bonds (ABS).[109] These ABS are then re-bundled with other ABS in the next-layer securitization, such as a CDO, which issues several tranches of its own bonds. These bonds are then used as collateral backing bonds issued in the next-level securitization, so-called CDO-squared, followed by CDO-cubed, and so on.[110]

Derivatives provide yet another canonic example of how the layering mechanism is used both to synthesize new assets and to scale up market trading. Derivatives are contingent claim contracts that determine counterparties' rights and obligations by reference to the changes in the value of specified "underlying" assets.[111] Because the underlying asset is merely a reference point for calculating contractual payouts, there is no theoretical limit on counterparties' ability to enter into as many derivatives contracts as they desire, on any terms they choose.[112] In this sense, derivatives are the ultimate tools for synthesizing a potentially infinite number of tradable

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https://www.bis.org/publ/qtrpdf/r_qt1803j.pdf.

[109] *See supra* notes 58-59 and accompanying text.

[110] *See* sources cited *supra* note 59.

[111] *See supra* notes 56-57 and accompanying text.

[112] In practice, of course, there are various limits on that ability, including regulatory ones.

financial products on top of any single underlying asset.

Indexing and benchmarking, mentioned above in connection with pooling, also allow for layering of tradable assets in a manner similar to derivatives. A major stock or commodity index, for example, enables the creation of a wide range of tradable products tracking it. For instance, the emergence of specialized commodity price indices in the late 1990s-early 2000s has been identified as a major factor behind the surge in financial investors' participation in commodities markets and the related growth of trading in commodity-linked financial instruments.[113]

All of the examples above underscore two key features of layering as an embedded system-level functionality.

First, layering enables a finite quantity of existing financial claims to serve as the base on which potentially infinite quantities of new financial claims can be produced. Thus, layering significantly blunts, if not eliminates, the fundamental structural constraint on the growth of secondary financial markets: the exogenously limited volume of instruments issued in the primary markets.

Second, layering produces highly complex interdependencies among the seemingly discrete assets and markets. Financial assets that constitute a single product chain do not have to be linked other than through value-derivation: they don't have to be issued by the same or similar entities or reference same or similarly sourced cash flows. The many different layers of financial products may be inherently connected, yet the precise patterns of correlation among their values may be difficult to discern.

c. Acceleration

While pooling and layering operate as the essential determinants of financial markets' structural complexity, the most visible and direct role of acceleration and compression is to amplify and sustain the growing *volume* and *velocity* of trading.

Acceleration occurs whenever the speed of transacting is increased (the velocity of trading), thus allowing more trades to be executed (the volume of trading). Perhaps the most easily recognizable example of acceleration as a mechanism of scaling up financial transactions is algorithmic, or high-frequency, trading (HFT). HFT is a trading strategy that uses complex algorithms to execute trades at speeds far exceeding human ability. In essence, HFT uses quantitative investment programs to take extremely short-term positions in equities, currencies, and any other electronically tradable

[113] *See, e.g.*, Ing-Haw Cheng & Wei Xiong, *The Financialization of Commodity Markets*, NBER Working Paper 19642 (Nov. 2013), *available at* http://www.nber.org/papers/w19642; Scott H. Irwin & Dwight R. Sanders, *Index Funds, Financialization, and Commodity Futures Markets*, 33 APP. ECON. PERSP. & POL'Y 1 (2011).

financial instruments, and to move in and out of such positions as a way of capturing extremely small gains on every trade.[114] By definition and design, HFT strategies dramatically, and successfully, accelerate and amplify trading activity in the relevant markets.[115]

The acceleration mechanism also works in less obvious ways, often in conjunction with the pooling and layering mechanisms. The very act of synthesizing a new tradable asset may, in and of itself, help to increase the aggregate volume and velocity of market transactions. The creation of a new asset eliminates potentially significant transactional costs of placing multiple trades that would otherwise be required in order to achieve the same economic exposure. It makes trading faster and cheaper relative to trading in the underlying assets themselves, which in turn leads to surging levels of trading activity. Indexing, derivatives, securitizations, and many other financial instruments and market practices exemplify these dynamics.

Standardizing tradable instruments and trading practices is another important tool of accelerating financial transactions. The logic of this acceleration tool is simple: eliminating idiosyncratic variations in the key economic terms of a particular category of financial products significantly reduces the amount of time and resources that need to be spent on each individual trade. By establishing a common baseline, it also makes easier and faster to craft bespoke varieties of the same product, if the need be.

As mentioned above, perhaps the best-known example of this kind is ISDA's success in creating an industry-wide set of standard documentation for over-the-counter (OTC) derivatives.[116] A much earlier and equally powerful example comes from the New Deal era, when the newly established Federal Housing Administration (FHA) used its power as the national provider of mortgage default insurance to encourage the adoption of a 30-year fixed-rate mortgage loan as the new industry standard.[117] The FHA's standard-setting actions played a critical role in facilitating the subsequent creation of the national secondary market for home loans.[118] As these examples show, secondary markets need standardization because of its transaction-boosting potential: standardization means faster trades, and more of them.

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[114] *See* Irene Aldridge, *What Is High-Frequency Trading, After All?* HUFFINGTON POST (July 8, 2010), *available at* https://www.huffingtonpost.com/irene-aldridge/what-is-high-frequency-tr_b_639203.html.

[115] *Id.*

[116] *See supra* notes 102-103and accompanying text.

[117] *See Public Actors, supra* note 39, at 133-134. For a fuller account, see Robert C. Hockett, *A Jeffersonian Republic by Hamiltonian Means*, 79 S. CAL. L. REV. 45 (2005).

[118] *Id.*

d. Compression

I use the term "compression" to refer generally to the technique of aggregating and compacting risk exposures and obligations associated with multiple trades in a manner that *de facto* transforms them into a single economic transaction.

In this sense, it is broader than "trade compression," a term of art denoting a common practice in derivatives trading that, quite simply, involves reducing the number of derivatives contracts while keeping the same net economic exposure.[119] In a typical compressed trade, several derivative contracts between the same counterparties are torn up and replaced with a single contract with a reduced (often, quite significantly) notional amount.[120] Compressing simplifies a complex transactional pattern by extracting and operationalizing its aggregate economic effect on the counterparties and reducing their gross risk exposures. By the same token, however, compression effectively hides the actual volume of transacting that took place between these counterparties. While the former is the intended micro-level transactional effect of compression, the latter is its less obvious but significant macro-level effect.

The same basic principle operates in the broader market context through the common practice of *netting*. Generally, netting involves offsetting of mutual payment obligations of transacting parties in order to facilitate the back-office process of clearing and settlement of multiple trades between them.[121] Netting does not directly generate any new financial liabilities or assets: it merely simplifies their ultimate settlement by eliminating unnecessary flows of funds and associated frictions in the process. This optimizing and risk-reducing function of netting is well known and widely acknowledged.[122]

By replacing multiple gross transfers due throughout the day with a single net transfer at the end of it, however, netting also enables a far greater amount of trading to take place. From that perspective, the widespread use of netting and trade compression has an important, and routinely under-appreciated, systemic effect: it empowers financial market participants to engage in secondary-market trading on a far greater scale, and at far greater speeds, than

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[119] *See* https://www.derivsdocu.com/blog/2015/11/20/trade-compression (explaining trade compression in over-the-counter derivatives markets).

[120] Trade compression can also be done on a multi-lateral basis. *Id.*

[121] Netting is also used to offset other obligations, such as those related to posting of collateral under derivatives or repo agreements.

[122] There is a vast literature, both academic and industry-produced, explaining the advantages of netting from the perspective of reducing credit, settlement, liquidity, and other risks. *See, e.g.*, ISDA, *Netting and Offsetting: Reporting Derivatives under U.S. GAAP and under IFRS* (May 2012), *available at* https://www.isda.org/a/veiDE/offsetting-under-us-gaap-and-ifrs-may-2012.pdf.

would be sustainable in the less forgiving world of gross settlement of trading obligations. In this sense, compression is more than simply a risk-reducing micro-level application: it is a system-level functionality for scaling up secondary markets in financial instruments.

To sum up, it is the system-wide operation of these four closely related transactional techniques – pooling, layering, acceleration, and compression – that empowers and sustains continuous quantitative growth and qualitative complexification of modern financial markets. These are also the enabling dynamics of what is routinely labeled "financial innovation." Much of that innovation is attributable to the iterative application of pooling, layering, acceleration, and compression tools in some new context or with the help of some new technology. The "innovative" nature of newly created financial products and market practices, therefore, should not be confused with, or reduced to, their narrowly technical or micro-level transactional aspects.[123]

C. Systemic Implications of Secondary Market Proliferation

Analyzing the process of continuous growth of the financial market through the lens of its core transactional modalities – pooling, layering, acceleration, and compression – allows us to draw several important conclusions about the nature of the financial system.

First of all, as a result of these mechanisms' combined operation, the financial system's macro-dynamics increasingly – and increasingly starkly – diverge from the transactional micro-dynamics in the financial market.[124] Moreover, the macro-level systemic factors play an increasingly important role in determining what happens in financial markets. In other words, focusing on transaction-level micro-factors – such as, e.g., reducing counterparties' transaction costs, information asymmetries, and various other "frictions" – is less and less likely to shed any meaningful light on the behavior of the markets in which these transactions take place. To understand how markets behave, we have to look to the broader modalities of those markets' self-regeneration and growth.

The independent significance and critical role of systemic factors in sustaining the operation of modern financial markets became painfully obvious during the global financial crisis of 2008, which explains the greater focus on macroprudential regulation in the post-crisis era.[125] It has become virtually commonplace to describe the financial system as "complex" and

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[123] This is, of course, an important and complex point that I plan to elaborate in full as part of a separate research project.

[124] For a theoretical and historical analysis of these general dynamics, see *Fixer-Upper, supra* note 18.

[125] For more on the post-crisis "macroprudential turn" in financial regulation, see Hockett, *supra* note 77.

"interconnected," almost to the point of making these qualities appear "natural" and even mystical in their omnipresence. By contrast, identifying the core transaction meta-technologies that are used to construct and sustain today's complex and interconnected financial system helps to demystify it.

Understanding how new financial assets and markets are continuously synthesized via pooling and layering, and then scaled up via acceleration and compression, helps us to visualize the logic of structural complexity, internal interconnectedness, and fragility of the system. The financial marketplace appears not as a flat space in which multiple parallel sub-markets operate as largely independent and potentially competing "financial intermediation" platforms, but rather as a fractal universe driven by the unifying logic of self-replication. In this picture of the financial system, the most significant relational dynamics are not horizontal, as it is implicitly postulated in the "disintermediation" or "shadow banking" narratives, but vertical, as in the dynamic patterns of connecting the many layers of financial risk trading.[126] And as this system grows bigger and moves faster, it also becomes increasingly unstable.

Another systemic implication of pooling, layering, acceleration, and compression is that they naturally operate to decrease the levels of transparency and governability of the financial market. It is difficult to "see through" the multiple layers of financial claims in a pyramid-like structure like a multi-layered FoF. It is even more difficult to assess the risks or to predict the behavior of a highly structured bespoke derivative referencing the value of other structured products. Similarly, the structural complexity and the speed of contagion in the financial market often render important market governance mechanisms, designed to resolve various market frictions, potentially ineffective. The failure of Lehman Brothers in October of 2008 provides an apt illustration of these trends. Following the firm's bankruptcy filing, neither Lehman's own management nor its major trading counterparties were able to establish with certainty the value of its derivatives positions and resolve the problem through the "normal" governance mechanisms, thus necessitating government intervention.[127]

This example also highlights the third systemic implication of the current patterns of the growth of financial markets: an increasing importance and intensity of self-amplifying, or recursive, market-wide collective action problems – and the resulting need for a more direct and effective exercise of

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[126] For a full elaboration of this multi-layered architecture of the financial system, see *Finance Franchise, supra* note 8.

[127] *See* Michael J. Fleming & Asani Sarkar, *The Failure Resolution of Lehman Brothers*, FRBNY ECON. POL'Y REV. 175 (2014), *available at* https://www.newyorkfed.org/medialibrary/media/research/epr/2014/1412flem.pdf.

market-wide collective agency.[128]

A structurally complex system based on the continuous synthesizing of tradable claims and scaling up trading activity is inherently prone to behaving procyclically. Investors in the fast-moving, contagion-prone, non-transparent financial markets are forced to act swiftly and in unison, whether that means not missing out on a "hot" investment or not being left holding the bag when it turns "toxic."[129] While individually rational, this behavior leads to collectively harmful results, as upward or downward price spirals become entirely divorced from so-called fundamental values.[130] In a market where fundamental value is often hidden at the bottom of a long chain of increasingly virtualized representations of that value, these price spirals are bound to be more violent and destructive, which significantly raises the importance of being able to arrest them as quickly as possible.

Of course, today's financial market looks nothing like the early stock market model that inspired classic *laissez faire* theories. The market that keeps growing bigger, faster, more complex – and therefore, more vulnerable to sudden and contagious shocks – cannot rely on the "invisible hand" to steer it away from trouble. That market needs an effective counterweight to collectively disastrous asset price booms and busts: it needs a collective agent capable of acting not in pursuit of purely profit-making goals but in the collective interest of all market participants.[131] While in theory this type of collective agency may be exercised by certain large private parties, the sheer scale of the modern financial market renders the private option impossible in practice. Only public actors, with their large size and unique risk tolerance, can realistically take on this critically important market-preserving role.[132]

As discussed above, under the terms of the New Deal settlement in finance, this market-preserving function has been explicitly assigned to the government, the quintessential collective agent in a modern polity. The government's role, however, was deliberately limited in order to leave control over capital allocation in private hands.[133] Ironically, the very success of private actors in expanding their freedom to generate financial risks – via continuous synthesizing of tradable financial products and scaling up secondary market trading – is opening the crucial space for a much more

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[128] For introduction and definition of the concept of "recursive collective action problem," or "ReCAP," and analysis of how this phenomenon manifests itself in a variety of contexts, see Robert Hockett, *Recursive Collective Action Problems: The Structure of Procyclicality in Financial, Monetary, and Macromarkets*, 3 J. FIN. PERSP. 1 (2015).

[129] *See id*. at 20-21.

[130] *Id.*

[131] *See id*. at 25.

[132] For a full discussion of public instrumentalities' market-preserving functions, see *Public Actors, supra* note 39, at 134-137.

[133] *See supra* Part I.B.

direct and proactive public involvement in managing the flows of capital in financial markets.[134]

In this sense, the broad systemic implications of modern financial markets' *modus operandi* increasingly push against the basic premises of the New Deal settlement. In the New Deal paradigm, the government's principal role in financial markets is that of a regulator, an exogenous force with a clearly limited mandate to influence private actors' allocative decisions.[135] Private market participants, by virtue of their presumed micro-informational advantages and individualized economic incentives (also presumed to be fundamentally aligned or align-able with the collective good), retain the ultimate control over allocating capital to specific economic uses.[136] Yet, as the above discussion shows, these presumptions do not necessarily hold in the context of increasingly complex, multi-layered, self-referentially growing modern financial markets. The systematic prioritizing of micro-transactional factors over macro-systemic ones, built into the New Deal settlement, is quickly becoming an impediment to its continuing efficacy as the overarching market governance framework.[137]

The rise of fintech in recent years is likely to elevate these existing tensions to a qualitatively new level. Viewed in this context, fintech is emerging as a potentially powerful tool for resetting the current public-private balance in finance.[138] While it is still too early to catalogue all of the specific ways in which the evolving technologies will or might be used to this effect, it is nevertheless both possible and necessary to begin a sustained inquiry into the macro-systemic aspects of key fintech trends.

III. DECODING FINTECH: TECHNOLOGICAL REVOLUTION, MARKET EVOLUTION, OR POWER DEVOLUTION?

The arrival of fintech is often equated with a "revolution" in finance.[139] Recent advances in digital communications, cryptography, data management,

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[134] *See Public Actors, supra* note 39, at 140-144, 147-160.

[135] *See supra* notes 38-41 and accompanying text.

[136] *See supra* note 42 and accompanying text.

[137] The recent growth of interest among the scholars of financial markets and regulation in understanding and adapting various insights from complexity studies and systems analysis reflects a growing recognition of the critical role of macro-systemic factors in finance. *See, e.g.* Robert F. Weber, *Structural Regulation as Antidote to Complexity Capture*, 49 AM. BUS. L. J. 643 (2012). While this is a promising avenue of analysis, it is important to keep in mind that, in contrast to many natural complex systems (such as, e.g., the human body or a particular ecosystem), the financial system is socially and legally constructed. It is fundamentally a product of law, which is itself a product of explicit policy choices. Analyzing the financial market's intra-systemic qualities and functions, therefore, cannot be separated from the analysis of its normative qualities and social functions.

[138] *See supra* Part I.D.

[139] *See supra* Part I.A.

and machine learning promise to revolutionize financial transactions by making them infinitely faster, easier, cheaper, more secure, more widely accessible, and individually tailored to every user's needs. These claims and expectations also shape much of the public discussion on how fintech is "disrupting" financial markets and how it should therefore be regulated.

This Article argues that, in order to decode the meaning of "fintech revolution," we must analyze fintech not as a collection of discrete finance-related *micro*-transactional technologies but as a *macro*-financial, *systemic* phenomenon. This requires, in turn, understanding whether, and how, specific fintech applications are going to affect – or already are affecting – the public's capacity to maintain the stability of the macro-environment. On the one hand, fintech may present a unique opportunity to correct the structurally destabilizing imbalance between private generation and public accommodation of financial risk, built into the existing paradigm of financial regulation. On the other hand, it may further intensify that imbalance, thus raising serious questions about the continuing viability of the New Deal settlement in finance.

This Part examines some of the more established fintech applications – including cryptocurrencies, distributed ledger technology, marketplace lending, ICOs, and robo-advising – from this perspective.[140] While not making any definitive claims, it highlights the degree to which these forms of fintech are poised to facilitate and amplify the pre-existing systemic dynamics of finance, thus further exacerbating the fundamental tensions built into the New Deal settlement.

A. "Eliminating Frictions:" Cryptocurrencies and Distributed Ledgers

To date, arguably the most promising and potentially impactful fintech applications have focused on resolving specific frictions in payments, clearing, and settlement of financial claims and transactions – the key functions performed by financial market infrastructures (FMI).[141] Payments is an area of particular interest in this respect. This is partly the case because of the sheer ubiquity and systemic importance of the payments system.[142] Partly, it is a result of recognizing persistent problems plaguing cross-border payments that typically involve several banks (which increases the costs of making payments) and take several days to clear the hurdles associated with

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[140] For a brief description of these technologies, see id.

[141] See BOARD OF GOVERNORS OF THE FEDERAL RESERVE SYSTEM, *Federal Reserve Policy on Payment System Risk* 2 (2017), *available at* https://www.federalreserve.gov/paymentsystems/files/psr_policy.pdf.

[142] Generally, a payments system is defined as "a set of instruments, procedures and rules for the transfer of funds between or among participants. Payment systems include, but are not limited to, large-value funds transfer systems, automated clearinghouse systems, check clearinghouses, and credit and debit card settlement systems." *Id.* at 6.

currency conversions and various other regulatory and administrative issues.[143] Fintech-driven solutions to the problem of slow and expensive payments range from the invention of alternative cryptocurrencies that aim to circumvent official sovereign currency-based payments channels to redesigning the payments platforms on the basis of some new digital technology.

1. Bitcoin: Synthesizing Assets

Bitcoin is the leading example of the first strategy. It is the most established and prominent cryptocurrency currently in use.[144] In simple terms, Bitcoin is a form of electronic money, a decentralized virtual currency that operates through a network of peer-to-peer computers, or nodes.[145] It is an online communication protocol that enables the use of bitcoins – electronic tokens or bits of data – as a means of payment and exchange similar to regular currencies.[146] However, no sovereign backs Bitcoin, and no state or any single private institution controls its creation and use.[147]

At the heart of Bitcoin is an innovative blockchain technology, which allows verification and recording of each transaction within the system in a publicly distributed ledger. Encrypted transactions are solved by the nodes and grouped in blocks (every few minutes), which are recorded one after another in a chain. Each node in the system keeps a copy of the whole distributed ledger, which ensures that the entire record of transactions cannot be altered.[148] Because of these features, Bitcoin users do not need to place trust in any single institution, like a bank or a securities broker, to keep the system secure.[149] Bitcoins are stored in digital wallets, or data files that also contain recorded transactions and private keys necessary to spend or transfer bitcoins.[150] The true identities of the transacting parties are hidden behind

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[143] *Id.*

[144] *See generally* NATHANIEL POPPER, DIGITAL GOLD (2015); PAUL VIGNA & MICHAEL J. CASEY, THE AGE OF CRYPTOCURRENCY (2015).

[145] *See* PEDRO FRANCO, UNDERSTANDING BITCOIN: CRYPTOGRAPHY, ENGINEERING, AND ECONOMICS 4 (2015). Bitcoin was created in 2009 by Satoshi Nakamoto, which is believed to be a pseudonym for an unknown person or entity. Despite the mysterious nature of Bitcoin's creator(s), its current proponents maintain that open-sources software cannot be controlled by its original creator and truly becomes a collective product that can only be altered by consensus arising in the community of peers. For a discussion of the intellectual origins and pre-history of Bitcoin, see id. at 161-169.

[146] JOSE PAGLIERY, BITCOIN AND THE FUTURE OF MONEY 6 (2014). Bitcoin with a capital "B" typically refers to the entire system supporting the virtual currency, while "bitcoin" with a lower-case "b" denotes the actual unit of that currency. *Id*.

[147] FRANCO, *supra* note 145, at 3 (2015).

[148] *Id.* at 15.

[149] *Id.* at 8-9.

[150] Rainer Bohme et al., *Bitcoin: Economics, Technology, and Governance*, 29 J. ECON.

unique Bitcoin addresses.[151] Bitcoin can be used to make payments and transfer value among digital wallet holders within that virtual system, which makes it a superior method of cross-border payments.

Bitcoins are "mined" by solving the encrypted transactions that get added to the blockchain. The software, in effect, creates bitcoins and awards them to "miners" willing to expend their time and effort to verify encrypted transfers from one digital wallet to another. Mining bitcoin requires significant computing power, and the difficulty of solving transaction "puzzles" is programmed to increase, in order to keep the supply of bitcoin from rising too rapidly.[152] Importantly, bitcoins can also be bought and sold for U.S. dollars or any other sovereign currency. Several Bitcoin exchanges allow conversion of bitcoins into non-virtual currencies.[153]

To true Bitcoin enthusiasts, it represents a great vehicle of social good, which can broaden access to faster and cheaper money transfer and payment services for the poor and the unbanked around the globe.[154] Libertarians embrace Bitcoin as an alternative to state-created conventional currencies and, more broadly, government monopoly on money and credit.[155] And many tech-savvy Millennials prefer Bitcoin simply because it combines cost-saving efficiencies with greater privacy and security.[156]

For the majority of financial market participants, however, Bitcoin's main virtue is its value as an investment – or, more precisely, speculative investment – asset.[157] As an asset, bitcoin is extremely volatile. On July 19, 2010, the recorded value of one bitcoin was just $0.06. By December 16, 2017, the value of a single bitcoin reached $19,343.04.[158] According to a respected industry publication, this puts the rate of bitcoin's appreciation relative to the U.S. dollar in those seven years at 32,000,000%.[159] It is, therefore, not surprising that, while Bitcoin has not been able to displace sovereign currencies, it has successfully emerged as a brand new financial asset class.[160]

PERSP. 213, 220-221 ((2015).

[151] FRANCO, *supra* note 145, at 9.

[152] PAGLIERY, *supra* note 146, at 33-34.

[153] Bohme et al., *supra* note 150, at 220.

[154] PAGLIERY, *supra* note 146, at 91-106.

[155] *Id.*, at 129-136.

[156] *Id.* at 115-120.

[157] *See* Rosa M. Lastra & Jason Allen, *Virtual Currencies in the Eurosystem: Challenges Ahead,* ECON Monetary Dialogue Study 24 (July 2018), *available at* http://www.europarl.europa.eu/cmsdata/150541/DIW_FINAL%20publication.pdf.

[158] *See* Daniel Hinge, *The hunt for a crypto taxonomy*, CENTRALBANKING.COM (May 4, 2018) (citing CoinDesk data).

[159] *Id.*

[160] The surprising part, however, is the sheer magbitude of the Bitcoin speculative hype, especially in 2016-2017. Although in the first half of 2018 bitcoin's market value came down

Importantly, bitcoin's high volatility makes it an attractive underlying commodity for derivatives trading. In September 2014, TeraExchange established the first regulator-approved U.S. bitcoin derivatives trading platform.[161] In December 2017, the Chicago Mercantile Exchange (CME) and the Chicago Board Options Exchange (CBOE), the two largest and oldest U.S. commodity futures exchanges, raced to launch Bitcoin futures contracts.[162] As the CME's website proclaims, "Now you can hedge Bitcoin exposure or harness its performance with a futures product developed by the leading and largest derivatives marketplace: CME Group, where the world comes to manage risk."[163] In May 2018, Goldman Sachs announced a decision to establish its own bitcoin derivatives trading desk, in response to its institutional clients' growing interest in holding bitcoin "as an alternative asset," and to create "its own, more flexible version of a future, known as a non-deliverable forward."[164]

Turning bitcoin into the raw material for derivatives trading has several important consequences. It legitimizes bitcoin as a *bona fide* tradable financial asset, rather than merely a virtual token without any tangible value backing it, and incorporates it into the established financial market infrastructure. This instantly transforms the dynamics of bitcoin trading by scaling up its volume and helping to support its price. In short, it makes bitcoin – a digital token, or a bit of encrypted data – part of the same menu of financial assets as U.S. Treasury Bonds and shares in General Electric.[165]

Bitcoin's amazing journey from an obscure techno-utopian experiment to Goldman Sachs' market-making books is fascinating in a deeper sense. It provides a vivid example of how fintech technology can be, and is, used to

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significantly from its peak of nearly $20,000 in late 2017, in May 2018 it was still hovering around $10,000. In his characteristically unsparing manner, Warren Buffett referred to bitcoin as "rat poison squared," a less esthetically pleasing image than that of a tulip bulb. *See,* Tae Kim, *Warren Buffett says bitcoin is "probably rat poison squared,"* CNBC.COM (May 5, 2018), *available at* https://www.cnbc.com/2018/05/05/warren-buffett-says-bitcoin-is-probably-rat-poison-squared.html.

[161] *See,* Michael J. Casey, *TeraExchange Unveils First U.S.-Regulated Bitcoin Swaps Exchange,* WALL ST. J. (Sept. 12, 2014).

[162] *See* Dan DeFrancesco, *FCMs Demand Self-Certification Overhaul After Bitcoin Debacle*, RISK.NET (Jan. 30, 2018). Both CME and CBOE listed their respective Bitcoin contracts through self-certification, which allowed them to avoid submitting the proposed contracts for regulatory approval. They were later criticized for the rushed and non-transparent nature of their actions, given the riskiness of these completely new products. *Id.*

[163] CME GROUP, http://www.cmegroup.com/trading/bitcoin-futures.html.

[164] Nathaniel Popper, *Goldman Sachs to Open a Bitcoin Trading Operation*, N. Y. TIMES (May 2, 2018), *available at* https://mobile.nytimes.com/2018/05/02/technology/bitcoin-goldman-sachs.html; Wolfie Zhao, *Goldman Sachs to Begin Bitcoin Futures Trading*, COINDESK.COM (May 3, 2018), *available at* https://www.coindesk.com/goldman-sachs-to-begin-bitcoin-futures-trading-within-weeks/.

[165] For a predictive analysis of this trend, see *Finance Franchise*, *supra* note 8.

synthesize tradable financial assets effectively out of thin air. In contrast to even the most esoteric traditional (that is, pre-fintech) financial products, the volume of tradable bitcoin is not tied to, and thus constrained by, any financial claims issued in the primary markets. The volume or value of bitcoin bears no relation to the production of any actual goods or services in the non-financial economy. The supply of bitcoins grows as a result of trading and transacting *in bitcoin*: it is, in this sense, an entirely self-referential and self-reproducing secondary-market phenomenon.

The growth of bitcoin derivatives and potentially other bitcoin-linked products – such as, e.g., exchange-traded funds (ETFs) passively tracking bitcoin's value – is a classic example of pooling and layering, two of the core transactional techniques used to synthesize new tradable claims referencing a single underlying asset. The fact that, in this case, the underlying asset is a digital token, as opposed to shares in operating companies or barrels of oil, potentially removes any "natural" limits on the extent of such pooling and layering – and, accordingly, on the ability of market participants to scale up trading in these continuously synthesized crypto-assets.

2. Distributed Ledger Technology: Scaling Up Trading

In recent years, numerous financial institutions and fintech firms have been actively exploring a broader range of potential applications of the blockchain – or, more broadly, "distributed ledger" – technology underlying Bitcoin.[166] Generally, distributed ledger technology (DLT) may be defined as "a set of technological solutions that enables a single, sequenced, standardized and cryptographically-secured record of activity to be safely distributed to, and acted upon by, a network of varied participants."[167] It is important to note that DLT is not new or unique in its ability to allow multiple network participants to share and view data in near real time: it is simply another model within the familiar category of a "distributed database management system."[168] Yet, the blockchain mystique factor – the marketing power of the new fintech lexicon – has catapulted DLT into the very center of the financial sector's digital "innovation" efforts.[169]

Because DLT is said to be "asset-agnostic," in a sense of being able to provide "the storage, recordkeeping, and transfer of any asset," it can potentially be applied to optimizing a variety of processes, including not only

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[166] Technically, blockchain is merely a particular kind of DLT. For purposes of the present discussion, however, these differences are not especially relevant, and these terms will therefore be used interchangeably.

[167] FINANCIAL CONDUCT AUTHORITY (UK), DISCUSSION PAPER ON DISTRIBUTED LEDGER TECHNOLOGY, DP17/3, 10 (April 2017), *available at* https://www.fca.org.uk/publication/discussion/dp17-03.pdf.

[168] *Id.*

[169] *Id.*

payments but also post-trade clearing and settlement of any asset.[170] So-called "smart contracts" that reside on distributed ledgers and distill contractual terms into a self-executing computer code can also be used for ongoing management of collateral and other counterparty obligations.[171]

Given the magnitude, complexity of institutional arrangements, and systemic significance of the payments, clearing, and settlement functions in wholesale financial markets, practical implementation of these concepts is no easy task. Not surprisingly, there are currently several parallel efforts to revolutionize these systems through adoption of DLT or "smart contracts."[172] These include, for example, the IBM-backed HyperLedger Fabric project that seeks to optimize cross-border trade financing and an open-source Corda platform for managing bank-to-bank financial agreements being developed by a large bank consortium, R3.[173]

In 2017, another consortium of major global banks, led by Switzerland's UBS, announced the next phase in the development of so-called "utility settlement coin," or USC.[174] The USC is a digital currency stored on a permissioned blockchain and used by member-banks to make payments to one another to clear and settle securities trades. This new cryptocurrency arrangement will allow for much faster and convenient clearing and settlement of bond and equity trades between the participating banks.[175] In each trade, both the sold-and-bought securities and the payment for them will be "delivered" through the consortium's blockchain system. Instead of using the relevant jurisdiction's official payments system and waiting for traditional money transfers to be completed, these banks will simply transfer the relevant amounts in USC to one another's USC accounts. The payee-

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[170] David Mills *et al., Distributed Ledger Technology in Payments, Clearing, and Settlement*, Fed. Res. Bd., Fin. & Econ. Disc. Paper No. 2016-095 (2016), at 17, *available at* https://www.federalreserve.gov/econresdata/feds/2016/files/2016095pap.pdf.

[171] *See* Luke Clancy & Steve Marlin, *Banks test promise of blockchain as CCP replacement*, RISK.NET (Apr.18, 2016).

[172] For a reminder of what "smart contracts" are, see *supra* note 26 and accompanying text.

[173] *See* Hugh Harsono, *Bank-based blockchain projects are going to transform the financial services industry*, TechCrunch.com (Jan. 28. 2018), *available at* https://techcrunch.com/2018/01/28/bank-based-blockchain-projects-are-going-to-transform-the-financial-services-industry/; Tanaya Macheel, *R3 Makes Code for Financial Agreements Platform Open Source,* AM. BANKER (Nov. 30, 2016), *available at* https://www.americanbanker.com/news/r3-makes-code-for-financial-agreements-platform-open-source.

[174] Michael Del Castillo, *Barclays, HSBC Join Settlement Coin as Bank Blockchain Test Enters New Phase*, COIN DESK (Aug. 30, 2017), *available at* https://www.coindesk.com/hsbc-barclays-join-utility-settlement-coin-as-bank-blockchain-test-enters-final-phase/.

[175] *Id.*

banks will then exchange their USC holdings for the relevant sovereign currency, on a one-to-one basis.[176] This key feature of the proposed closed-universe, blockchain-based interbank payment platform – USC's direct convertibility into major sovereign currencies – requires an explicit commitment on the part of the relevant central banks to support the arrangement.[177] The consortium is reportedly working with several central banks – presumably, the Federal Reserve, European Central Bank, Bank of England, and Bank of Japan – to set up a system for guaranteed exchanges of USC for all major sovereign currencies.[178]

There is very little information available on the USC project or other similar projects currently under way, which makes it difficult to understand how exactly these new DLT-based payments, clearing, and settlement arrangements will work in practice.[179] It is even more difficult to identify and assess their potential impact – both positive and negative – on the financial system's operation, resilience, and stability.

Generally, the most frequently cited potential benefits of using DLT for payments, clearing and settlement include its ability to reduce complexity in cross-border transactions, improve "end-to-end processing speed and thus availability of assets and funds," increase "transparency and immutability in transaction record keeping," improve "network resilience through distributed data management", and reduce "operational and financial risks."[180] In essence, DLT is expected to make trades settle pretty much instantaneously, thus significantly reducing transactional costs and counterparty risk. Some of the most widely cited potential risks of moving payments, clearing, and settlement functions onto DLT platforms include increased cyber-security and operational vulnerabilities, legal uncertainty with respect to ownership of digital tokens or enforceability of smart contracts, and (very importantly) finality of settlement in a distributed system not backed by a central bank.[181] For most of these enumerated problems, however, there appear to be reasonably manageable solutions, some of which involve things like "more nimble" regulatory responses.[182]

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[176] *See* Izabella Kaminska, *What is 'Utility Settlement Coin', Really?* FT ALPHAVILLE (Sept. 18, 2017), available at https://ftalphaville.ft.com/2017/09/18/2193542/what-is-utility-settlement-coin-really/.

[177] *Id.*

[178] *Id.*

[179] The design and operation of USC is especially intriguing in this respect. *See id.*

[180] *See* Mills *et al., supra* note 170 at 17; COMMITTEE ON PAYMENTS AND MARKET INFRASTRUCTURES (CPMI), *Distributed Ledger Technology in Payment, Clearing and Settlement* (Feb. 2017), at 1, *available at* https://www.bis.org/cpmi/publ/d157.pdf.

[181] *See* Mills *et al., supra* note 170 at 28-29; 31-34.

[182] "Regulatory sandboxes," which effectively exempt qualifying fintech firms from otherwise applicable regulations, are often presented as this kind of a nimble response. *See*

From a systemic point of view, however, the prospect of widespread adoption of DLT-based systems for payments, clearing, and settlement of financial transactions may not be quite so favorably balanced. The main concern here is straightforward. If DLT succeeds in making wholesale payments, clearing, and settlement instantaneous, easy, and cheap, it will enable potentially exponential growth in the volume and velocity of trading in securities and other financial assets. To put it simply, in a fully frictionless world of blockchain-powered transaction processing, overtly speculative trading will also be faster, easier, cheaper, and thus more voluminous.

Such system-wide scaling up of trading activity goes far beyond a mere improvement in end-to-end processing speed. Quantitative changes of this magnitude are bound to effect a qualitative change in the nature and behavior of financial markets more generally. This will, in turn, magnify the systemic role of – and amplify the pressure on – central banks and other public instrumentalities charged with ensuring financial stability. Hyper-fast, hyper-expansive financial markets will require a hyper-fast and hyper-capacious public actor of "last resort."[183] Envisioning the specific form – or forms – this collective agency should take is an exercise in bold institutional imagination, bound to raise a host of politically salient questions.[184] Unless we are ready to face these questions, we are not ready for the arrival of frictionless trading in financial assets.

One more point is worth making in connection with DLT and its potential to revolutionize payments, clearing, and settlement infrastructure. Recall that the original Bitcoin payments system is designed to operate on the real-time gross settlement (RTGS) basis: each bitcoin transfer between wallets is assigned a unique identifier and, once added to the immutable public ledger, serves as an objective proof of the coins' ownership. In this "trustless" world, there is no built-in transactional credit function: no specialized intermediaries lending their own balance sheets to transacting parties and, therefore, no native *netting* capability.

This pure RTGS principle at the heart of the Bitcoin system – or, in terms of the market dynamics discussed above, *acceleration without compression* – is the main reason why blockchain in its original form cannot support large-scale trading in financial markets. Without the ability to net, counterparties' liquidity needs impose hard constraints on the volume of trading they can

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generally Allen, *supra* note 6.

[183] For examples of what such a high-capacity public instrumentality might look like, see *Public Actors, supra* note 39, at 140-174; *National Investment Authority, supra* note 38; *Golden Share, supra* note 55.

[184] Among other things, it will directly implicate the recently reignited controversy over central bank powers and independence. For recent contributions to this debate, see PAUL TUCKER, UNELECTED POWER (2018); PETER CONTI-BROWN, THE POWER AND INDEPENDENCE OF THE FEDERAL RESERVE (2016).

sustain. Furthermore, not only does the system have to process great many more individual transactions, it also does not allow for trading on credit. Nor does it allow for using coins as collateral: a verified transfer effects a simple change in ownership recorded in the distributed ledger. Operationally, leverage becomes far more difficult to use in a system that explicitly precludes "double-spending," or spending what you don't fully and exclusively own.

It is this fundamental problem that the financial industry actors – the supposedly "disintermediated" banks and the "disruptive" nonbank challengers alike – are seeking to solve. Characteristically, both the problem and the solutions are couched in purely technological terms as a matter primarily of processing speed or computing power. Among the reported solutions is the Lightning Network,[185] which allows people to sign smart contracts creating "time-locked, two-way payment channels" based on a pre-agreed notional amount and seeded with a single bitcoin payment.[186] The parties can then transfer money to one another within that pre-set balance, as well as to and from third parties' accounts, forming "a network of traced payments that need not be confirmed in the Bitcoin blockchain."[187] By allowing limitless "off-chain" transactions managed via smart contracts, Lightning promises to overcome Bitcoin's processing capacity limits and to allow it to compete with Visa's network.[188]

These efforts, however, aim to deliver far more than simply a technical fix for a technical problem: Lightning and similar programs are potentially creating a crucial system-wide capacity for *levering* and *netting* of financial transactions "off chain." Now, what gets recorded in the publicly distributed ledger can be simply a net result of multiple trades run by dealers: a single ultimate number that provides precious little insight into market activity underlying it. In effect, this off-chain transacting replicates the familiar patterns of margin trading and collateralized borrowing that enable financial asset speculation. The new technology does not alter the economic substance, and public policy implications, of these transactional techniques: it is still all about private parties borrowing to make short-term profits in secondary-market trading. But technology makes these old dynamics much less visible behind the shining veil of scientific progress. What used to be done "off balance sheet" can now be done "off blockchain," and with the same result: potentially excessive financial risk and leverage hidden behind an ostensibly transparent ledger. Yet, focusing on the *form* in which that publicly viewable

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[185] *See* https://lightning.network/.

[186] MICHAEL J. CASEY & PAUL VIGNA, THE TRUTH MACHINE: THE BLOCKCHAIN AND THE FUTURE OF EVERYTHING 75 (2018).

[187] *Id.*

[188] *Id.*

but informationally incomplete ledger exists – whether it is a physical book or a complex piece of software – distracts attention from this basic fact.

B. "Democratizing Finance:" Digital Crowdfunding and Robo-Advising

In addition to its ability to optimize transaction processing and eliminate frictions in the operation of financial market infrastructures, fintech is often praised for its unprecedented potential to make financial markets more inclusive and equally accessible.[189] Bitcoin, for example, is often touted as a tool of financial inclusion, because it makes payments and asset transfers more affordable. Two other fintech trends explicitly credited with this "democratizing" effect on financial markets are digital crowdfunding (including marketplace lending and ICOs) and robo-advising.

1. Marketplace Lending and ICOs: Synthesizing Assets

Crowdfunding is a loose category covering historically varied forms of finance.[190] Today, crowdfunding generally refers to raising funds from a large number of individual investors, typically by using online social networks or specialized funding platforms.[191] These platforms allow start-up companies and individual entrepreneurs to "market" their idea to a wide range of potential investors and, if successful, raise capital at a lower cost.[192]

Marketplace (a.k.a. peer-to-peer, or P2P) lending is simply crowdfunding of debt. It seeks to lower the costs of unsecured borrowing by eliminating the

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[189] *See supra* Part I.A.

[190] Crowdfunding is a form of crowdsourcing, a term that encompasses a broader variety of mass collaborations on a particular project or idea. Crowdsourcing often involves sharing of innovative ideas and soliciting of technical support, feedback, or other resources from the "crowd." Although not officially known as "crowdsourcing," the practice of gathering monetary or in-kind contributions from a dispersed group of people was widely used throughout history, most notably for various charitable purposes. *See*, Craig R. Everett, *Origins and Development of Credit-Based Crowdfunding* (May 28, 2014), *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2442897. The advent of the Internet enabled the rapid development of numerous peer-to-peer online transactional platforms (e.g., eBay and Napster) that led to the emergence of the current forms of online crowdfunding. *See* COGNIZANT, MARKETPLACE LENDING: A MATURING MARKET MEANS NEW PARTNER MODELS, BUSINESS OPPORTUNITIES (July 2014), at 2, *available at* http://www.cognizant.com/InsightsWhitepapers/Marketplace-Lending-A-Maturing-Market-Means-New-Partner-Models-Business-Opportunities-codex989.pdf. In this Article, I use the term crowdfunding to refer solely to financial investment-oriented transactions, rather than philanthropically motivated loans or donations.

[191] Joan MacLeod Heminway & Shelden Ryan Hoffman, *Proceed at Your Peril: Crowdfunding and the Securities Act of 1933,* 78 TENN. L. REV. 879, 881 (2011).

[192] For examples of online crowdfunding sites that provide a virtual marketplace for prospective equity investors and capital-seeking entrepreneurs, see Fundable, https://www.fundable.com/landing/crowdfunding?gclid=COX31PXI78cCFQeTHwod_SwGJg; EquityNet, https://www.equitynet.com/how-it-works.aspx.

need for the services of a commercial bank or any other institutional lender. In the U.S., online P2P lending got its official start in late 2005, when Prosper.com launched its online platform.[193] Prosper.com and LendingClub, both of which focused initially on consolidation of consumer debt, quickly became the leading U.S. marketplace lending platforms. Their success spurred rapid growth of online lending platforms specializing in various loan products.[194]

Although individual lending platforms' operational models may differ, they generally share certain basic features. They typically cap the size and maturity of individual loans, limit individual investors' exposure to a particular borrower by breaking up the loan amount among a large number of investors, and use internal and external credit ratings to determine the risk-adjusted interest rate on each loan. The lending platform operators collect transaction and servicing fees.[195] The basic idea is that, by using advanced technology to process information and underwrite loans quickly and at a low cost, marketplace lending sites are able to match individual lenders and borrowers efficiently and transparently.[196]

The proliferation of marketplace financing sites in the last decade led some observers to declare "the beginning of a revolution in how the general public allocates capital."[197] Others welcomed it as a rising tide of ultimate "disintermediation."[198] However, the business quickly attracted sophisticated financial players able to conduct credit analysis and run risk models to tailor higher returns from their marketplace loan investments. Hedge funds, private equity funds, banks, insurance companies, and wealthy individuals became the primary buyers of marketplace loan products,[199] which generally have

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[193] *See* Prosper Marketplace, Inc., https://www.prosper.com/help/general/#protection. The model was pioneered in the United Kingdom by Zopa, which launched the first peer-to-peer lending platform in 2005.

[194] RICHARDS KIBBE & ORBE LLP, 2015 SURVEY OF U.S. MARKETPLACE LENDING, *available at* http://www.rkollp.com/assets/attachments/RKO%20Lender%20Survey.pdf.

[195] *See* Renaud Laplanche, *Five Big Myths about Marketplace Lending*, AM. BANKER (Jan. 28, 2015).

[196] Unlike banks, P2P platforms typically do not make loans using their own balance sheets: they simply find individuals willing to lend money to a particular borrower at a particular rate. In this model, even high-risk borrowers should be able to find potential lenders willing to take a small portion of the risk, if compensated accordingly. Banks and other balance-sheet lenders don't have such flexibility.

[197] C. Steven Bradford, *Crowdfunding and the Federal Securities Laws,* 2012 COLUM. BUS. L. REV. 1, 5 (2012).

[198] Andrew Verstein, *The Misregulation of Person-to-Person Lending*, 45 U.C. DAVIS L. REV. 445, 449 (2011).

[199] *See* Kevin Wack et al., *Innovation of the Year: Online Marketplace Lending*, AM. BANKER (Dec. 17, 2014). Thus, investment management giant BlackRock heavily investied in marketplace lending, while George Soros and former PIMCO CEO Mohamed El-Erian were among the high-profile individual investors. *Id.*

higher interest rates than traditional bank loans.[200] Many of these investments are leveraged and subsequently securitized.[201]

The entry of yield-hungry institutional investors led to increased competition in the sector and pushed marketplace lenders to grow their loan origination volumes, to diversify their loan products, and to consolidate.[202] Marketplace lenders now routinely form partnerships with banks and other institutional investors, pursuant to which banks and other investors commit to buying a certain percentage of whole loans originated by or through the marketplace platform.[203] To satisfy institutional investors' demand for this lucrative asset class, marketplace lenders intensified their borrower-acquisition efforts, partly by extending more high-risk loans.[204]

In short, within a decade, marketplace lending has effectively evolved from an alternative form of peer-to-peer finance into a post-crisis rendition of subprime lending and shadow-banking securitization.[205] In this sense, it functions as a classic channel of continuous synthesizing of tradable assets used to construct multi-layered and interconnected chains of financial claims. Rather than reinventing credit as a truly decentralized and democratic means of mutual self-help, today's marketplace lending operates primarily as a means of scaling up trading volumes in institutionally-dominated wholesale markets.[206]

By 2017, the tech-savvy public's attention had shifted to a new form of digital crowdfunding: "initial coin offerings," or ICOs. In an ICO, a firm planning to develop and produce some form of a digital product – e.g., new software – sells project-specific digital tokens that can be used as units of

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[200] For example, LendingClub has delivered an adjusted annualized return of nearly 8.7% on the first $8 billion of issued loans, and issued over $1 billion in personal loans carrying interest rate above 20%. Todd Baker, *Marketplace Lenders Are a Systemic Risk*, AM. BANKER (Aug. 17, 2015). In 2014, OnDeck, a marketplace platform specializing in small business lending, reportedly issued loans at an average annual percentage rate of 54%. Kenneth A. Posner, *Alternative Lenders Have a Ways to Go to Ensure "Revolution,"* AM. BANKER (Jan. 12, 2015).

[201] *See* Kevin Wack et al., *supra* note 199.

[202] *See* Kevin Wack, *Shakeout Is Coming, Marketplace Lenders Warn*, AM. BANKER (Apr. 16, 2015).

[203] *See* Kevin Wack et al., *supra* note 199; Mike Cagney, *How Marketplace Lenders Will Save Financial Services*, AM. BANKER (Aug. 19, 2015).

[204] *See* Baker, *supra* note 200.

[205] *See Finance Franchise, supra* note 8, at 1207.

[206] In June 2018, SoFi's CEO announced the company's new strategy of making loan decisions, funds disbursements, and securitizations instant. Penny Crosman, *SoFi's CEO Strategy for Success: 'Make every Transaction Faster',* AM. BANKER (June 20, 2018). This aptly underscores the significant potential of marketplace lending as a broad-based platform for the continuous synthesizing of high-yield assets and scaling up of secondary-market trading.

currency in purchaser's hands once the project launches.[207] Depending on the scheme, these tokens may be used for different purposes: some of them simply allow access to an online platform or grant participation and governance rights in a particular online network, others can be used to buy the product or service being funded, and yet others may entitle their holders to an actual portion of profits from the project in question.[208] The vast majority of ICOs to date are done using smart contracts on the Ethereum platform.[209] The key advantage of using Ethereum is that its technology allows for smooth post-ICO trading of the tokens: i.e., it enables the emergence of a secondary market in these new digital "assets."[210]

In 2014, Ethereum itself became one of the first examples of a successful ICO by raising about $18.4 million through pre-sales of ether, its native crypto-currency.[211] As the popularity and use of Ethereum as the platform of choice for various crypto-projects grew, the value of ether increased correspondingly, making it a valuable financial investment.[212] ICOs went mainstream in 2017, which saw hundreds of offerings raise billions of dollars.[213] Notably, the most successful ICOs of the year included ventures promising to improve the existing blockchain infrastructure, to offer a "better" cryptocurrency, or to make existing crypto-assets easier to monetize.[214]

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[207] *See supra* note 28 and accompanying text.

[208] *See* Wilson Sonsini Goodrich & Rosati, *Initial Coin Offerings: An Overview of Regulatory Considerations* (June 30, 2017), *available at* https://www.jdsupra.com/legalnews/initial-coin-offerings-an-overview-of-98251/.

[209] *See* CASEY & VIGNA, *supra* note 186 at 99. Ethereum is designed as a common platform for hosting an infinite variety of so-called "decentralized apps" (or "Dapps") for cryptographically recording and exchanging all manner of digitized data: medical records, land titles, titles to goods, marriage certificates, copyright and other rights, contractual payments, etc. Computers verifying transactions earn ether, Ethereum's cryptocurrency, whose value accordingly increases as the network grows. Ethereum's internal programming language allows third parties to write an unlimited variety of programs, thus enabling an unlimited variety of "smart contracts." *Id.* at 79-81.

[210] Ethereum's standardized set of smart-contract instructions allows various digital tokens to retain a common, consistent format allowing these tokens to be traded on top of Ethereum's blockchain even after the conclusion of an ICO. *Id.* at 102.

[211] *Id.* at 84, 99.

[212] *Id.*

[213] According to some estimates, the total amount raised in ICOs in 2017 exceeded $5.6 billion. Oscar Williams-Grut, *Only 48% of ICOs Were Successful Last Year but Startups Still Managed to Raise $5.6 Billion,* BUSINESS INSIDER (Jan. 31, 2018), *available at* http://www.businessinsider.com/how-much-raised-icos-2017-tokendata-2017-2018-1.

[214] Oscar Williams-Grut, *The 11 Biggest ICO Fundraises of 2017*, BUSINESS INSIDER (Jan. 1, 2018), *available at* http://www.businessinsider.com/the-10-biggest-ico-fundraises-of-2017-2017-12?r=UK&IR=T. The biggest ICO of 2017 was Filecoin, which raised about $257 million from sales of a token entitling its holders to blockchain-based data storage space. *Id.* Perhaps the most interesting case from the perspective of this Article was the SALT

To fintech enthusiasts, ICOs signal a profoundly democratic shift in market power from traditional venture capital firms to users of the relevant digital product or service.[215] Yet, it is undeniable that ICOs are often seen as purely speculative financial plays.[216] Throughout 2017, investors were ready to snap up ICO "assets," often in a matter of minutes, without much due diligence conducted in traditional securities offerings.[217] They didn't appear to worry about whether or not the tokens they were buying were related to an economically viable enterprise, or to *any* economic activity outside the crypto-asset space.[218] Undiscriminating investor demand for tradable tokens drove inflated ICO valuations, a familiar sign of a speculative asset boom.[219]

Predictably, surging ICOs raised alarm among financial regulators concerned with investor fraud and criminally-connected fund-raising.[220] From a systemic perspective, however, ICOs implicate a far more structurally significant shift. Complete virtualization of tradable assets enables – at least in principle, but very likely in practice as well – a virtually complete separation of the financial system from the real economy. Free of any "natural" productivity-related constraints, financial markets will easily morph into sites of pure crypto-speculation. Left unconstrained, this continuous generation of tradable bits of encrypted data will easily transcend the limits of traditional systemic stability regulation, leaving both the financial system and the real economy vulnerable to shocks originating in an increasingly self-referential crypto-space. It will also render regulators' task of protecting investors and capital markets from abuse and misconduct inherently impossible to perform via traditional means.

Lending Platform ICO, with the tokens designed to allow holders of cryptocurrencies to use them as collateral for borrowing in fiat currencies. *Id.*

[215] *See* Richard Waters, *To Coin a Craze: Silicon Valley's Cryptocurrency Boom*, FIN. TIMES (Sept.13, 2017).

[216] *Id.*

[217] *See* CASEY & VIGNA, *supra* note 186 at 103-104 (citing to an ICO by Gnosis, whose platform allows users to create prediction markets for betting on anything, in which the company raised $12.5 million in twelve minutes).

[218] *See* Waters, *supra* note 215.

[219] *Id.* Even high post-ICO failure rates did not dampen this speculative demand. *See* Aaron Hankin, *Nearly half of all 2017 ICOs failed*, MARKETWATCH.COM (Feb. 26, 2018), *available at* https://www.marketwatch.com/story/nearly-half-of-all-2017-icos-have-failed-2018-02-26.

[220] For example, China and South Korea banned ICOs in 2017. *See* Darryn Pollock, *From Gibraltar to Australia: How Countries Approach ICOs*, COINTELEGRAPH.COM (Feb. 16, 2018), *available at* https://cointelegraph.com/news/from-gibraltar-to-australia-how-countries-approach-icos. In the U.S., the SEC announced that certain ICOs may constitute securities issuances subject to federal securities laws. *See* https://www.sec.gov/ICO.

2. Robo-Advising: Scaling Up Trading

Robo-advisors are "automated interfaces that offer investment advice and discretionary investment management services without an intervention of a human advisor, using algorithms and asset allocation models that are advertised as being tailored to each individual's investment needs."[221] Robo-advising is quickly becoming a mainstream financial service. Charles Schwab, Vanguard, and Fidelity offer robo-advising services.[222] Even Morgan Stanley, one of Wall Street's most venerable investment banks, launched a robo-advising unit in December 2017.[223]

Because robo-advisors eliminate expensive human labor and use algorithmic trading to maintain or adjust clients' portfolio allocations, their services are significantly cheaper than those of traditional wealth managers.[224] Robo-advisors are potentially able to offer relatively simple and cost-effective investment options – mainly, index mutual funds and passive exchange-traded funds (ETFs) – to a wider array of clients.[225] The absence of human intervention is also touted as an attractive feature of robo-advising because it promises to eliminate potential conflicts of interest plaguing the fund management industry.[226] For these reasons, proponents of robo-advising routinely portray it as a valuable tool of financial inclusion and "democratizing" wealth management by broadening its availability beyond the exclusive world of wealthy people.[227] Critics, on the other hand, contest these claims as significantly overstating the cost-efficiency and integrity of robo-advice and warn against channeling retirement and retail investors' money into these automated accounts.[228]

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[221] Chiu, *supra* note 4 at 88. Robo-advisors rely on online questionnaires, filled out by prospective clients, to devise asset allocation and trading strategies that most closely track each client's expressed investment goals, preferences, and general risk parameters.

[222] *See* Matthew Frankel, *Robo-Advisers: What They Cost and What You Get*, MOTLEY FOOL (Nov. 13, 2017), *available at* https://www.fool.com/retirement/2017/11/13/robo-advisors-what-they-cost-and-what-you-get.aspx. Charles Schwab and Vanguard are, of course, already well known as pioneers in democratizing access to wealth management.

[223] Maria Terekhova, *Morgan Stanley Launches a Robo-Adviser After 6 Month Pilot*, BUSINESS INSIDER (Dec. 5, 2017), http://www.businessinsider.com/morgan-stanley-launches-a-robo-advisor-after-16-month-pilot-2017-12.

[224] Chiu, *supra* note 4 at 89.

[225] *Id.*

[226] *Id.* For an easily accessible and comprehensive account of pervasive agency problems in the mutual fund industry, see WILLIAM A. BIRDTHISTLE, EMPIRE OF THE FUND: THE WAY WE SAVE NOW (2016).

[227] *See* Deloitte, *The Expansion of Robo-Advisory in Wealth Management* (Aug. 2016), https://www2.deloitte.com/content/dam/Deloitte/de/Documents/financial-services/Deloitte-Robo-safe.pdf.

[228] *See, e.g.*, Melanie Fein, *Robo-Advisers: A Closer Look* (June 30, 2015), *available at* https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2658701.

It is hardly surprising that the continuing growth of robo-advising invites debate. Replacing humans with algorithms in an area traditionally based on relationships and exercise of professional judgment by trusted fiduciaries is not simply a matter of lowering fees. It raises a host of important legal and regulatory issues, especially with respect to advisors' fiduciary duties and investor protection under securities laws.[229] These issues, however, are beyond the scope of this Article. For present purposes, it is critical to focus on the broader potential systemic significance of robo-advising.

One important factor in this respect is that the lower cost – and thus broader accessibility – of robo-advising is not simply a result of eliminating the expense of hiring a human expert. This cost efficiency is also a product of passive index-tracking strategies typically pursued by robo-advisers. Robo-advice tends to channel clients' money into ETFs and other passive investments, often also determined by algorithms, which are inherently cheaper than actively managed fund products.[230]

In this sense, robo-advising appears to amplify both fundamental patterns of secondary market growth, discussed above: it enables synthesizing of new tradable assets, and it serves to scale up the aggregate trading activity in financial markets.[231] Reaching significant segments of the population previously unable to participate in capital markets potentially improves ordinary people's access to investment opportunities. At least as importantly, however, it also improves the market's "access" to their savings. Through robo-advising, new market entrants' money is used to create new financial products that can then be pooled and layered, potentially many times over. This constant influx of new "base" products is critical for sustaining the financial market's built-in tendency to keep scaling up.

Furthermore, as discussed above, the central role of algorithmic trading in the robo-advising business model has a direct – and potentially massive – acceleration effect on financial asset trading.[232] The fact that, in generating all of this additional trading activity, robo-advisers tend to use similar algorithms raises serious stability-related concerns about potential herding behavior and the possibility of rapid unidirectional portfolio shifts.[233] Not only are there many more super-fast trades being executed via robo-advisors' algorithms, these trades are likely to form potentially highly correlated tidal

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[229] *See, e.g.*, Chiu, *supra* note 4; Melanie Fein, *Are Robo-Advisors Fiduciaries?* (Sept.5, 2017), *available at* https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3028268.

[230] FINANCIAL STABILITY BOARD, *Financial Stability Implications from Fin Tech: Supervisory and Regulatory Issues that Merit Authorities' Attention* (27 June 2017), at 43-45, *available at* http://www.fsb.org/wp-content/uploads/R270617.pdf.

[231] *See supra* Part II.B.

[232] *See supra* Part II.B.2.c.

[233] FINANCIAL STABILITY BOARD, *supra* note 230, at 45-46.

waves of money moving in and out of the same asset classes.[234]

In fact, there are serious reasons to believe that the real driver behind the rapidly rising popularity of robo-advising is not the commonly touted "democratizing" impulse but the growing appeal of algorithmic trading as a portfolio-enhancing strategy for wealthy investors. Thus, it appears that robo-advisors are increasingly targeting wealthy (or relatively wealthy) investors who are already in the market, rather than the truly "under-served" low-income people.[235] Many large robo-advisors are introducing minimum account balance requirements for access to digital investment services, ranging from $25,000 to $50,000 and possibly higher.[236] For this contingent of wealthy investors, robo-services are a source of new, cost-efficient portfolio diversification opportunities. In line with the same logic, Morgan Stanley's robo-advising unit is said to target primarily the Millennial children of the bank's existing clients.[237]

Tellingly, there are stark parallels between these developments and the dynamics in marketplace lending, discussed above. There, what started as a promise of a peer-to-peer credit system quickly evolved into another rendition of the institution-dominated market for high-yield consumer debt.[238] Here, what started as a promise of opening the world of investment to the poor is quickly evolving into the reality of opening the world of (yet more) speculative trading to the wealthy.

As these examples demonstrate, technology alone cannot make the financial system more "democratic" or "just." Democratizing finance cannot be reduced to a purely technical exercise in decentralizing financial services or making them cheaper through the use of algorithms. It is an inherently *political* exercise, and only a democratic polity can achieve that goal through a coherent and comprehensive program of institutional reforms.[239] The real

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[234] *Id.*

[235] *See* Bryan Yurcan & Suleman Din, *Will Cheap Advice Turn Off Wealthy Clients?* AM. BANKER (June 5, 2018), *available at* https://www.americanbanker.com/news/fifth-third-securities-and-fidelity-partner-on-automated-advice-for-small-investors?utm_campaign=intraday-c-Jun%205%202018&utm_medium=email&utm_source=newsletter&eid=12a6d4d069cd56cfddaa391c24eb7042 (discussing how large financial institutions' robo-advising services target the "mass affluent audience").

[236] *Id.* ("Wells Fargo and U.S. Bank have digital advice account minimums double that of Fifth Third's. And by blending human service with digital platforms, other firms have sought wealthier clients. Schwab's Intelligent Advisory service has a $25,000 account minimum, while Vanguard's Personal Advisor Services (the largest digital advice platform, with over $100 billion in assets under management) has a $50,000 account minimum.").

[237] *See* Terekhova, *supra* note 223.

[238] *See supra* Part III.B.1.

[239] For a comprehensive theoretical and practical analysis and justification of, and specific proposals for implementing, such institutional reform, see, e.g., *Public Actors, supra*

question is whether the exciting new technology will be used to aid or to impede this process.

C. Fintech as a Systemic Phenomenon: Unsettling the Public-Private Balance

This brief overview of certain key developments in the rapidly evolving fintech sector is not meant to be an exhaustive catalogue of everything that this sector has to offer. Nor does it claim to present a full analysis of specific legal, technical, and policy issues these developments raise.[240] Instead, the purpose of the present discussion is to trace the fundamental continuity behind the fintech "disruption," in search of a new conceptual and normative perspective for understanding fintech as a systemic phenomenon.

Standard accounts of the systemic implications of fintech activities tend to present lengthy sets of fintech-related factors that are likely either to reduce various systemic risks or to amplify them. Some of the commonly listed financial stability enhancers include, for example, systemic risk-reducing effects of making transacting faster and easier (i.e., eliminating market "frictions") and greater competition in the financial services industry.[241] Potential systemic risk amplifiers, on the other hand, include the heightened tendency toward herding behavior and procyclicality, greater vulnerability to technical glitches and operational failures, and the rise of systemic importance of non-financial firms.[242]

Although these are valid and serious arguments worthy of attention and study, the focus of this Article is on the deeper – and broader – dynamics within the financial system. As argued above, the New Deal political settlement established the fundamental balance of public and private roles, competencies, and responsibilities in the financial sphere.[243] Under its terms, private market participants are primarily in control of allocating financial capital, while sovereign public is primarily responsible for maintaining the macro-financial stability.[244] From this perspective, the emerging fintech technologies and activities are not merely recreating some of the familiar sources of systemic risk or rearranging the familiar institutional landscape of financial services. At the higher level of magnitude, fintech's systemic impact has to be assessed in terms of its potential to cause a decisive shift in the currently existing public-private balance in finance.

While it is difficult to generalize across the evolving and varied fintech

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note 39; *National Investment Authority, supra* note 39.

[240] For recent analyses of these issues, see sources cited *supra* notes 3-4.

[241] *See* FINANCIAL STABILITY BOARD, *supra* note 230, at 16-17.

[242] *Id.* at 20-21.

[243] *See supra* Part I.B.

[244] *Id.*

space, the new technologies' self-proclaimed unifying *raison d'être* is qualitative transformation and optimization of transactional capacity in financial markets. Importantly, that refers primarily, if not exclusively, to *private* transacting capacity.[245] In some instances, this goal of directly empowering the private, as opposed to the public, side of the financial market is quite explicit. Bitcoin enthusiasts, for example, openly tout that cryptocurrency's ambition and ability to do away with sovereign governments' control over money.[246] In most instances, however, the rhetoric of fintech consciously emphasizes its potential to yield significant *public* benefits: financial inclusion, greater financial autonomy, and greater convenience, among other things.[247]

Yet, even a brief examination of these new technologies reveals the sense in which they systematically tip the scale in favor of the *private*, as opposed to the public side of the New Deal settlement. By making transacting in financial markets infinitely faster, cheaper, and easier to accomplish, fintech critically augments the ability of private actors to synthesize tradable financial claims – i.e., private liabilities – and thus generate new financial risks on an unprecedented scale. Moreover, as the discussion of Bitcoin and ICOs shows, new crypto-technology enables private firms to synthesize tradable financial assets effectively out of thin air.[248] This may be thought of as the crucial last step in the decades-long process of virtualization of financial claims – e.g., through creation of derivatives and other highly structured financial products – which will finally render financial markets *entirely* self-referential.

It is difficult to overestimate the significance of this leap for the financial – and, more broadly, economic – system. Making financial trading explicitly divorced from the production of any actual goods or services in the real, or non-financial, economy will have enormous consequences both for financing and organizing the entire economic system and for managing the financial sector.

Among other things, it will make it increasingly difficult, if not impossible, for the sovereign public to continue safeguarding and guaranteeing macro-financial stability. The sheer scale and complexity of the financial market effectively "liberated" from exogenously imposed constraints on its growth will make it inherently more volatile and unstable –

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[245] This is, of course, natural, given that most fintech applications are being developed by profit-seeking private market participants. Governments may and do participate in fintech projects, especially as they explore potential for issuing sovereign cryptocurrencies, but they have not yet commandeered any particular technology for principally public use.

[246] *See* Lastra & Allen, *supra* note 157 at 18-20.

[247] *Id*. *See also, Treasury Report*, *supra* note 3, at 17.

[248] *See supra* Part III.A.1.

and, consequently, both far more dependent on public support and requiring far greater quantities of such support. The same factors, however, will also make it increasingly difficult, if not impossible, for the public to control, or even track, new technology-driven proliferation of risk in the financial system. Moreover, the underlying policy rationale for the public accommodation of privately created financial liabilities – i.e., the publicly salient role of financial markets in channeling investments in the real economy – will effectively disappear. In short, in this new environment, the public will be forced to bear a vastly greater (and difficult to quantify in advance) burden of stabilizing an increasingly unstable and uncontrollable financial system that keeps growing for the sake of its own growth.

The key point here is not to assert the inevitability of this, or any other, specific scenario. My purpose is to show why fintech as a *systemic* phenomenon cannot be reduced to a mere collection of specific transactional friction-solving tools. Fintech has to be appreciated for its potentially game-changing effect on the existing balance of public and private power to define the fundamental purpose and direction of the financial system. Even at this early stage, it is increasingly apparent that various forms of "disruptive" fintech technologies, in fact, operate in tandem with and amplify the same long-standing financial market dynamics – pooling and layering of financial assets and acceleration and compression of financial transactions – that have been gradually eroding the New Deal settlement. If (or when?) fintech delivers on its promise to make these mechanisms virtually frictionless, thus taking their operation to a qualitatively different level, the financial market will completely forsake the frail confines of the New Deal settlement. We need to start thinking seriously about what should replace it. In this sense, fintech is ultimately a matter of public policy of the highest order.

CONCLUSION

Fintech is visibly "disrupting" traditional methods of delivering financial services and conducting financial transactions. Less visibly, it is also changing the way we think about finance and envision its future trajectory. The rise of fintech is gradually recasting our collective understanding of the financial system in seemingly objective – science-driven and normatively neutral – terms, as simply another sphere of applying advanced information technologies and computing power to eliminate specific transactional "frictions" in financial markets. By making transacting faster, easier, cheaper, and instantly adjustable to individual parties' needs and preferences, new technology seems to promise a "win-win" solution to the financial system's many ills.

This Article has presented an alternative account of fintech as a systemic, as opposed to merely transactional, phenomenon. Grounding the evolving

fintech trends in the broader institutional context of the financial markets' operation, the Article exposed the normative and political significance of the current fintech moment. The arrival of these new-generation technologies enables a potentially decisive shift in the underlying balance of the sovereign public's and private actors' relative powers, competencies, and roles in the financial system. By making transacting faster, easier, cheaper, and instantly adjustable to individual parties' needs and preferences, new technology is empowering private actors to engage in virtually unconstrained financial speculation. Unless the public side proactively counters new technologies' potentially destabilizing systemic effects, it may soon find itself in an impossible position of having to back up an uncontrollable and unsustainably self-referential financial system.

To be clear, the purpose of this Article is not to over-dramatize potential dangers, or to deny potential benefits, of fintech. Far from it. New technology opens a wide range of previously inconceivable possibilities for improving our shared financial lives and for creating fuller, more capacious forms of financial citizenship.[249] At this relatively early stage, it would be premature to issue any definitive conclusions as to what fintech's ultimate impact on society is going to be, or what specific risks individual technologies are going to pose to financial stability. It is vitally important, however, to take an informed systemic view of the unfolding fintech "revolution" well before these risks materialize. Only by doing so can we begin harnessing the transformative power of fintech for our collective long-term benefit. This Article takes a critical first step toward that goal.

[249] For a fascinating, and fascinatingly optimistic, account of these possibilities, see CASEY & VIGNA, *supra* note 186.

RESPONSES TO WRITTEN QUESTIONS OF SENATOR BROWN FROM STEVEN BOMS

Q.1. Given that companies like Google and Facebook collect enormous amounts of information, and are also in a position to influence what information consumers are exposed to. For example, Facebook might show payday loan or private student loan advertisements to servicemembers or to minorities but not its other users.

Should fair lending laws be updated to cover not just the provision of credit, but also targeted advertisement of such products on social media platforms?

A.1. CFDR members believe that fair lending laws represent important public policy. The content of those laws, however, is determined solely by Congress and, when authority is delegated, to regulatory agencies. Each company in the CFDR membership—which does not include Google, Facebook, or any similar "big tech" company that operates a social media platform—strives to abide by all applicable fair lending laws, at both the State and Federal levels, and will continue to abide by fair lending laws if they should change in response to your concerns addressed in the predicate to this question.

RESPONSES TO WRITTEN QUESTIONS OF SENATOR SCOTT FROM STEVEN BOMS

Q.1. My "Making Online Banking Initiation Legal and Easy"—or MOBILE—Act allowed banks and credit unions to use a scan of a driver's license through a mobile device to verify a customer's identity when opening an account.

Approximately 16 million adults live in households without a checking or savings account and an additional 51 million adults live in households that rely on nonbank lenders with sky-high interest rates.

Yet about 90 percent of unbanked and underbanked adults own a mobile phone, of which 75 percent are smartphones.

Please answer the following with specificity:

What impact does linking personal finance with mobile and data technologies have on the financial well-being of consumers?

A.1. The ability to link personal finance with mobile and data technologies could significantly decrease the number of unbanked or underbanked households in the United States. The first step in analyzing the impact of a more seamless flow of data transfer through mobile technology would be to asses why these householders are unbanked or underbanked. For some, including those who live in rural communities, it may be that the nearest branch bank has closed and that the next closest bank is tens of miles away. For others, it may be a distrust of the traditional banking system, informed perhaps by prior bad experiences or lack of knowledge about the services and solutions offered. Either way, having access to—and actually availing oneself of—financial services products is critical to consumer financial wellness as it helps families manage budgets, establish credit, pay bills, and save for the future.

The mobility of technology driven by the near ubiquity of modern mobile telephones and digital networking holds great promise to reach underserved areas of the country with tailored financial services solutions. The MOBILE Act is a great example of a forward-thinking legislative approach that embraces new ways of using and transmitting data. CFDR supports Congress's building on this success to further erode barriers to the free flow of consumer-permissioned data across interfaces so that all consumers, whether presently underserved or not, can make the best use of a 21st century, mobile, data-driven financial services marketplace.

RESPONSES TO WRITTEN QUESTIONS OF SENATOR BROWN FROM BRIAN KNIGHT

Q.1. Given that companies like Google and Facebook collect enormous amounts of information, and are also in a position to influence what information consumers are exposed to. For example, Facebook might show payday loan or private student loan advertisements to servicemembers or to minorities but not its other users.

Should fair lending laws be updated to cover not just the provision of credit, but also targeted advertisement of such products on social media platforms?

A.1. It is reasonable and appropriate to prohibit social media platforms from enabling lenders to use prohibited characteristics to target or withhold credit offers, and regulators should have the ability to enforce this prohibition. An illustrative example in a related area is found in the Assistant Secretary for Fair Housing and Equal Opportunity filing's of a housing discrimination complaint against Facebook for violations of the Fair Housing Act.[1] In its complaint, the assistant secretary alleges that Facebook allowed advertisers of housing and housing-related services to directly target or withhold ads on the basis of protected classes such as race, religion, age, and gender. Such conduct should be prohibited.[2]

The question of whether social media sites should be prohibited from using neutral data that may correlate with protected classes is more complex. Concerns about disparate impact must be balanced with the fact that accurate algorithms based on neutral data may also be the most effective way to communicate useful information to potential customers. Additionally, seeking to prohibit the use of algorithms using neutral data for conveying ads to customers could face potential constitutional issues.[3] Beyond identifying these potential issues, I have not done sufficient study to come to a conclusion on the issue.

---

[1] Anna Maria Farias, "Housing Discrimination Complaint: Assistant Secretary for Fair Housing and Equal Opportunity v. Facebook, Inc.", August 13, 2018, *https://www.hud.gov/sites/dfiles/PIH/documents/HUD_01-18-0323_Complaint.pdf.*

[2] Facebook has not been found liable for any such acts, and to my knowledge it has not admitted to the allegations in the Assistant Secretary's complaint.

[3] Some courts have found that algorithms like those used by Google are speech protected by the First Amendment. See Langdon v. Google, Inc., 474 F. Supp. 2d 622, 629–30, (D. Del. 2007). Additionally, the Supreme Court in Texas Department of Housing and Community Affairs v. Inclusive Communities Project, Inc., acknowledged that disparate impact liability must be limited to avoid "serious constitutional questions." See Texas Department of Housing and Community Affairs v. Inclusive Communities Project, Inc., 135 S. Ct. 2507, 2512 (2015).

RESPONSES TO WRITTEN QUESTIONS OF SENATOR HELLER FROM BRIAN KNIGHT

Q.1. In Nevada, Industrial Loan Companies (ILCs) play an important role in our economy. There is a growing demand for ILCs which have proven to meet consumer needs throughout the country. The current FDIC Chair has said that she welcomes ILC applications. Do you believe that a FinTech company that meets FDIC requirements should be allowed to be chartered as an ILC?

A.1. Expanding competition and innovation in banking services will benefit consumers. Therefore, we should have a presumption that a FinTech firm that meets the statutory and regulatory requirements for an ILC charter should be granted a charter. Risks created by granting a charter could likely be addressed through existing regulation and competition protection mechanisms. To the extent that additional protections or limitations are needed to handle unique circumstances, Congress should pass legislation to create those protections or limitations.

RESPONSES TO WRITTEN QUESTIONS OF SENATOR REED FROM SAULE T. OMAROVA

Q.1. In your testimony, you state that "Technology is not an end in and of itself, it is merely a tool: it can be used to improve our collective future or to destroy it. The Committee's task is to ensure that the latter does not happen, while everybody is looking the other way." You also mention elsewhere in your testimony that FinTech could lead to "potentially systematic misallocation of credit, and other cross-sectoral abuses of market power."

Could you please provide us with a couple of concrete examples of precisely what we should be trying to avoid? Do you have any suggestions for how to avoid these examples?

A.1. Finance is the lifeblood of the economy, and information is the lifeblood of the digital economy. By definition, "FinTech" combines both. That means that FinTech firms, either individually or as a group, can potentially exercise an unprecedented degree of control over the flow of money, information, and physical goods in e-commerce—all at the same time. This potential for extreme concentrations of power across previously separate economic markets raises a spectrum of significant public policy concerns, including concerns about dominant FinTech conglomerates stifling (instead of promoting) competition in affected markets and misallocating financial and other economic resources throughout the economy.

More narrowly, it also implicates the venerable U.S. principle of separating banking from commerce. Goldman Sachs' recent foray into metals warehousing provides a recent real-life example of how a large financial institution can combine and abuse market power across different, seemingly unrelated, markets. Thus, it has been well-documented how Goldman Sachs' acquisition of Metro, a metals warehousing company, allowed it to control supply—and therefore price—of aluminum in North America, by creating artificial bottlenecks in the delivery of physical aluminum to purchaser-companies. Goldman Sachs' control over the critically important storage facilities gave it both the incentive and the ability to drive up the price of aluminum to benefit its own physical commodities trad-

ing and financial derivatives operations. The artificial rise in the price of aluminum, however, significantly increased American companies' production costs and ultimately resulted in higher consumer prices for a wide range of products, from soft drinks to automobiles.

Big FinTech conglomerates are well-positioned to commit similar abuses of market power on a far larger scale. This is one of the principal reasons why the direct or indirect formation of such conglomerates, in any organizational from, should not be permitted as a matter of public policy and public interest.

Here is a simple hypothetical example of what can happen if, among other things, the Federal Reserve narrows its presently flexible interpretation of what constitutes "controlling influence" under the Bank Holding Company Act of 1956 (the "BHC Act"). Thus, Amazon Inc. can buy 24.9 percent of voting equity in multiple U.S. deposit-taking banks, without technically being deemed a "bank holding company" (or "BHC"). As a result of the Federal Reserve's newly "clarified" interpretive approach, Amazon can easily structure these equity acquisitions in a way that leaves it free to continue all of its online commerce, logistics, cloud warehousing, and other data management businesses. Yet, Amazon's size and power in these markets will effectively guarantee it a de facto ability to exercise outsized control over each individual bank's management and business decisions. Amazon's heft as a potential business client, a service provider, or a strategic partner will put it in the driver's seat with respect to the banks in which it technically holds "noncontrolling" stakes (let us call them "Amazon-owned banks," for simplicity's sake).

Amazon can then use its outsized de facto power over these Amazon-owned banks to do the following:

- It can get sensitive financial or other information on its competitors—i.e., various nonfinancial companies that also happen to be Amazon-owned banks' banking clients—and then uses that information either to drive those companies out of business or to force them to do business with Amazon on unfavorable terms.
- Amazon can also pressure Amazon-owned banks to extend credit to businesses affiliated with or favored by Amazon, which will give it additional leverage over those "favored" companies and thus increase its market power in the affected sectors.
- Amazon can also make Amazon-owned banks refuse credit to its direct competitors or to any other "un-favored" local companies.

In each case, Amazon's self-interested behavior will result in significant market distortions and inefficiencies and compromise federally insured banks' ability to perform the critical task of channeling capital to its more productive uses in the real economy. From this perspective, allowing the formation of big FinTech (or TechFin) conglomerates will pose a grave danger to the country's long-term economic growth—and, ultimately, its social and political stability.

To prevent this and many other similarly dangerous outcomes, it is crucial that policymakers always place the arguments that, in one way or another, call for "facilitating innovation" or "modernizing financial regulation" in the context of how they impact the broader financial and economic market structure and integrity. Rhetoric notwithstanding, no FinTech-related proposals and arguments that could potentially result in the creation of large finance-technology (or tech-finance) conglomerates should be adopted into actual policy.

ADDITIONAL MATERIAL SUPPLIED FOR THE RECORD

LETTER FROM THE AMERICAN ACADEMY OF ACTUARIES SUBMITTED BY CHAIRMAN MIKE CRAPO

September 17, 2018

Honorable Mike Crapo
Chairman
Committee on Banking, Housing,
and Urban Affairs
U.S. Senate
534 Dirksen Senate Office Building
Washington, DC 20510

Honorable Sherrod Brown
Ranking Member
Committee on Banking, Housing,
and Urban Affairs
U.S. Senate
534 Dirksen Senate Office Building
Washington, DC 20510

Re: Full Committee Hearing: *Fintech: Examining Digitization, Data, and Technology*

Dear Chairman Crapo and Ranking Member Brown:

On behalf of the American Academy of Actuaries[1] Big Data Task Force, I would like to take the opportunity to provide the following for the official record for the Senate Committee on Banking, Housing, and Urban Affairs' full committee hearing *Fintech: Examining Digitization, Data, and Technology*, scheduled for Tuesday, Sept. 18, 2018.

Earlier this summer, the Academy's Big Data Task Force published a new monograph, *Big Data and the Role of the Actuary*. The monograph examines how Big Data is providing actuaries with powerful new analytical tools and opportunities to work with data, with a focus on current and emerging practices, regulatory considerations, and professionalism. We welcome the opportunity to discuss the monograph in more detail with you and your staff, as well as with other members of the committee.

*****

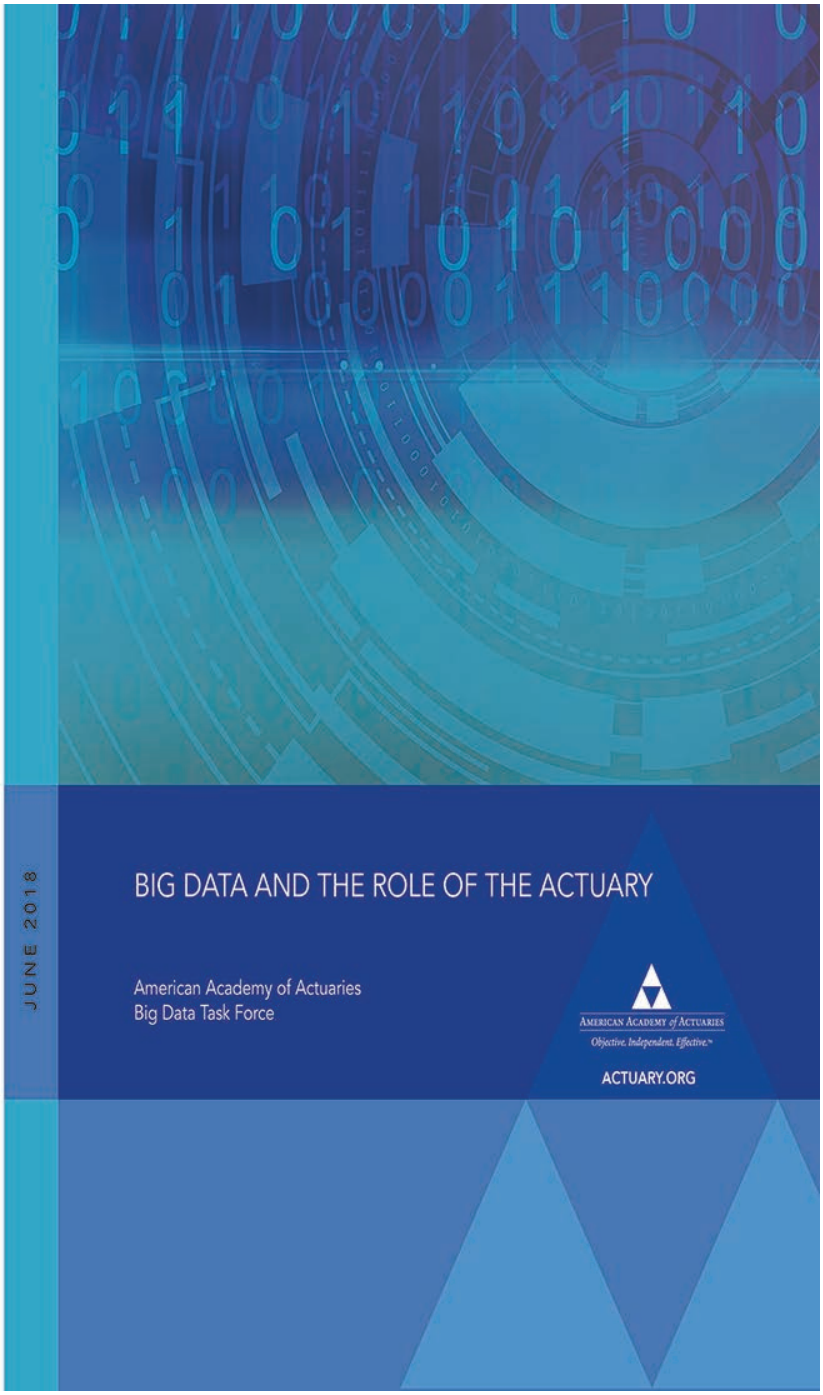
[1]The American Academy of Actuaries is a 19,500-member professional association whose mission is to serve the public and the U.S. actuarial profession. For more than 50 years, the Academy has assisted public policymakers on all levels by providing leadership, objective expertise, and actuarial advice on risk and financial security issues. The Academy also sets qualification, practice, and professionalism standards for actuaries in the United States.

We appreciate the opportunity to provide these comments. If you have any questions or would like to discuss further, please contact Nikhail Nigam, the Academy's policy analyst for risk management and financial reporting issues, at 202-223-8196 or nigam@actuary.org.

Sincerely,

Robert Beuerlein, MAAA, FSA, FCA, CERA
Chairperson
Big Data Task Force
American Academy of Actuaries

CC: Members of the Senate Committee on Banking, Housing, and Urban Affairs


JUNE 2018
BIG DATA AND THE ROLE OF THE ACTUARY
American Academy of Actuaries
Big Data Task Force
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Big Data and the Role of the Actuary

JUNE 2018

American Academy of Actuaries
Big Data Task Force

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Executive Summary

Remarkable advances have been made over the past decade in the use of Big Data, including the Internet of Things, machine learning, cognitive computing, and artificial i telligence, and the fiel continues to evolve. These advances have led to the development of a multi-billion-dollar industry referred to as InsurTech, the innovative use of technology in insurance, which is expected to have a significant impact on insurance and the work that actuaries perform.

While the use of Big Data in the property and casualty insurance area is more developed than in some of the other areas of actuarial practice, signifi ant advances have been made in recent years in the use of Big Data in health and life insurance. Similar advances in the pension area have not been as noticeable. However, it can be expected that over the next decade, all areas of actuarial practice will be signifi antly impacted by the use of Big Data.

What Is Big Data?

"Big Data" has become a common term and topic of discussion throughout the world. A glance at any news outlet will likely fi d a story that describes some facet of the Big Data phenomenon.

Broadly speaking, Big Data refers to the collection of extremely large data sets that may be analyzed using advanced computational methods to reveal trends, patterns, and associations.

Big Data can support numerous uses, from search algorithms to InsurTech. The defin tion of Big Data generally includes the "5 V's":

- ***Volume*** Large amounts of data are collected and require processing.
- ***Velocity*** Data is available and must be processed at lightning speed, frequently instantaneously.
- ***Variety*** The data being used comes in different forms.
- ***Veracity*** The reliability of the data is not uniform.
- ***Value*** The data being extracted must be usable or be able to be monetized.

Big Data is not only about data. New, advanced tools are available that enable Big Data to be processed and utilized in ways that were not previously possible. These tools include data handling capabilities and computational techniques such as predictive analytics and advanced algorithms that have signifi antly increased data speed and storage capacity.

With the rapid advances in the availability of data and the development and proliferation of advanced data analytics techniques, the insurance industry's interest in Big Data analytics capabilities has grown commensurately. InsurTech is the use of recent technology to bring effici cies and innovation to the insurance industry. It has led to new products, new distribution channels, new risks for insurance companies, and changes to claims handling methods. It also can lead to greater emphasis on market conduct examinations, potential jurisdictional arbitrage, and a more complex regulatory environment. As the utilization of Big Data becomes a potential disruptor for the insurance industry, the need for professionals who are bound by a code of conduct, adhere to standards of practice and qualifi ation, and subject to counseling and discipline if they fail to do so, will become more apparent.

The American Academy of Actuaries' Role

The focus of the American Academy of Actuaries regarding Big Data has been and will continue to be around the concepts of professionalism and public policy. From a public policy standpoint, the Academy continues to work with regulatory bodies on how these complex issues impact the public through the regulation of insurance and governance of retirement systems. The American Academy of Actuaries continues to work with policymakers and regulators to address and refi e regulatory frameworks in which Big Data work may appropriately be governed.

From the perspective of the U.S. actuarial profession, the pillars of actuarial professionalism—the Code of Professional Conduct, actuarial standards of practice, and U.S. Qualifi ation Standards—provide a framework for actuaries to perform actuarial services related to Big Data.

Data Analytics Techniques and Methodologies

With regard to advanced data analytics techniques for Big Data, four types exist:

- Descriptive: What happened?
- Diagnostic: Why did it happen?
- Predictive: What will happen?
- Prescriptive: What should I do?

Most insurers have a long history of performing descriptive and diagnostic analytics. Included in diagnostic analytics are traditional statistical inference techniques that seek to characterize the relationships between variables or elements. Recently, there has been a signifi ant increase in the use of predictive analytics that differs from traditional inferential statistics in that it is not concerned with proving the "why" behind what's driving a relationship but only with whether variables help predict a given outcome objective. Determining the optimal action to take considering these analytics is the function of prescriptive analytics.

Descriptive data analysis and feature extraction/selection, as well as data visualization, use sophisticated mathematical tools, including principal component analysis, ridge and lasso regressions, and clustering algorithms. Understanding the data and the relationships between variables is of utmost importance before engaging with the models designed to predict. Visualization tools such as box-plots, histograms, scatter diagrams, and scatter matrix are used for this task.

When using these techniques, actuaries need to consider that it is not always possible to develop a precise and defin tive formula where complex human behavior is involved. Accordingly, actuaries need techniques in addition to predictive analytics to signifi antly increase their understanding of anticipated behavior or events and support their strategies and decisions. Th s becomes a professionalism issue for actuaries.

Regulatory Considerations

Benefits and hallenges to Insurers, Regulators, and Consumers

Despite its potential, there are a number of concerns regarding Big Data that impact insurers, regulators, and consumers.

Insurers

The use of predictive analytics can lead to a better understanding of risk than traditional methods. New sources of data not only increase dimensionality of data dramatically, but also allow for the use of more direct indicators of individual risk. New methodologies allow for a potentially better understanding of risk drivers and relationships between them, as well as detecting potential fraud. The benefit of a better understanding of risk is protection against adverse selection and improved reserve adequacy, such as with health care models that can be used to more accurately predict utilization of health care services.

Potential drawbacks of new insurance models driven by predictive analytics include disruptions the fundamental pricing principles of the industry, such as the collapse of the law of large numbers, disruptions in risk peaks and subsequent difficulty in assessing short-term risk, and premium inadequacy resulting from both new pricing models and substantial upfront build costs.

Regulators

Regulators may benefit from better advance knowledge of outcomes and could apply some predictive analytics techniques directly to their review processes. Potential benefits for regulators include the enabling of a more streamlined process for approval of pricing and rate filings as well as scanning of annual statement filings to detect previously unknown patterns. Regulators can also use predictive analytics to detect fraud.

Reviewing predictive analytics can be a challenge to regulators given the amount of data used to develop a model, the complexity of the techniques, and limited regulatory resources. Regulators also may have difficulty explaining complex models to consumers and other interested parties who are trying to understand the impact of the models on insurance rates. The NAIC Big Data (EX) Working Group is proposing additional support for regulators for reviewing new models that contain predictive analytics capabilities.

Consumers

Analytics can lead to more competition and more competition can lead to more options for consumers. Predictive analytics can result in quicker decisions on underwriting, where allowable, because of the use of external data. Claim settlement can also be accelerated using predictive analytics. Analytics also can result in better offerings by insurers to policyholders from the use of external data that can help inform decisions regarding better fit of coverage.

The main challenge to consumers is lack of transparency: trying to understand the data and analytics being used to determine their eligibility for products and the price they are being charged. It may not be clear to the consumer how they are being underwritten or what behaviors they can modify or steps they can take to get a better rate. A potential issue with pricing based on predictive analytics is that it can lead to more granular pricing, which benefits some consumers but not others. Th s broader distributed range of prices could be perceived as unfair. Privacy issues are also a concern for consumers because of a lack of transparency regarding how data is collected and used.

Existing Regulatory Framework

The legal and regulatory requirements that potentially govern the use of Big Data by insurers at the state, federal, and international levels fall into two categories: 1) those designed to protect consumers in general; and 2) those intended to prohibit discrimination against certain protected classes of individuals.

Emerging Regulatory Developments

NAIC Activity (NAIC Big Data (EX) Working Group)

Advances in statistical modeling techniques and evolving sources of data are challenging existing regulatory processes. Methods, such as those used to calculate premiums, are more complex than ever before. Current algorithms and models are not as easy to understand and follow as traditional algorithms. In addition, with the exploding availability of data, including consumer data, insurers are utilizing types of data not previously incorporated into advanced modeling techniques. Moreover, for many aspects of the insurance business, companies differ in methods and approaches employed and in their documentation and explanation of such methods and approaches.

The complexity and evolution of the methods and approaches used by insurers is threatening to outpace the rate at which regulators can educate themselves on these new methods and approaches. To address these issues, the NAIC has increased training opportunities, such as the predictive model training that was organized by the American Academy of Actuaries at the 2017 Summer NAIC Insurance Summit, and information-sharing forums to address current gaps in knowledge. The NAIC also formed a Big Data Working (EX) Group (the Big Data WG).

Regulatory Sandboxes

"Regulatory sandboxes" have recently received signifi ant attention from regulators, companies, and start-ups active in the fi ancial services industries. Although the concept can take a variety of forms, a regulatory sandbox is generally a discrete regulatory environment designed to encourage innovation in a regulated industry. Depending on the context, a sandbox might function primarily as a forum for encouraging earlier and more frequent engagement between innovators and regulators, without necessarily allowing for waivers of existing law. Alternatively, a sandbox can relax regulatory requirements, effectively creating an alternative, less restrictive regulatory regime for proposed innovations. Given the regulatory issues involved, it is not difficult to imagine this concept being applied to insurance companies in the context of Big Data.

Professionalism

Actuaries have professional obligations to uphold the reputation of the actuarial profession and fulfill the profession's responsibility to the public in the emerging area of Big Data. An important part of this responsibility is to comply with the law. In many situations, actuaries also have unique insights into the results and implications of the use of Big Data and must be willing and capable to explain such insights, where appropriate, to the key stakeholders of the work, such as regulators, consumers, company management, auditors, etc. The value of the actuaries' work is enhanced through adherence to the Code of Professional Conduct, actuarial standards of practice, and U.S. Qualifi ation Standards. A key attribute of the applicable standards is the requirement for actuaries to provide explanations and rationales for their conclusions.

Professional judgment from actuaries is critical in the utilization of Big Data in actuaries' work. Actuaries provide added value to Big Data work in their ability to "connect the dots" through a deep understanding of the subject matter. In exercising professional judgment, it is important for actuaries to be cognizant of the fact that without performing proper

analyses or validation, the results of Big Data can be misleading. A combination of a good understanding of the context in which the data was obtained and avoidance of unthoughtful adherence to the results of a model can aid in better Big Data outcomes.

There are many professionalism issues that may be encountered when working with Big Data and predictive analytics. The work of actuaries is governed by the Code of Professional Conduct (Code) and must comply with applicable actuarial standards of practice (ASOPs). The Code and ASOPs provide a framework for dealing with issues of professionalism that might arise in the work of actuaries. While actuaries have traditionally dealt with large volumes of data and a variety of modeling techniques, Big Data may pose new challenges that differ from those that actuaries encountered in the past. In addition, actuaries historically have built analyses and models based on traditional inferential statistical methods (descriptive and diagnostic analytics); however, predictive analytics techniques offer unique and different challenges to consider.

Role of the Actuary

In many applications of Big Data in businesses in which actuaries are employed, multidisciplinary teams are utilized to effici tly and effectively complete the project. The teams are commonly composed of statisticians, computer scientists, data scientists, and actuaries. Actuaries on these teams may be thought of as the subject matter experts. But actuaries may be positioned to be the quarterbacks of the Big Data teams. With the proper background, an actuary can understand and direct the work of the Big Data multidisciplinary team based on their professionalism requirements and subject matter expertise.

As the evolution of Big Data continues in the areas of practice in which actuaries provide services, the professionalism and technical expertise provided by actuaries are essential elements upon which the public and regulators can place reliance. The professionalism requirements of actuaries provide guidance for the proper application and disclosure of Big Data assumptions and methodologies. They require actuaries to adhere to the high standards of conduct, practice, and qualifi ations of the actuarial profession, thereby supporting the actuarial profession in fulfilling its responsibility to the public.

Section I
Current and Emerging Practices

Remarkable advances have been made over the past decade in the use of Big Data, including the *Internet of Things, machine learning, cognitive computing,* and *artificial in elligence,* and the fiel continues to evolve. These advances have led to the development of a multi-billion-dollar industry referred to as InsurTech, the innovative use of technology in insurance, which is expected to have a significa t impact on insurance and the work that actuaries perform.

Section I of this monograph provides examples of current and emerging applications of Big Data in the various practice areas of actuarial work. While the use of Big Data in the property and casualty insurance area is more developed than in some of the other areas of actuarial practice, signifi ant advances have been made in recent years in the use of Big Data in health and life insurance. Similar advances in the pension area have not been as noticeable. However, it can be expected that over the next decade, all areas of actuarial practice will be signifi antly impacted by the use of Big Data.

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Big Data is not only about data. New, advanced tools are available that enable Big Data to be processed and utilized in ways that were not previously possible. These tools include data handling capabilities and computational techniques such as predictive analytics and advanced algorithms that have signifi antly increased data speed and storage capacity. The value of the data in the absence of these tools might be orders of magnitude less than it is currently. Within the context of this monograph, Big Data refers to both the data and the associated analytics applied to the data.

With the rapid advances in the availability of data and the development and proliferation of advanced data analytics techniques, the insurance industry's interest in Big Data analytics capabilities has grown commensurately. InsurTech is the use of recent technology to bring effici cies and innovation to the insurance industry. It has led to new products, new distribution channels, new risks for insurance companies, and changes to claims handling methods. It also can lead to greater emphasis on market conduct examinations, potential jurisdictional arbitrage, and a more complex regulatory environment. InsurTech is discussed in depth in Appendix 1 of this monograph. As the utilization of Big Data becomes a potential disruptor for the insurance industry, the need for professionals who are bound by a code of conduct, standards of practice, and qualifi ation standards will become more apparent.

Th s monograph describes some uses of Big Data and predictive analytics in the work of insurance and pension actuaries. The primary focus is on the regulatory and professionalism aspects and the roles of actuaries who work with Big Data.

The American Academy of Actuaries' Role

The focus of the American Academy of Actuaries regarding Big Data has been and will continue to be around the concepts of professionalism and public policy. From a public policy standpoint, the Academy continues to work with regulatory bodies on how these complex issues impact the public through the regulation of insurance and governance of retirement systems. The American Academy of Actuaries continues to work with policymakers and regulators to address and refi e regulatory frameworks in which Big Data work may appropriately be governed.

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Any data analytics project starts with data, and a variety of techniques are used to reconcile, scrub, and pre-process that data. A common rule of thumb for most predictive analytics projects is that 80 percent of the time is devoted to ensuring data quality, understanding the data and relationships within, and extracting/selecting features (or predictors).[1] Many techniques exist to ensure quality of modeling data, including reconciliation using a range of data sources, dealing with data issues such as missing values, and reducing data dimensionality, if necessary.

Descriptive data analysis and feature extraction/selection, as well as data visualization, use sophisticated mathematical tools, including principal component analysis, ridge and lasso regressions, and clustering algorithms. Understanding the data and the relationships among variables is of utmost importance before engaging with the models designed to predict. Visualization tools such as box-plots, histograms, scatter diagrams, and scatter matrix are used for this task.

Most data analytics techniques and tools use various forms of optimization and statistical algorithms, as well as machine learning methods. Model inferences are then evaluated and analyzed. The tasks of implementation and documentation, as well as the purpose of the predictive or data analytics model, provide for additional considerations for model selection, including the level of transparency, ease of use, update, and feedback loop execution.

Some models are harder to interpret than others, and precise formulas and causal relationships are not always discernable. To this end, other techniques are typically used to supplement and explain models' results, such as expert opinions, customer questionnaires, existing relevant industry research, and research from other industries.

Commonly used modeling techniques include the following:

- Generalized linear modeling
- Linear discriminant analysis
- Time series analysis
- Survival analysis
- Association algorithm
- Sequence analysis
- Clustering algorithms
- Classifi ation algorithms
- Neural network analysis
- Decision trees
- Random forests
- Gradient boosted machines
- Support vector machines
- Naïve Bayes analysis
- Bayesian estimation
- Ensemble models
- Text mining
- Behavioral economics models

1 "Cleaning Big Data: Most Time-Consuming, Least Enjoyable Data Science Task, Survey Says"; *Forbes*; March 23, 2016.

When using these techniques, actuaries need to consider that it is not always possible to develop a precise and defin tive formula where complex human behavior is involved. Accordingly, actuaries need techniques in addition to predictive analytics to signifi antly increase their understanding of anticipated behavior or events and support their strategies and decisions. Th s becomes a professionalism issue for actuaries. See Section III on professionalism for more information.

Application of Predictive Analytics

The following are examples, by function, of how insurers use predictive analytics:

Marketing: Insurers use predictive analytics to market to consumers. Companies can observe consumer behavior in a variety of forms and build targeted advertisements to appeal to customers. Companies can gather information about consumers using cookies or other mechanisms. Companies also can build "propensity to buy" models to target consumers who are more likely to make a purchase. These activities can reduce marketing costs, leading to overall cost reductions or the reallocation of marketing funds for other purposes.

Engagement: After an insurance purchase has been made, companies engage with targeted customers using customer-specific ethods, as research shows that an engagement focus by the company leads to more future sales and better retention as compared to a transactional focus. These targeted customers and engagement methods are selected using predictive analytics. Customer value propositions should improve, as should internal performance management. However, companies should recognize that this increased engagement can off et some or all the cost reductions achieved through more effici t marketing.

Underwriting: Predictive analytics can improve underwriting processes where this is permitted by regulation. Streamlined application processes and shorter underwriting wait times can improve company placement rates. The elimination of costly underwriting methods, such as the use of bodily fluids in life insurance, can signifi antly reduce expenses. These enhanced risk assessment processes can then reduce the cost of the policy through an improved ratio between mortality and expenses.

Product Development: Insurance companies can use predictive analytics techniques to fi d new markets and design new products for it. Companies can offer a better-fitting product line to the market by analyzing prior history data on insurance, driving history, health records, and lifestyle.

Claims and Reserving: Claims management for fraud detection is another area where predictive analytics can be useful, as are process effici cy, cost reduction, fast-tracking, and principle-based reserves (PBR) assumption-setting for life insurance.

Decision-Making Analytics: Predictive analytics can be used to mimic human decision-making, to produce decision-making rules that are better than those used previously, and to map potential outcomes more quickly and with more accuracy. Each of these can provide major benefits, but also come with certain constraints. For example, the matching of human decision-making means that human biases will be preserved. Producing decision-making rules requires an investment of signifi ant effort, and the mapping of potential outcomes requires vast quantities of data.

Behavior Analytics: Acquiring a comprehensive understanding of customer behaviors and needs is important so that insurers can anticipate future behaviors, offer relevant products, and appropriately segment their business. For example, analytics systems can spot if a customer is likely to lapse by detecting a large number of calls to a customer service center.

Customer Satisfaction and Upselling: In addition to providing predictions about when a customer is likely to lapse, gaining customer insight with predictive analytics also can help insurers to develop trusted relationships and engage customers with accurate information. As a result, insurers can be more successful in achieving positive outcomes such as solving customer problems in real time and upselling and cross-selling products.

Targeted Marketing: Developing a more complete understanding of customer behavior allows insurers to become more effici t in targeting products and services. Th s can be accomplished by offering personalized services, contacting the customer for special offers when they are likely to lapse, or offering a package for a family life cycle event.

Practice-Area-Specific pplications

Big Data and predictive analytics are used in each of the four actuarial practice areas.

Life Insurance

Some predictive analytics offerings for accelerated underwriting develop scores from biometric information. Others look at predictors less commonly used in traditional underwriting, such as public records, social media activity, motor vehicle reports, credit information, and wearable devices. Examples of predictive models that are used include: triaging individual requirements (e.g., determining if blood is needed), best classifi ation model, multiple classifi ation model, and a true mortality prediction model.

For life insurance, the application of predictive analytics to actuarial assumption development, such as mortality or lapses, sometimes starts with term insurance and then is expanded to permanent coverages. Predictive analytics techniques are applied to term insurance to improve term conversion rates (the rates at which customers convert their term policy into a whole life policy). For annuities, predictive analytics is used to develop mortality assumptions, improve longevity analyses, and to model policyholder behavior under guaranteed riders such as Guaranteed Minimum Withdrawal Benefits (GMWB).

GMWBs and Guaranteed Minimum Income Benefits (GMIB) are two common product features where predictive analytics are used in the setting of policyholder behavior assumptions. Specifi ally, companies are using predictive analytics to model how policyholders exercise guaranteed benefit options. For example, policyholders can wait longer than the initial waiting period to gain additional guarantees. Predictive analytics will examine such things as policy size, funding level, asset allocations, percent of guaranteed amount withdrawn, and prior withdrawal history to predict the likelihood of a future withdrawal.

Companies can utilize apps and wearables that enable the proactive tracking of their customers, while helping the customers to manage their health. For example, a company may make post-issue changes in underwriting classifi ation based on health-related data from wearables.

Property and Casualty Insurance

Historically, property and casualty insurance companies have utilized predictive analytics for purposes such as pricing, especially personal lines; underwriting; claims management; quoting; fraud detection/prevention; premium audit; and agent selection/retention. While these techniques have been used for many years, more sophisticated and broader applications continue to evolve. These advanced methods are often used for rating and underwriting, risk management, targeted marketing, behavioral analytics, and product development.

The types of analyses that can be developed, including entire new rating algorithms, new classifi ation plans such as territory structures that incorporate geographical elements, or scoring algorithms such as insurance scoring, may not look like traditional simple rating steps. These complex algorithms and models may be difficult for a reviewer to follow and understand. As a result, such algorithms and models, if used for rating and underwriting purposes, may attract additional scrutiny from regulators as the regulators seek to understand the new and emerging practices.

Analytics also can assist risk management efforts by providing feedback on unsafe actions or conditions and generating alerts for potential fault or failure situations. The "Internet of Thi gs" enables sensors to provide continuous monitoring and feedback. Telematics can provide information on driving actions or conditions that may be used to provide discounts for safe drivers.

Health Insurance

An important application in health care modeling is the task of risk adjustment, utilizing risk scoring models that can be both predictive and descriptive. Risk adjustment in health insurance became prevalent in the 1990s, before the widespread use of predictive modeling. The models employed (often referred to as grouper models) were developed using linear regression to predict resource utilization in a period from a set of covariates (frequently age, sex, and diagnoses). They are referred to as "grouper models" because they group together diagnostic International Classifi ation of Disease (ICD)-9 (15,000) or ICD-10 (80,000) codes[2] into a smaller number of hierarchical codes consisting of similar diagnoses. Grouper models are powerful tools for both risk adjustment and for predictive modeling because they signifi antly reduce the dimensionality of predictive modeling without signifi ant loss of accuracy.

2 The International Classifi ation of Diseases, Tenth Edition (ICD-10) is a clinical cataloging system that went into effect for the U.S. health care industry on Oct. 1, 2015. Accounting for modern advances in clinical treatment and medical devices, ICD-10 codes offer many more classifi ation options compared to those found in its predecessor, ICD-9.

Risk adjustment is widely used as a predictive analytics tool in reimbursements of many government health systems (Medicare Advantage; Medicaid; ACA exchanges) and private insurance contracts, in reimbursement for providers taking on risk under capitation and risk-sharing arrangements, and for determining the effectiveness of providers in building high-performance networks.

Early applications of predictive modeling in underwriting and "case fi ding" (identifi ation of high-risk patients for management) used grouper models because these were frequently available (being required by insurers for risk adjustment). However, in the early 2000s purpose-built predictive models began to proliferate, often for case fi ding purposes for patients with specific c nditions (cardiovascular disease, diabetes, mental illness, orthopedic, etc.), as well as specific roblem areas such as hospital readmissions following the Centers for Medicare and Medicaid Services' (CMS) introduction of penalties for excessive readmissions. Currently, predictive analytics is widely used in case fi ding for medical management programs.

All health insurers; many provider groups; many hospitals, pharmacies, and pharmacy benefit management (PBM) companies; and all medical management companies employ predictive modeling in some form or another to identify high-cost or high-risk patients. Predictive modeling was used, prior to the passing of the Affordable Care Act, to predict high-cost members of insurance pools for underwriting, rating, and pricing. It may still be used in rating and pricing for blocks of business but not at the individual level. Its use is often limited for underwriting, although it may be used to price an entire group under large group lines of business and/or association business in some states.

Pensions

The use of Big Data and data analytics in the pension area currently is limited, but its use is growing with the emergence of new roles for pension actuaries. One notable use is mortality improvement assumptions for pension valuations. These assumptions often are derived via extensive mortality data analysis, graduation to smooth out random noise, trend identifi ation, and pattern extrapolation. Th s also is an example of data analytics used to set actuarial assumptions.

Pension actuaries have begun to analyze and model embedded options in employer benefit programs and potentially suboptimal choices made by plan participants. Th s is an emerging area for the use of predictive analytics in pension practice to set appropriate participant behavior assumptions. A related emerging use of predictive analytics is in the fi lds of pension risk transfer and longevity risk management.

Considerations in the Use of Predictive Analytics

Business Considerations

Before developing, implementing, and employing predictive analytics and other Big Data analytics models, companies need to carefully assess what their objectives are, what barriers they are likely to face, and how best to proceed. Barriers that need to be overcome include how to build the necessary infrastructure and synchronize it with existing infrastructure. Other issues that also need to be addressed include obtaining the expertise to effectively use predictive analytics, data availability, potentially confli ting priorities, and cost.

Because predictive analytics may involve multiple business functions and objectives, companies may wish to consider the benefits of developing a comprehensive and integrated strategy to support their efforts and a cost-effective means to test their strategy. Companies will need to develop robust sets of data principles to govern enterprise-wide handling of data. For example, it can be extremely challenging to harmonize, cleanse, and certify data from multiple internal (often legacy) and external systems. Th s is a critical step, especially when using data to derive assumptions used in fi ancial reporting or for key company decision-making.

As companies aggregate data into data warehouses (often structured, more traditional data for reporting) and data lakes (often unstructured data combined with structured data), investments in data infrastructure are needed. Companies also will need to consider what else may change because of the use of predictive analytics. For example, if underwriting were to be streamlined, would changes to the application process be needed?

The evaluation of predictive models, important in actuarial professionalism, typically includes retrospective studies to measure model effectiveness and to establish criteria for when the new methods are used alone or in combination with old methods. Scenario analysis can aid in the determination of criteria that best align with companies' goals. Sensitivity tests can be used to assist in understanding variations in contributing variables and how interactions among those variables impact model outcomes.

After implementation, the model must continue to be monitored to measure its continued fit to new data. Does the model meet the objectives? Are the emerging results consistent with the projections based on the historical data on which the model was built? Is there any change in the strategy that may require the model to be adjusted? Must traditional methods be maintained to supplement some or all the new methods?

Companies also will need to address legal, regulatory, professional, ethical, and privacy concerns. These considerations typically are factored in before models are built, but, at a minimum, before implementation. Regulators may have questions about how predictive analytics-generated assumptions were demonstrated to be credible. Predictive analytics may be found to give more effici tly generated, evidence-based assumptions than traditional methods.

Model Development Considerations

There are many considerations in developing a predictive analytics model. Many of the considerations also apply when using more traditional analytical methods. The questions that might be asked include:

- Is the model appropriate for the situation for which it is being used?
- What are the evaluation criteria used to assess accuracy, effectiveness, and statistical appropriateness of the model?
- Is the data used in the analytical method acceptable to regulators? Some variables may not be allowed by current regulation.
- Is the data verifiable and credible?
- Is there a way for the policyholder to challenge and correct values?
- Is the relationship between predictor variables and the target variable intuitive? While causation is not a requirement of the actuarial standards regarding classifi ation plans (there are generally four classifi ations for life insurance: preferred plus, preferred, standard plus, and standard), an attempt is generally made to explain the rationale for the relationship.
- Is the new variable replacing a previously used variable? When a new variable is replacing a historical variable, an explanation as to why this replacement is an improvement is generally developed. An example of such an improvement is the use of actual driving patterns from telematics devices replacing variables like age and gender. Clearly, the use of the actual driving experience is a better match to the expected claims than the historical rating variables of age and gender that have acted as proxies for driving behavior.
- Could the data variable be considered a proxy for a disallowed variable? Insurers are not permitted to use certain variables, such as race and nationality. However, there is a possibility that some other variables might be proxies for disallowed variables. Caution should be exercised to avoid using variables that may be considered as proxies for data elements not permitted, although determination of proxy status may not be feasible.
- How are missing values handled in the preprocessing stage of the data and/or in the modeling?

- What steps have been taken to ensure quality of the modeling data?
- How frequently will the values be refreshed? From an implementation standpoint, the modeler must decide on how frequently the model will be measured against new data to determine if the model needs to be "refreshed" or "rebuilt." Refreshing a model involves updating the model with parameter estimates that result from running the algorithm on new data. A complete rebuilding of the model may become necessary if there are major changes in company underwriting, risk, or if environmental and behavior factors impact the level of loss experience.

Data Sources

The insurance industry has long relied on multiple sources of data. Emerging sources of data utilized in Big Data often are external to a company or can be internal data that previously was not available or difficult to extract. In legacy systems, for example, inconsistent sources and historical infrastructure may have created barriers to utilizing data. The explosion of structured and unstructured data availability, computing power, and new methods of data extraction provide for new opportunities regarding data collection.

Many observers believe that social media and consumer data may hold promise, but their lack of structure and the signifi ant prevalence of missing data make them more difficult to process.

Specific ata sources by area of practice are summarized below. In many instances, data sources are common among multiple areas of practice.

Life Insurance

Traditional data sources used for life insurance include the following:

- Experience study data, much of it coming from companies' internal administrative systems, including the policyholder's age, gender, account value, face amount, and other key customer and policy data. Policyholder use of elective benefits, death, withdrawal, and surrender/lapse data are also included in this category.
- Underwriting data that includes the policy application, attending physician statements, bodily fluids test results, Medical Information Bureau (MIB) information, and motor vehicle reports (MVRs).

Emerging data sources used for life insurance include the following:

- Data captured by sales and marketing to target customer segments, as well as customers within those segments.

- Electronic inspection reports for accelerated underwriting (AU) programs (i.e., underwriting without invasive testing such as fluids and exams).
- Other emerging data for underwriting includes public records such as bankruptcy filings and criminal history, demographic data, genetic information, credit scores, electronic medical records (EMRs), prescription histories, and lifestyle and behavioral data captured from wearables like Fitbit devices. Some of these are used for pre-policy-issue analytics, while others are used for ongoing monitoring. Some are used as part of formal underwriting and others highlight the need for additional analysis.
- Social media interactions including website clickstreams used both to verify underwriting data and as a lead-generation tool. For example, underwriters may check social media outlets, such as Facebook, Instagram, and Snapchat, for signs of nicotine use and other health-related information.
- Facial analytics and facial visuals to assist with identifying elements that were previous difficult to verify, e.g., smoking status.
- Income and wealth information for risk classifi ation, marketing, and to assist with identifying lapse propensity.

Property and Casualty

The application of analytics for predictive purposes in the property/casualty (P&C) area of practice has been commonplace for some time and has become an important aspect of underwriting, ratemaking, and reserving. The data used for most P&C lines includes location and claims loss history, while other data is used specifi ally for the personal or commercial lines.

Traditional sources for P&C insurance include the following:

- For personal and/or commercial auto insurance—age and gender of the driver, type of vehicle, miles driven, as well as DMV information.
- For property insurance—type of construction, fi e protection (e.g., smoke detectors, sprinklers), distance to water, and age of roof or utilities.
- For commercial liability insurance—the type of business being insured.

Emerging data sources for P&C insurance include the following:

- For some personal lines models, data sources that refl ct more specific ersonal information. However, these variables are fi ding disfavor with some regulators, due to potential discrimination issues.
- For all lines of insurance, non-insurance information like weather data, crime statistics, population density, traffic d sity, and census information that might be predictive of claims.

- Telematics devices in cars that make detailed information about driver behavior easier to obtain. Telematics data has started to be used in rating and underwriting for personal and commercial auto.
- For many lines of P&C business, cellular technology, the Internet of Thi gs and other advanced technologies, and new sources of data like home telematics and social media offer new insights into risk.

Health Insurance

Traditional data sources for health insurance include the following:

- Physician referral information or medical chart information, which can be useful in identifying diagnosis codes and other information about a patient.
- Enrollment information, including effective dates of coverage.
- Medical claims information, including diagnosis codes.
- Prescription drug claim information to provide additional insight into a patient's condition.
- Laboratory results information for understanding member outcomes, status, and morbidity.
- Self-reported data, such as from health risk assessments (although possibly not reliable because it is self-reported).

Emerging sources for health insurance include the following:

- Device-reported information, such as from wearable devices or home use devices.
- Electronic medical records, which are emerging as highly valuable information and often are used for risk adjustment supplemental information and audits. Th s data may be in a standard format or of an unstructured nature.
- Consumer and social media data, such as web searches.

Pension

Traditional data sources for pensions include the following:

- For pension plan design purposes—company-specific, roprietary, and confide tial data, such as participant information.
- For projects involving new plan designs, assumption setting, and risk management—company- or client-provided proprietary data on plan participants.

- For models that use macroeconomic or geographic input—data from the Census Bureau and the Department of Labor, data from household surveys conducted by other government agencies such as the Centers for Disease Control and Prevention, longitudinal studies, as well as tax statistics available from the Internal Revenue Service.
- Company data on other retirement plans, such as 401(k), to be aggregated with traditional pension plan data for benefit adequacy analysis.

Emerging data sources for pensions include the following:

- Data available to a company from different benefit programs or from a different part of its business. For example, a data warehouse consisting of payroll and human resources data, pension administration information (defi ed benefit and defi ed contribution plans), and medical, dental, and disability claims can be constructed. Aggregating various existing data sources allows more patterns and relationships to be found via data analytics.
- Plan participant behavior, preferences, and the level of participant satisfaction from participant surveys or pension plan administration data. Pension plan administration data provided by record-keepers can include data across different employers, not just a company's own employees. Also, behavioral economists, who study the impact of psychological, social, cognitive, and other non-rational factors in the economic decisions of individuals, conduct research to identify factors influencing participant choice. The results of this research are useful in identifying attributes to use in predictive analytic models. A company can look for data associated with such attributes from its own data warehouse or from other data vendors.
- Consumer data, such as credit scores or consumer purchase patterns, and other forms of digital data, such as social media data, background checks, motor vehicle records, or facial analytics, for participant behavior modeling.
- Mortality data from broader public sources.
- For pension risk-transfer business—age, gender, benefit amounts, and actuarial assumptions associated with the group of plan participants in question. The emerging practice is to use other data available from a company's data warehouse or information from similar employers (usually provided by pension administrators or benefit plan consultants) to better assess the mortality experience of a group of plan participants, as well as the benefit options likely to be elected by plan participants.

Section II
Regulatory Considerations

Benefits and Challenges o Insurers, Regulators, and Consumers

Despite its potential, there are a number of concerns regarding Big Data that impact insurers, regulators, and consumers.

Insurers

The use of predictive analytics can lead to a better understanding of risk than traditional methods. New sources of data not only increase dimensionality of data dramatically, but also allow for the use of more direct indicators of individual risk. New methodologies allow for a potentially better understanding of risk drivers and relationships between them, as well as detecting potential fraud. The benefit of a better understanding of risk is protection against adverse selection and improved reserve adequacy, such as with health care models that can be used to more accurately predict utilization of health care services.

Potential drawbacks of new insurance models driven by predictive analytics include disruptions of the fundamental pricing principles of the industry, such as the collapse of the law of large numbers, disruptions in risk peaks and subsequent difficulty in assessing short-term risk, and premium inadequacy resulting from both new pricing models and substantial upfront build costs.

Regulators

Regulators may benefit from better advance knowledge of outcomes and could apply some predictive analytics techniques directly to their review processes. Potential benefits for regulators include the enabling of a more streamlined process for approval of pricing and rate filings as well as scanning of annual statement filings to detect previously unknown patterns. Regulators can also use predictive analytics to detect fraud.

The main regulatory rate standard in P&C rate making is that rates not be "excessive, inadequate or unfairly discriminatory."[3] Analytics that result in a premium that is more closely correlated with the future expected cost could assist regulators in ensuring that this standard is met. Additionally, the not unfairly discriminatory standard could be addressed with a more granular classifi ation model that is supported by analytics. Increased solvency could result, to the extent that the analytics supporting a classifi ation plan result in a better match of price to risk. The use of analytics may also increase competition resulting in better service (coverage options, claims settling, etc.) to policyholders.

However, risk pooling requirements in health insurance may not necessarily result in this type of additional benefit in rate setting due to restrictions in pricing and underwriting based on individual member characteristics.

Reviewing predictive analytics can be a challenge to regulators given the amount of data used to develop a model, the complexity of the techniques, and limited regulatory resources. Regulators also may have difficulty explaining complex models to consumers and other interested parties who are trying to understand the impact of the models on insurance rates. The NAIC's Big Data (EX) Working Group is proposing additional support for regulators for reviewing new models that contain predictive analytics capabilities.

Consumers

Analytics can lead to more competition, and more competition can lead to more options for consumers. Predictive analytics can result in quicker decisions on underwriting, where allowable, because of the use of external data. Claim settlement can also be accelerated using predictive analytics. Analytics also can result in better offerings by insurers to policyholders from the use of external data that can help inform decisions regarding better fit of coverage.

The main challenge to consumers is lack of transparency: trying to understand the data and analytics being used to determine their eligibility for products and the price they are being charged. It may not be clear to the consumer how they are being underwritten or what behaviors they can modify or steps they can take to get a better rate. A potential issue with pricing based on predictive analytics is that it can lead to more granular pricing, which benefits some consumers but not others. Th s broader distributed range of prices could be perceived as unfair.

3 For example, see the NAIC's Model Rating Laws (Property and Casualty Model Rating Law – File and Use Version (NAIC Model 1775); Property and Casualty Model Rate and Policy Form Law Guideline (NAIC Model 1776); Property and Casualty Model Rating Law – Prior Approval Version (NAIC Model 1780).

Privacy issues are also a concern for consumers because of a lack of transparency regarding how data is collected and used. Consumers also may object to the use of some data either because they do not believe it is related to the cost of providing insurance, does not fairly distinguish risk, or because they do not believe the data is accurate. For example, the use of credit-related data in ratemaking for private passenger auto insurance is an example of data to which some consumers have objected, resulting in a variety of treatments from regulators ranging from complete prohibition in some states to allowing certain credit-related data in rating and underwriting in others.

Existing Regulatory Framework

The legal and regulatory requirements that potentially govern the use of Big Data by insurers at the state, federal, and international levels fall into two categories: 1) those designed to protect consumers in general; and 2) those intended to prohibit discrimination against certain protected classes of individuals.

Given the wide span of potentially applicable requirements, the following is a high-level overview of the legal and regulatory landscape. It is not intended to provide a comprehensive legal analysis of any laws or regulations.[4]

Consumer Protection Requirements

Consumer protection requirements cover a broad span of laws and regulations designed in a variety of areas. These requirements can be divided into privacy protections and general protections.

The collection and use of personal data by insurers is governed by privacy requirements that fall under regulatory review. In general, consumers have control over how their protected fi ancial and health information, and other sensitive personal information, is shared by insurers with third parties. In addition, insurers may use consumer reports (as defi ed in applicable laws and regulations) only for specifi d permissible purposes. The increasing variety, velocity, and native digital format of available personal consumer data also are increasing focus on cybersecurity regulations and their connection to privacy concerns.

4 In 2017, the NAIC Big Data (EX) Working Group reviewed a summary of the "current regulatory frameworks used to oversee insurers' use of consumer and non-insurance data," focused primarily on the P&C insurance industry. See NAIC Big Data (EX) Working Group 2017 Summer Meeting Materials.

In terms of general protections, insurers overall must notify and explain adverse underwriting decisions to consumers. In addition, regulations exist that prohibit P&C and health insurers from charging excessive, inadequate, or unfairly discriminatory rates. Regulations also exist that prohibit life insurers from unfair rate discrimination between individuals of the same class and equal life expectation..

Examples of potentially relevant consumer protections include:

- **The ramm-Leach-Bliley Act (GLBA).**[5] Title V of GLBA includes specific ules governing how insurers may share and disclose consumers' personal information, including consumer reports and protected health information. The NAIC Privacy of Consumer Financial and Health Information Model Regulation[6] implements the requirements of GLBA as they apply to insurers. Specifi ally, insurers are required to provide consumers with an annual privacy notice explaining the information collected, how such information is used and shared, and how it is protected. Subject to certain exceptions, consumers have the right to opt out of having their protected fi ancial information shared with unaffiliated third parties and must opt in before their protected health information can be shared.
- **The air Credit Reporting Act (FCRA).**[7] The FCRA regulates the use and dissemination of consumer reports. Users of consumer reports are subject to certain requirements under the FCRA, such as notice requirements for adverse actions with respect to insurance transactions based upon consumer report information.
- **European Union General Data Protection Regulation (EU GDPR).**[8] The EU GDPR effective as of May 2018 is intended to simplify the regulatory environment across the EU and give more control to consumers over how their personal data is used by businesses. Companies governed by the GDPR, including companies based in the EU as well as companies collecting/processing data on EU residents, will have an obligation to erase data when customers ask to exercise their "right to be forgotten" and withdraw their consent to storing or using their personal data. The GDPR also requires companies to obtain explicit consent before collecting personal data.

5 15 U.S.C. § 6801 et seq.
6 NAIC Model 672.
7 15 U.S.C. § 1681.
8 Regulation (EU) 2016/679.

- **NAIC Insurance Information and Privacy Protection Model Act (the Model Privacy Act).**[9] The Model Privacy Act governs insurers' collection, use, and disclosure of consumer information in connection with insurance transactions. Among other things, it provides access to personal information and the consumer's right to verify and correct such information. The Model Privacy Act also requires insurers to provide consumers with notice of the reasons for an adverse underwriting decision (or notice that such reasons can be requested).
- **Rate Regulation.** In the P&C space, state insurance laws and regulations ensure that premium rates—which can be developed using several different data sources—are not excessive, inadequate, or unfairly discriminatory. Additional requirements regarding the use and review of predictive models in determining rates vary widely by state and context. For example, certain states require P&C insurers to file predictive models used to determine premium rates, rating classes, etc.[10] In addition, state and federal rate regulations in health insurance also limit the ability to use certain variables for rating, particularly in the individual and small group markets. And fi ally, the NAIC Model Unfair Trade Practices Act prohibits life insurers from unfair discrimination between individuals of the same class with equal life expectation.
- **Cybersecurity Regulation.** In early 2018, the New York State Department of Financial Services issued a fi st-in-the-nation regulation setting forth minimum requirements for covered entities to address cybersecurity risks. Covered entities must establish cybersecurity programs that address encryption, access controls, and limitations on data retention.

Anti-Discrimination Requirements

Anti-discrimination laws are meant to prohibit discrimination with respect to protected classes of people. State insurance laws include anti-discrimination requirements, and there are several federal anti-discrimination laws that could be relevant to insurers' use of Big Data. Potentially applicable anti-discrimination requirements include, but are not limited to, the following:

- State insurance law anti-discrimination requirements: These laws prohibit unfair discrimination.[11]

9 NAIC Model 670.

10 To illustrate, *see* NH Rev Stat § 412:16(II) (2016) ("Every insurer shall file with the commissioner every manual, predictive models or telematics models or other models that pertain to the formulation of rates and/or premiums, minimum premium, class rate, rating schedule or rating plan and every other rating rule, and every modifi ation of any of the foregoing which it proposes to use."); and NV Insurance Bulletin 17-001 (2017) ("The Division issues this bulletin to remind insurers that any mathematical model used in underwriting or rating of any personal line of property and/or casualty insurance, or other line of property and/or casualty insurance subject to regulation of rates pursuant to NRS 686B.030, must be filed with the Division for prior approval pursuant to NRS 686B.110.").

11 For example, N.Y. Ins. Law § 4224(a)(1) provides:

> (a) No life insurance company doing business in this state and no savings and insurance bank shall
>
> (1) *make or permit any unfair discrimination between individuals of the same class and of equal expectation of life,* in the amount or payment or return of premiums, or rates charged for policies of life insurance or annuity contracts, or in the dividends or other benefits payable thereon, or in any of the terms and conditions thereof (emphasis added).

- Discrimination based on sex, marital status, race, religion, and national origin also is generally prohibited.[12] In addition, certain state-specific equirements may apply.
- **Federal Laws:**
  - Equal Credit Opportunity Act: Th s prohibits any creditor from discriminating against any applicant based on race, color, religion, national origin, sex, marital status, or age. Title VII of the Civil Rights Act prohibits discrimination by covered employers based on race, color, religion, sex or national origin. Americans with Disabilities Act (ADA) extends the coverage of the Civil Rights Act of 1964 to Americans with disabilities.
  - Age Discrimination in Employment Act (ADEA): Th s forbids employment discrimination under certain circumstances against anyone at least 40 years of age in the United States.
  - Fair Housing Act (FHA): Th s makes it unlawful to refuse to sell, rent to, or negotiate with any person because of that person's inclusion in a protected class.
  - Genetic Information Nondiscrimination Act (GINA): Th s prohibits the use of genetic information in health insurance and employment.

Emerging Regulatory Developments

NAIC Activity (NAIC Big Data (EX) Working Group)

The evaluation of insurers' compliance with state law and regulation relies, in large part, on the information that is provided to regulators. Th s information can come from various sources, including fi ancial statements, fi ancial and market conduct examinations, filings, specific equests and data calls, or from statistical agencies.

Advances in statistical modeling techniques and evolving sources of data are challenging existing regulatory processes. Methods, such as those used to calculate premiums, are more complex than ever before. Current algorithms and models are not as easy to understand and follow as traditional algorithms. In addition, with the exploding availability of data, including consumer data, insurers are utilizing types of data not previously incorporated into advanced modeling techniques. Moreover, for many aspects of the insurance business, companies differ in methods and approaches employed and in their documentation and explanation of such methods and approaches.

12 *See* NAIC Model 880, which prohibits "[r]efusing to insure, refusing to continue to insure, or limiting the amount of coverage available to an individual because of the sex, marital status, race, religion or national origin of the individual."

The complexity and evolution of the methods and approaches used by insurers is threatening to outpace the rate at which regulators can educate themselves on these new methods and approaches. Insurance regulators may choose to educate insurance department staff n these new techniques or employ external resources versed in techniques to evaluate of these new methods. From an insurer perspective, any delay on the review of new methods due to expertise limitations could result in reduced speed to market of innovations and new products, which could create a non-level playing fi ld, allowing some companies to exploit regulatory shortfalls.

To address these issues, the NAIC has increased training opportunities, such as the predictive model training that was organized by the American Academy of Actuaries at the 2017 Summer NAIC Insurance Summit, and information-sharing forums to address current gaps in knowledge.

The NAIC also formed a Big Data (EX) Working Group (the Big Data WG). The Big Data WG's charges are to:

- "Review current regulatory frameworks used to oversee insurers' use of consumer and non-insurance data. If appropriate, recommend modifi ations to model laws/ regulations regarding marketing, rating, underwriting and claims, regulation of data vendors and brokers, regulatory reporting requirements, and consumer disclosure requirements.
- Propose a mechanism to provide resources and allow states to share resources to facilitate states' ability to conduct technical analysis of, and data collection related to, states' review of complex models used by insurers for underwriting, rating, and claims. Such mechanism shall respect and in no way limit states' regulatory authority.
- Assess data needs and required tools for regulators to appropriately monitor the marketplace and evaluate underwriting, rating, claims, and marketing practices. Th s assessment shall include gaining a better understanding of currently available data and tools and recommendations for additional data and tools as appropriate. Based upon this assessment, propose a means to collect, house, and analyze needed data."[13]

Th s Big Data WG recently proposed the exploration of a predictive analytics team staffed by the NAIC to provide predictive analytics modeling, insurance, and actuarial expertise to the states. The suggestion is that state regulators could rely on the expertise of the team to assist them in the review of advanced modeling techniques presented in insurance company models. The team would not opine on compliance with state laws or regulations but would serve in a technical advisory role at the request of a state regulator.

13 Big Data (EX) Working Group 2018 Charges; National Association of Insurance Commissioners.

Another recent proposal by the Big Data WG proposes the creation of a Predictive Analytics Working Group (PAWG). The PAWG would develop guidelines and processes to govern how state regulators would work with the team. An example of such a guideline would be a versioning system for company models, which would allow for the identifi ation of company models previously submitted for a technical review. The objective is to have a more flex ble and cost-effective resourcing approach for the states, bringing increased technical understanding to model reviews for the evaluation of state-specific aws and regulatory compliance.

Some of the concerns raised thus far include whether the NAIC will be able to obtain the necessary staff or such a team and the legality of housing such an organization within the NAIC; such concerns are currently under review. Beyond staffing and legal concerns, there are additional concerns regarding a centralized organization's ability to manage model versions, data security, models based on machine learning, and the protection of intellectual property.

Permitted Uses of Big Data

As regulation of Big Data evolves, defini g what is and is not allowable—and what parameters and restrictions should apply under what circumstances—for insurance modeling and other uses of Big Data will be key decisions for legislators and regulators. An outstanding question from a regulatory perspective is whether, and to what extent, legislators and regulators will adopt different approaches with respect to:

- new uses of traditional data elements, such as using new types of models for mortality assumptions as opposed to a traditional actuarial actual-to-expected approach; and
- the introduction of new data elements, such as data from online shopping, social media, or telematics, into the insurance decision-making process.

The regulatory issues associated with the use of new data elements are potentially more complex. For example, driving telemetry data could include information on the specifi roads traveled by an individual and the time at which they were traveled, which could pose issues from a privacy perspective.

Data Ownership, Transparency, and Portability

As the use of new data sources and analytic techniques increases and evolves, lawmakers and regulators will face difficult issues when crafting rules around how and when data can be owned, accessed, and transported.

Various models for governing the collection and dissemination of consumer data exist in different jurisdictions. For example, in the United States, consumers generally have the right to opt out of data collection or sharing activity.[14] In contrast, in the EU, consumers generally must explicitly opt in before data can be collected or shared.[15]

Examples of potential regulatory questions with regard to data ownership, transparency, and portability include:

- Are existing privacy protections adequate?
- Should individuals "own" their data? To what degree should individuals have the right to access their own data? Who exactly should be able to access such data?
- Should individuals have the right to challenge, amend and/or correct their own data? Should there be limits on what can be corrected, e.g., medical diagnostic data?
- Should individuals have the right to "blur" their data (while also bearing the consequences of such blurring)? For example, in certain instances individuals can choose to limit their smartphone GPS location to a set radius to maintain their privacy. However, doing so renders pizza delivery and Uber/Lyft equests ineffective. Th s could have an unintended effect as those individuals willing to share more accurate data could end up with less expensive insurance coverage and/or enhanced benefits.
- Should individuals have the right to "transport" their data? Can an individual with auto coverage with one insurer take the personal data that the insurer has collected to a competing insurer to shop for a better quote? Current pricing is mainly driven by public information (accidents/violations), but if driving habits have been monitored, could that data be transferred? What are the possible effects on anti-selection and cost spirals?
- Are there relevant distinctions among different lines of insurance business that necessitate or justify different regulatory approaches or treatment?

14 15 U.S.C. § 6801 et seq.
15 Regulation (EU) 2016/679.

Regulatory Sandboxes

"Regulatory sandboxes" have recently received signifi ant attention from regulators, companies, and startups active in the fi ancial services industries. Although the concept can take a variety of forms, a regulatory sandbox is generally a discrete regulatory environment designed to encourage innovation in a regulated industry. Depending on the context, a sandbox might function primarily as a forum for encouraging earlier and more frequent engagement between innovators and regulators, without necessarily allowing for waivers of existing law. Alternatively, a sandbox can relax regulatory requirements, effectively creating an alternative, less restrictive regulatory regime for proposed innovations. Given the regulatory issues involved, it is not difficult to imagine this concept being applied to insurance companies in the context of Big Data.

Several regulators have implemented some form of regulatory sandbox, both in the United States and internationally. For example, in the United States, the Consumer Financial Protection Bureau (the CFPB) and the Office f the Comptroller of the Currency (the OCC) each has projects designed to encourage innovation. The CFPB launched Project Catalyst in 2012. Th s project includes dedicated CFPB staff ocused on encouraging innovation that is "safe and benefic al" to consumers. In 2016, the OCC announced a new framework designed to encourage "responsible innovation." The framework includes the establishment of an OCC Office f Innovation with dedicated staff hat will serve as a central point of contact for InsurTech innovators and will conduct outreach and provide technical assistance for InsurTech innovations.

In the context of the U.S. insurance industry, in 2017 the Illinois Department of Insurance proposed legislation that would have created a new "Innovation Division" within the insurance department and granted this division broad authority to support the development of insurance innovations and assist insurers with compliance.[16] As of the publication of this monograph, this legislation has not been acted upon.

A major reinsurance company has proposed a Future Insurance Technology Lab (FITLab) framework to the NAIC. The FITLab is intended to serve as "a 'safe space' for open communication between industry and regulators surrounding new innovative efforts." It would create a confide tial forum at NAIC meetings during which companies could discuss and receive feedback on proposed innovations from a working group of state regulators.[17]

16 Illinois SB3451 (2018).
17 "Proposal: Future Insurance Technology (FIT) Lab, a US regulatory sandbox solution," Kelsey Brunette, Munich Re America Inc., Nov. 28, 2016.

There are still a number of open questions around the FITLab and the regulatory sandbox concept in general, such as how long the "innovation waiver" would last or how material the innovation needs to be.

In the United Kingdom, the Financial Conduct Authority, the primary fi ancial product and market conduct regulator, launched an innovation project in 2014 and created an "Innovation Hub." If an innovator demonstrates that it is developing a real innovation that benefits consumers, it can apply to receive dedicated support and feedback from Innovation Hub staff

Potential Regulatory Disruptions

In any regulated industry, changes in business practices may evolve so quickly that regulators, and regulation, will need to sprint to keep pace. Big Data is already accelerating the pace of change in certain aspects of the insurance business.

The development of accelerated underwriting (AU) in the life insurance industry—made possible in large part by the availability of new data sources and analytic techniques—and the associated reserving implications under the NAIC's PBR framework are a useful example. Guidance set forth in the initial PBR valuation manual did not anticipate the use of Big Data and the emergence of AU, so it did not address the question of how reserving standards should incorporate AU. Regulators are working on bridge solutions for 2018 and beyond.

In other instances, it is possible that a regulated entity, or possibly a startup, may follow the examples of Uber and Airbnb and bring a new solution to market irrespective of existing regulatory protocols or the fundamental permissibility of the solution. Th s could create unintended regulatory consequences for traditional insurers.

These events could impact the insurance business model via changes in the distribution model (e.g., robo-advisers, social media advertising, smartphone tie-ins), changes in coverages, changes in premium and claim payment practices, and operational risks, among others. Based on experience in the P&C insurance and other industries, some of the potentially critical success factors for these innovative approaches include the following:

- Are the offerings voluntary?
- Do they create clear value for consumers?
- Do the offerings elicit a groundswell of public support?

Some conceivable examples of potential disruption include the following:

- Offerings may cross regulatory boundaries, such as a FinTech[18] company providing long-term insurance coverage or auto insurance rates based on savings account balances.
- Driverless cars may move regulators to mandate commercial insurance rather than personal insurance coverage.
- Offerings of "all-in-one" risk packages for a major portion of the life cycle may become available.

Insurers will need to consider the regulatory response to their use of Big Data and what level of regulatory risk they are prepared to assume. There is currently considerable uncertainty in the industry around how insurers' use of Big Data will be regulated. Meanwhile, many companies continue to make signifi ant investments in InsurTech, new models, and Big Data infrastructure. To help limit potential losses and foster the confide ce needed for insurers to continue to invest in Big Data, lawmakers and regulators will need to watch these developments carefully and be prepared to respond quickly.

Regulatory Challenges

Regulators will continue to face challenges as they review and respond to insurers' evolving uses of Big Data. The following highlights important challenges, which often have professionalism considerations as well (outlined in Section III):

a. **Privacy.** As insurers' collection and use of data evolve, insurance regulators seek to better understand company algorithms and the types of data used for areas in which regulatory and legal review is necessary. To provide state-of-the-art products, many insurers are investing heavily in data, technology, and related resources. Given the competitive nature of the marketplace, insurers often are reluctant to share data-related intellectual property and market insights with regulators, which can create challenges for regulators trying to understand evolving practices. The degree of protection afforded under state freedom-of-information laws varies substantially by jurisdiction and often does not provide suffici t protections from insurers' perspectives. Stronger privacy protection for Big Data information might increase transparency and thereby enhance regulators' understanding of evolving practices and facilitate better regulation.

18 FinTech stands for fi ancial technology, and in its broadest defin tion, it is "technologies used and applied in the fi ancial services sector, chiefly used by fi ancial institutions themselves on the back end of their businesses. But more and more, FinTech is coming to represent technologies that are disrupting traditional fi ancial services, including mobile payments, money transfers, loans, fundraising, and asset management." *See*: "The Complete Beginner's Guide to FinTech in 2017"; *Forbes*, Feb. 10, 2017.

In addition, as both the uses and complexity of data grow, consumer opinion may increasingly influence regulators' views and reactions. For example, if individuals believe that the use of certain types of data is inappropriate, regulators may need to understand and account for these expectations of consumer privacy.

b. **Staffing.** Shortages of staffing and expertise for regulators will likely prove problematic given the increasing complexity of data and approaches. To address this, proposed addition of NAIC staff hat could support technically rigorous and data-intensive reviews could facilitate a more effici t use of regulatory resources.

c. **Correlation vs. Causation.** If individuals and competitors do not know their risk exposure versus others, then large heterogeneous pooling works well. As insurers identify behaviors (or controllable risk drivers) through empirical research or data analytics, insurers can signal to the market how to lower collective risks or appropriately charge those who take on riskier behavior. For example, owners of commercial buildings understand the value of automatic sprinklers, which result in lower insurance premiums and claims. Individuals who smoke are charged for their elected riskier behavior. However, predictive analytics can only uncover correlations among data elements. These data elements may be driven at a deeper level by other factors. Both insurers and regulators will need to ensure that spurious correlations are not driving pricing and coverage decisions. For those events where the true drivers are not known, risk pooling can be used to smooth out the impact of costly events randomly striking members of a group.

The American Academy of Actuaries has historically worked closely with regulators and policymakers in providing objective, unbiased, and nonpartisan insights into issues of an actuarial nature. In these interactions, these parties have relied on the professionalism and technical skills of actuaries to provide clear information for the benefit of the public.

Section III will address professionalism considerations for actuaries working with Big Data. As Big Data continues to evolve, the Academy will continue to work with regulators and the public to provide insights and information to address the challenges that Big Data may present.

Section III
Professionalism

Actuaries have professional obligations to uphold the reputation of the actuarial profession and fulfill the p ofession's responsibility to the public in the emerging area of Big Data. An important part of this responsibility is to comply with the law. In many situations, actuaries also have unique insights into the results and implications of the use of Big Data and must be willing and capable to explain such insights, where appropriate, to the key stakeholders of the work, such as regulators, consumers, company management, auditors, etc. The value of the actuaries' work is enhanced through adherence to the Code of Professional Conduct, actuarial standards of practice, and U.S. Qualific tion Standards. A key attribute of the applicable standards is the requirement for actuaries to provide explanations and rationales for their conclusions.

Professional judgment from actuaries is critical in the utilization of Big Data in actuaries' work. Actuaries provide added value to Big Data work in their ability to "connect the dots" through a deep understanding of the subject matter. In exercising professional judgment, it is important for actuaries to be cognizant of the fact that without performing proper analyses or validation, the results of Big Data can be misleading. A combination of a good understanding of the context in which the data was obtained and avoidance of unthoughtful adherence to the results of a model can aid in better Big Data outcomes.

It should be noted also that "spurious correlations" that might be exhibited in a Big Data analysis do not imply causality. There are many examples of two pieces of data that are very closely correlated over a period of time that do not have a causal relationship. While causality is not a requirement for the application of Big Data analytics, users of Big Data should be aware of that these correlations exist.

There are many professionalism issues that may be encountered when working with Big Data and predictive analytics. The work of actuaries is governed by the Code of Professional Conduct (Code) and must comply with applicable actuarial standards of practice (ASOPs). The Code and ASOPs provide a framework for dealing with issues of professionalism that might arise in the work of actuaries. While actuaries have traditionally dealt with large volumes of data and a variety of modeling techniques, Big Data may pose new challenges

that differ from those that actuaries encountered in the past. In addition, actuaries historically have built analyses and models based on traditional inferential statistical methods (descriptive and diagnostic analytics); however, predictive analytics techniques offer unique and different challenges to consider. Some professional organizations, such as the Data Science Association, have codes of conduct that apply specifi ally to the key elements of Big Data, such as data quality, volume, variety, and associated analytical techniques. For instance, data scientists must "use reasonable diligence when designing, creating and implementing machine learning systems to avoid harm."[19]

Th s section reviews the professionalism requirements for actuaries working with Big Data and engaging in predictive analytics. Some professionalism and ethical issues that arise in this context are also highlighted.

Actuarial Professionalism

Code of Professional Conduct

In 2001, the five U.S.-based actuarial organizations adopted a consistent Code of Professional Conduct. The Code sets forth what it means for an actuary to act as a professional. It identifies he responsibilities that actuaries have to the public, to their clients and employers, and to the actuarial profession. The purpose of the Code is to require actuaries to adhere to standards of conduct, practice, and qualifi ation. The Precepts of the Code identify the professional and ethical standards with which an actuary must comply to fulfill their responsibility to the public and the actuarial profession. The law (i.e., statutes, regulations, judicial decisions, and other statements having legally binding authority) may impose additional obligations upon an actuary. Where requirements of law confli t with the Code, the requirements of law shall take precedence. Many of the 14 Precepts in the Code will have relevance to work performed related to Big Data.

Several Precepts deal with general conduct issues that apply to every service provided by actuaries, such as acting honestly, with integrity and competence; using titles and designations only as authorized by the relevant actuarial organization; prohibitions against disclosing confide tial information; and requirements to cooperate with others. Most of the Precepts focus on the conduct of an actuary when providing actuarial services. The Code defi es actuarial services as "Professional services provided to a Principal by an individual acting in the capacity of an actuary. Such services include the rendering of advice,

19 *Data Science Code of Professional Conduct*; Data Science Association.

recommendations, fi dings, or opinions based upon actuarial considerations."[20] An actuary will need to consider whether the Code applies to their performance of services that involve Big Data based on whether those services meet the defin tion of actuarial services and if a particular service involves actuarial considerations. Consider a marketing effort to gain new customers that uses predictive analytics to determine the customers who would be most likely to buy an insurance product. Actuarial considerations for such an effort might include data quality, appropriateness of use, and the accuracy of predictive results.

Actuarial Standards of Practice

Precept 3 of the Code requires an actuary to ensure that actuarial services performed by or under the direction of an actuary satisfy applicable standards of practice. In the United States, the applicable ASOPs are promulgated by the Actuarial Standards Board (ASB). When a question arises about the applicability of a standard of practice, or where no applicable standard exists, an actuary shall utilize professional judgment, considering generally accepted actuarial principles and practices.[21] When an actuary uses procedures that depart materially from those set forth in an applicable standard of practice, the actuary must be prepared to justify the use of such procedures.

A full treatment of the relevant sections of each of the ASOPs is beyond the scope of this paper. Following are some of the ASOPs that may be relevant to services involving Big Data. Further details regarding these ASOPs are included in Appendix 2.

1. ASOP No. 23, *Data Quality*, provides guidance to actuaries when selecting data, performing a review of data, using data, or relying on data supplied by others in performing actuarial services. It also applies to actuaries who are selecting or preparing data or who are responsible for the selection or preparation of data that will be used by other actuaries in performing actuarial services when making appropriate disclosures regarding data quality.

2. ASOP No. 12, *Risk Classification (for All Practice Areas)*, applies to all actuaries when performing professional services with respect to designing, reviewing, or changing risk classifi ation systems used in connection with fi ancial or personal security systems regarding the classifi ation of individuals or entities into groups intended to refl ct the relative likelihood of expected outcomes.

20 American Academy of Actuaries; *Code of Professional Conduct*; Jan. 1, 2001.
21 Ibid.; Precept 3, Annotation 3.1.

3. ASOP No. 38, *Using Models Outside the Actuary's Expertise (Property and Casualty)*, applies to actuaries who use models that incorporate specialized knowledge outside of the actuary's own area of expertise when performing professional services in connection with property and casualty insurance coverages. Th s standard applies to the use of all models whether or not they are proprietary in nature.

4. ASOP No. 25, *Credibility Procedures*, applies to actuaries when performing actuarial services involving credibility procedures: a) when the actuary is required by applicable law to evaluate credibility; b) when the actuary chooses to evaluate the credibility of subject experience; c) when the actuary is blending subject experience with other experience; or d) when the actuary represents the data being used as statistically or mathematically credible.

5. ASOP No. 41, *Actuarial Communications*, provides guidance for preparing actuarial communications within any practice area. Included in this guidance are requirements regarding: a) form and content; b) clarity; c) timing of communication; and d) identifi ation of responsible actuary. Additionally, guidance regarding disclosures with an actuarial report, explanation of material differences, oral communications, responsibility to others, and retention of materials are included.

6. ASOP No. 21, *Responding to or Assisting Auditors or Examiners in Connection with Financial Audits, Financial Reviews, and Financial Examinations*, applies to actuaries when performing actuarial services as a responding actuary or as a reviewing actuary in accordance with generally accepted auditing standards or a fi ancial examination for the purpose of oversight of the fi ancial condition of an entity. An actuary needs to be sensitive to the possibility that when Big Data and predictive analytics are used for fi ancial reporting purposes, the responding actuary may have to explain the use of Big Data to the reviewing actuary.

The examples of applicable ASOPs are not exhaustive. Other ASOPs may be applicable depending on the assignment. As the use of Big Data and predictive modeling continues to evolve, it is possible that it will become the basis for developing actuarial assumptions or contribute to the construction of models or be integrally involved in pricing and ratemaking or the evaluation of risks in general. With these innovations, the actuary would be well served to understand the implications, benefits, and considerations in using Big Data and predictive modeling.

Qualifi ation Standards

Precept 2 of the Code states that "An Actuary shall perform Actuarial Services only when the Actuary is qualifi d to do so on the basis of basic and continuing education and experience, and only when the Actuary satisfies pplicable qualifi ation standards." Annotation 2-2 goes on to state: "The absence of applicable qualifi ation standards for an assignment or for the jurisdictions in which an Actuary renders Actuarial Services does not relieve the Actuary of the responsibility to perform such Actuarial Services only when qualifi d to do so in accordance with this Precept."[22] The actuary should always refl ct on their qualifi ations, and must be prepared to document their qualifi ations (USQS Section 6.2) for any project being undertaken, and Big Data/predictive analytics projects are no exception. As an evolving area, it may not always be a clear-cut determination, and professional judgment may need to be applied.

In addition, U.S. Qualifi ation Standards section 4.3[23] addresses emerging or nontraditional areas of actuarial practice. It states that an actuary practicing in an emerging or nontraditional practice area can satisfy the continuing education requirements by maintaining knowledge of applicable standards of practice, actuarial concepts, and techniques relevant to the topic of the Statement of Actuarial Opinion.

Ethical Considerations

Many actuaries are well equipped to integrate innovative analytics with traditional actuarial practices. A new paradigm involves a demand for new skills and can raise a wide range of ethical and professional challenges. The Code and the ASOPs guide actuaries in navigating these challenges, and dealing with new implications, while continuous education and the highly developed quantitative skills of actuaries can aid them in acquiring new skill sets and staying abreast of emerging technologies.

The traditional "look in the mirror" test (which is implied but not spelled out in the Code) means that an actuary objectively examine his or her qualifi ations (basic and continuing education and experience) and make a professional judgment about whether the actuary can fulfill the actuary's obligations under the Code to:

- Act honestly, with integrity and competence—perform actuarial services with skill and care (Precept 1); and
- Perform actuarial services only when qualifi d to do so (Precept 2).

22 Ibid.
23 Available at actuary.org/usqs.

Algorithms, Techniques, Correlation, and Causality

Th s section reviews the potential professionalism issues that may surface when using Big Data and predictive analytics in any actuarial area.

Many newly introduced methodologies, whether previously employed in other professions or recently developed, represent sophisticated models that borrow from other areas of science, such as artific al intelligence. Some methodologies involve extremely difficult and complex mathematics that may require someone specifi ally trained in that area. Other models may be hard to interpret, even if fully understood. Th s could result in what is perceived as nontransparent outcomes.

To the extent that an actuary employs a model, the actuary's level of effort in understanding and evaluating a model should be consistent with the intended use of the model and its materiality to the results of the actuarial analysis. At times an algorithm or model may lack transparency or may not exhibit a clear connection between the input and output. If the application of an algorithm or model results in an outcome that regulators or others perceive as unfair or unfairly discriminatory, its use may be restricted or disallowed. As noted in Section II, the actuary should be aware of regulators' concerns that a variable could be considered a proxy for, or be correlated with, a prohibited factor.

Actuaries often are asked to lead projects that utilize predictive models. ASOP No. 38, although referenced as a property and casualty ASOP, may provide some guidance beyond P&C work, as it contemplates that actuaries may make use of a model that is outside of their area of expertise.[24] In addition, a revised version of ASOP No. 38 is pending that would cover all practice areas. The current ASOP No. 38 requires the actuary to:

1. Determine appropriate reliance on experts;
2. Have a basic understanding of the model;
3. Evaluate whether the model is appropriate for the intended application;
4. Determine that appropriate validation has occurred; and
5. Determine the appropriate use of the model.

Understanding what an actuary's responsibilities are and what roles the actuary plays on the predictive analytics team is key. These are important professionalism questions for the actuary who may not have an explicit role or defi ed responsibility in the development or use of the models but who nonetheless has some implicit level of professional or ethical responsibility.

24 ASOP No. 1, Section 4.3 states: "An ASOP should not be interpreted as having applicability beyond its stated scope and purpose. … If no ASOPs specific o the task are applicable, the actuary may, but is not required to, consider the guidance in related ASOPs."

There are currently no ASOPs specifi ally dealing with Big Data or predictive models that differ in material aspects from traditional actuarial methods, models, and techniques. Consequently, users of such models may choose to look to ASOP No. 38 or, if they are performing services in connection with P&C insurance coverages to which ASOP No. 38 applies, they will need to justify any material deviation from the obligations identifi d in ASOP No. 38.

For example, in employee benefit plan designs, if an actuary is unfamiliar with the algorithms used to model employee behavior, employee preference, and employee choice and those considerations are material to the actuary's work, ASOP No. 38 may provide useful information in terms of model evaluation, validation, and documentation. The actuary's work product may not involve the creation of such models, but their use could impact the actuary's work, assumptions, or communications.

Applications of Big Data can be useful in identifying correlations based on patterns discovered by analyzing data that tracks well with the behavior of individuals. In some cases, however, the correlation indicated by the data might be coincidental or there may be a confounding factor—i.e., a spurious correlation. Th s may suggest an algorithm problem. Actuaries working in this area need to ensure that specialists who analyze the data and build the models/algorithms have appropriate training and use the tools and procedures to test and correct for issues such as spurious correlations. For example, following standard model-building practices such as data partitioning with training, validation, and testing sets will most likely identify and eliminate such spurious correlations. Without correcting for spurious correlations, undesirable results may occur.

Underwriting is an area where it is important to understand the distinction between correlated results and causal relationships. While actuarial standards do not require an actuary to establish a causal relationship, many regulators have, for public policy reasons, disallowed the use of underwriting indicators unless it can be shown there is a causal relationship with the insurance claims that might occur under the insurance contract. In some cases, causal relationships are self-evident or can be presumed or explained. In other cases, such causal relationships can be demonstrated with data and analyses. However, there can be cases where the relationship is subject to some uncertainty about the validity or the quantifi ation of the relationship, and the underwriting indication may not be allowed.

Algorithms can be used in the underwriting process to assign a policyholder to a risk class and/or rate class. Generally, such assignments must be objective, transparent, and explainable to regulators and to insureds. There can be regulatory, statutory, or other legal restrictions regarding explanations and justifi ations of ratings and risk class assignment.

Data analytics also brings the potential benefit of uncovering previously unknown or hidden relationships in highly dimensional data. Once indicated by the data analytics, such relationships or correlations may indicate a need for further investigation. In health insurance, data analytics may suggest that a gap in diagnostic coding of a condition may exist as part of a risk adjustment program, when the condition that appears to be missing a diagnostic code in claims may not actually exist. For example, if prescription drug claims are used to determine potentially missing diagnoses in medical claims and an asthma medication claim is present without a diagnosis in the medical claims data, it may suggest that a gap exists for the asthma condition. However, some asthma medication also is used to treat chronic obstructive pulmonary disease (COPD) and, if this is the case, the model's result may be erroneous. The descriptive and predictive models, consequently, may provide opportunities for identifying potential issues that can be researched through review of medical records, or through a care coordination visit, or further investigation into potential waste, fraud, or abuse. If the method or approach does not result in an unsupportable action, the algorithm can be tested for its ability to be a good predictor, and adjusted as necessary.

Using Big Data for claim/care management outreach may give an incomplete or even an inaccurate picture of the issues a member may have. For care management efforts in health insurance, outreach on asthma education or disease management programs may be inaccurate if the member is using an asthma medication for treatment of COPD. It is important for the actuary to be aware of the correlation of the data to other potential causes before using the information. Often Star Ratings in Medicare Advantage and Prescription Drug and Affordable Care Act business for health insurance are used to measure how well a plan performs in several categories, such as quality of care and customer service, include patient satisfaction scores. If outreach is performed based on an inaccurate result from an algorithm, this can lead to patient dissatisfaction and lower Star Ratings of a plan.

The use of Big Data models is an extension of the traditional work of the actuary governed by the Code and ASOPs. There are several challenges not seen in traditional actuarial work including, but not limited, to:

- Reliance on and the need to supervise the work of other technical experts;
- Drawing conclusions from correlated relationships without clear evidence of a causal relationship; and
- Public policy concerns regarding the use of personal data.

These challenges require the actuary to carefully consider the professionalism and ethical considerations associated with these data models in ways that may not apply in traditional actuarial work.

Role of the Actuary

In many applications of Big Data in businesses in which actuaries are employed, multidisciplinary teams are utilized to effici tly and effectively complete the project. The teams are commonly composed of statisticians, computer scientists, data scientists, and actuaries. Actuaries on these teams may be thought of as the subject matter experts. But actuaries may be positioned to be the quarterbacks of the Big Data teams. With the proper background, an actuary can understand and direct the work of the Big Data multidisciplinary team based on their professionalism requirements and subject matter expertise.

As the evolution of Big Data continues in the areas of practice in which actuaries provide services, the professionalism and technical expertise provided by actuaries are essential elements upon which the public and regulators can place reliance. The professionalism requirements of actuaries provide guidance for the proper application and disclosure of Big Data assumptions and methodologies. They require actuaries to adhere to the high standards of conduct, practice, and qualifi ation of the actuarial profession, thereby supporting the actuarial profession in fulfilling its responsibility to the public.

Appendices

Appendix 1: InsurTech

InsurTech is a blending of the words "insurance" and "technology." It is the insurance industry analog of the term FinTech, a blending of the words "fi ancial" and "technology." The application of InsurTech is marked by the innovative use of technology to transform the insurance customer's buying, underwriting, and in force management experience by replacing traditional constructs of insurance with technology-driven systems that use predictive analytics and are often independent of the traditional approaches.

InsurTech innovations continue to occur at increasing rates of speed throughout the insurance marketplace, ranging from marketing to claims, and including fi ancial management, although the current focus is signifi antly on marketing and distribution. These innovations are happening in all lines of insurance business.

Below are three examples of ways in which InsurTech is transforming the industry:

- Insurance companies are changing the customer buying experience through InsurTech applications. Under one such app-driven product, underwriting utilizes Big Data-based algorithms to issue policies in less time than consumers have experienced under traditional underwriting. Th s company primarily targets Millennials, an app-driven generation that cares about causes. The company donates a portion of their revenues to charities insureds elect through the app-mediated application process.
- Life insurance companies are deploying life insurance applications using InsurTech devices and approaches. For instance, one company has deployed InsurTech processes to speed up the issuance of life insurance policies and another introduced a program that integrates InsurTech technologies with its life insurance products.
- Attracting and retaining new customers is a top priority of some insurers using technology-driven devices to transform the customer engagement relationship. InsurTech consulting fi ms are cropping up in the life insurance space to address the challenges insurers are facing to understand the evolution currently taking place in the marketplace.

Momentum in the industry is growing to increase the capitalization on the benefits of InsurTech both for additional functionalities and in other insurance practice areas.

The "how" of InsurTech, like FinTech, is highly dependent upon Big Data sources and Big Data analytics, such as predictive analytics. The most pervasive examples of InsurTech applications include wearable devices, telematics devices, customer technology apps, data portals, and platforms. Innovative InsurTech applications utilize predictive and artific al intelligence methodologies and technologies that simplify underwriting algorithms, and improve claims management, retention, targeted marketing, and other processes after issue. Companies are measuring the accuracy of traditional models against Big Data-based models and often fi ding the latter just as accurate, if not more so—and, more importantly, signifi antly less expensive than traditional models. Additionally, many real-time analyses that previously could not be performed are now performed using predictive analytics.

InsurTech approaches deploy Big Data to manage, expand, and remediate, if necessary, the customer experience and other aspects of insurance transactions, as well as insurance company management and strategy, often with signifi ant savings and effici cies. However, infrastructure changes to manage Big Data capabilities can involve large investments.

The driving force behind the development of InsurTech companies is the belief that the insurance industry is ripe for innovation and disruption. One force driving this disruption is behavioral. Millennials pursue a different consumer engagement paradigm than prior generations. The following generations will be even more media-enabled, forcing additional evolution in how companies engage consumers, simplify the issuance of polices, and manage those policies after issue.

The offering of ultra-customized policies, social insurance, and new streams of data from internet-enabled devices characterize the market approach of InsurTech companies. In addition to new pricing models, InsurTech startups are testing deep learning-trained artific al intelligence models to handle the tasks of brokers and fi d the right mix of policies to complete an individual's insurance coverage. There is interest in the use of apps to pull disparate policies into one platform for management and monitoring, creating on-demand insurance for micro-events like borrowing a friend's car and the adoption of the peer-to-peer model to both create customized group coverage and incentivize positive choices through group rebates.

The industry may be ripe for these innovations, but incumbent players are sometimes reluctant to adopt them. Insurance is a highly regulated industry with many layers of jurisdictional legal limitations. Regulators are still developing the expertise to regulate the use of Big Data in the context of insurance. Thus, they may be resistant to relaxing

regulations before they fully understand predictive algorithms. Insurance companies may err on the side of caution and shy away from startup ventures rather than risk regulatory challenges.

Many InsurTech startups still require the help of traditional insurers to handle underwriting and manage catastrophic risk. In addition, change always requires a transformative mindset. However, insurance is dependent upon consumers, and as more InsurTech capabilities garner consumer interest with a more refi ed, tech-enabled, and user-friendly approach, insurers will likely embrace the idea of InsurTech, buying up some of the innovations or creating their own innovations.

Observations

While innovations come with rewards, they also involve risks. There is a need to evaluate the risks these innovations pose to the fi ancial standing of insurance organizations. The following are some key observations of the potential impact of emerging insurance technologies on life, health, pension, and property and casualty insurance.

Observation 1: The distribution of many insurance products is moving away from the traditional and exclusive agent/broker-policyholder relationship toward a more impersonal, internet-based relationship. Th s will likely benefit insurers in the following ways:

- Provide signifi ant strategic advantage to those companies that effectively, and in a timely manner, deploy its use. InsurTech companies can provide signifi ant guidance as to how insurance companies can market better and more cost-effectively;
- Improve how insurance companies manage their in-force blocks of business; and
- Motivate regulators to develop Regulatory Technology (RegTech) to monitor the use of InsurTech.

Observation 2: For insurers, the key risks associated with the emergence of InsurTech include data privacy, regulatory compliance, product marketing, cyber fraud, and operational, underwriting, and strategic risks.

Observation 3: Insurers adopting and leveraging advanced technologies to deliver innovative insurance products face the risk of confli ting outcomes derived from the used of technologies such as artific al intelligence, machine learning algorithms, and natural language processing techniques. Cloud computing services pose a unique risk associated with unauthorized sharing of consumer data.

Observation 4: The increasing use of third-party data to reduce and simplify traditional underwriting methodologies poses risks to post-claim review processes for insurers, especially within the contestable period. It may also be more difficult to use claims experience as a learning tool for the underwriting process.

Observation 5: InsurTech developments may increase the scrutiny of insurer market conduct and operations by regulators as nontraditional data sources may contain proxies for variables disallowed by regulators. In addition, the technologies will likely undergo scrutiny by regulators to ensure similar outcomes for similar risks.

Observation 6: Regulators will need to augment their skill sets to supervise the use of InsurTech, advanced modeling techniques, and Big Data by insurance companies. Insurers and regulators likely will need to strike a balance between regulatory supervision and industry innovation to deliver an improved level of services to consumers at competitive costs.

The observations provide insight into how InsurTech will likely transform the insurance industry. They do not directly address risks that are a function of how the technologies were developed or the standards by which these technologies are evaluated against model risk and validation criteria. The following outlines considerations for assessing InsurTech vendor risk and developing model risk and validation criteria.

InsurTech Vendor Risk

Many companies (InsurTechs) have been formed in recent years that focus on leveraging technology to address the issues and opportunities presented to insurers. These InsurTechs are vendors to insurance companies as the insurance marketplace and regulators take up these innovations. Considerations for working with InsurTechs follow.

Product Quality

Criteria must be established to assess the quality of the InsurTech startups and the products they can potentially offer insurers. Areas important in assessing quality might include:

- Insurance product expertise;
- Quality of company management;
- Insurance-backed funding sources;
- Knowledge of insurance distribution channels;
- Financial strength to suggest industry sustainability;
- Understanding of the regulatory insurance environment and privacy issues; and
- Demonstrated proficie cy developing tech-based customer engagement media.

Integration and Maintenance

A signifi ant problem with any technology is its susceptibility to obsolescence. It can be very costly and resource-intensive for companies to integrate innovative technology with existing company systems. However, the integration of digital technologies can help insurers develop the following:

- Advanced methodologies to exchange data between facilities;
- Advanced machine learning analytics capabilities; and
- Ability to identify and acquire new sources of consumer data.

External Data Dependencies

The main concerns involve the consistency of data from a myriad of sources and how to measure the impact of data inconsistency on models and ultimately the consumer. Specifi considerations include:

- The credibility, validity, and traceability of data sources;
- The independent validation and reconciliation of data sources;
- The epoch of data sources and alignment to measures assessed by models; and
- The validity and review of underlying models generating external data sources.

Compliance Standards

The advent of the age of Big Data has challenged regulators with issues that current regulations are not equipped to address. Regulators are rapidly augmenting their education and regulatory tools to deal with the following:

- Privacy issues poised by the inclusion of Big Data sources in models;
- Ethical issues raised using Big Data in models impacting consumers;
- The inclusion of variables in Big Data masking disallowed variables;
- The reconciliation of consumer risk metrics derived from different models and data sources, and across different geographies; and
- The structuring of modeling data sets to assess geographical influences.

Model Risk & Validation

As with any innovation, Big Data represents an unexplored frontier for insurers, regulators, and consumers. Every model poses a certain amount of model risk to an organization. Model risk can be introduced through such things as:

- Applying models incorrectly;
- Using improper models;
- Developing inaccurate conclusions; and
- Utilizing improper data.

Other forms of model risk can be introduced through items that are uniquely associated with Big Data. InsurTech vendor models use Big Data and technology for driving decisions based on data rather than traditional underwriting methods. However, the validation methodologies of InsurTech technologies are still developing. Some considerations in the development of validation methods might include the following:

- Controls around authorized access and authorized use;
- Controls around the proper operation of InsurTech technologies;
- Assessing controls around data transmission and security from hacking;
- Validation of underlying algorithms and temporal consistency of results; and
- Analytical and surveillance tools to trigger alerts to refresh or rebuild models.

It is unlikely that the use of Big Data will become obsolete. The insurance industry will need to develop model governance policies and standards of practice to monitor the use and application of InsurTech technologies, as well as to collaborate with the regulatory community on issues that these innovations raise.

Appendix 2: Actuarial Standards of Practice (ASOPs)

A full treatment of the relevant sections of each of the ASOPs[25] is beyond the scope of this paper. The pertinent sections of some relevant ASOPs are highlighted and commented on in the following. Th s list is not intended to be exhaustive or all inclusive.

1. ASOP No. 23, *Data Quality*

Section 4.1.g states: [An actuarial communication should disclose when material and relevant] "the existence of results that are highly uncertain or have a potentially signifi ant bias of which the actuary is aware due to the quality of the data or other information relevant to the use of the data, and the nature and potential magnitude of such uncertainty or bias, if they can be reasonably determined…"

Big Data cannot be expected to be completely error-free. Data may come from third-party sources or may require frequent updating in near real time for use in certain applications. Section 4.1.g is just one of the 11 disclosure requirements in the ASOP. The disclosures in ASOP No. 23 tie into ASOP No. 41, *Actuarial Communications*.

2. ASOP No. 12, *Risk Classifi ation (for All Practice Areas)*

Section 3.2.1 states: "The actuary should select risk characteristics that are related to expected outcomes."

Section 3.2.2 states: "While the actuary should select risk characteristics that are related to expected outcomes, it is not necessary for the actuary to establish a cause and effect relationship between the risk characteristic and expected outcome in order to use a specifi risk characteristic."

Section 3.3.3 states: "When establishing risk classes, the actuary should (a) comply with applicable law; (b) consider industry practices for that type of fi ancial or personal security system as known to the actuary; and (c) consider limitations created by business practices of the fi ancial or personal security system as known to the actuary."

As noted above, this ASOP says that "…it is not necessary for the actuary to establish a cause and effect relationship between the risk characteristic and expected outcome to use a specifi risk characteristic." However, this cause-and-effect relationship may make it easier to explain the results to policyholders, agents, regulators, underwriters, and management.

25 Available on the Actuarial Standards Board's website.

It should be noted that this ASOP is not confi ed to pricing and underwriting. A Big Data project to identify liability claims that have a high potential for adverse development would use many data elements, each of which can be thought of as a risk classifi ation. Care should be taken to ensure that the data elements, perhaps in combination, do not result in discrimination that would violate applicable law.

3. ASOP No. 38, *Using Models Outside the Actuary's Expertise (Property and Casualty)*

Section 3.3.1 states: "The actuary should be reasonably familiar with the basic components of the model and have a basic understanding of how such components interrelate within the model. In addition, the actuary should identify which fi lds of expertise were used in developing or updating the model and should make a reasonable effort to determine if the model is based on generally accepted practices within the applicable fi lds of expertise. The actuary should also be reasonably familiar with how the model was tested or validated and the level of independent expert review and testing."

ASOP No. 38 covers topics in the P&C area that may be relevant to reliance on models developed by others, reliance on other actuaries on the modeling team, responsibilities in understanding the model, model structure, and model assumptions and parameters within the limits already discussed.

As of the writing of this paper, the ASB is considering the adoption of an actuarial standard of practice that more broadly addresses the use of models by actuaries in all practice areas. The proposed modeling ASOP has completed its 3rd exposure draft nd will be considered by the ASB in June 2018 for a 4th exposure.

4. ASOP No. 25, *Credibility Procedures*

Section 3.5 states: "In carrying out credibility procedures, the actuary should consider the homogeneity of both the subject experience and the relevant experience. Within each set of experience, there may be segments that are not representative of the experience set as a whole. The predictive value can sometimes be enhanced by separate treatments of these segments. The actuary should also consider the balance between the homogeneity of the data and the size of the data set."

ASOP No. 25 also covers such topics as selecting or developing credibility procedures, selection and blending of experience, and homogeneity of the data. Appendix 1 of ASOP No. 25 contains a section on emerging techniques that discusses generalized linear models and other multivariate modeling techniques. However, there is no express commentary regarding the applicability of this ASOP to Big Data.

5. ASOP No. 41, *Actuarial Communications*

Section 3.2 states: "In the actuarial report, the actuary should state the actuarial fi dings, and identify the methods, procedures, assumptions, and data used by the actuary with suffici t clarity that another actuary qualifi d in the same practice area could make an objective appraisal of the reasonableness of the actuary's work as presented in the actuarial report."

Section 3.4.4 states: "An actuarial communication should identify the party responsible for each material assumption and method. Where the communication is silent about such responsibility, the actuary who issued the communication will be assumed to have taken responsibility for that assumption or method. The actuary's obligation for identifying the other party who selected the assumption or method depends upon how the assumption or method was selected."

ASOP No. 41 also covers topics such as clarity, timing, who the responsible actuary is, the actuarial report, reliance on others for data and other information, responsibility for assumptions and methods, and disclosures, but there is no specific d scussion of the applicability to Big Data.

6. ASOP No. 21, *Responding to or Assisting Auditors or Examiners in Connection with Financial Audits, Financial Reviews, and Financial Examinations*

Section 3.5.4 states: "The responding actuary should be prepared to discuss with the auditor or examiner, including the reviewing actuary, the following items underlying those elements of the fi ancial statement or other elements within the scope of the fi ancial audit, fi ancial review, or fi ancial examination for which the actuary is the responding actuary:

a) the data used;
b) the methods and assumptions used, and judgments applied, and the rationale for those methods, assumptions, and judgments;
c) the source of any methods and assumptions not set by the responding actuary;
d) the models used;
e) the design and effectiveness of controls around the process, procedures, and models;
f) any signifi ant risks to the entity considered by the responding actuary; and
g) the reasoning to support results and conclusions."

Therefore, where Big Data and predictive analytics are used for fi ancial reporting purposes, the responding actuary should be able to explain the use of Big Data to the reviewing actuary.

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STATEMENT FROM FINANCIAL INNOVATION NOW SUBMITTED BY CHAIRMAN MIKE CRAPO

Statement for the Record
Senate Banking Committee
"Fintech: Examining Digitization, Data, and Technology"
September 18, 2018

Financial Innovation Now ("FIN") is an alliance of technology leaders working to modernize the way consumers and businesses manage money and conduct commerce. We believe that technological transformation will make financial services more accessible, safe and affordable for everyone, and we promote policies that enable these innovations.[1] FIN appreciates the Committee's efforts to examine how consumers and small businesses are using their own financial data to empower themselves and make better-informed decisions.

There is now a wide range of tools for consumers and small businesses to better manage their finances, including myriad apps that enable consumers to view and manage consumer financial account information on a consolidated basis across accounts and financial institutions. These tools help consumers analyze account activity, make better-informed financial decisions and become aware of, and ultimately avoid, unnecessary fees. Consumers also are using savings tools, informed by permissioned access to consumer financial account data, to help meet their savings goals, as well as apps that can educate and advise them on the range of financial products and services that may be available to them, including recommendations for credit and other financial products or services.

Open data can also enable efficient and more reliable tools that provide verification of account ownership or loan application information. Account verification tools enable consumers to access other financial products and services, including peer-to-peer payment services, in real time, rather than by delayed verification options, such as micro-transfers.

In spite of strong consumer interest and the potential for significant consumer benefit, consumer access to financial account data has, at times, been restricted. Some account-holding financial institutions have blocked access to permissioned entities (e.g., personal finance applications) that the consumer directs to access consumer financial account data. In addition, sometimes account-holding financial institutions change data formats and URLs or online forms in ways that disrupt automated access to consumer financial account data by these permissioned entities acting on behalf of consumers.

[1] FIN member companies include Amazon, Apple, Google, Intuit, PayPal, and Stripe.

FIN offers the following principles for a safe and accessible financial data ecosystem:

Security. Realizing the benefits of permissioned access to consumer financial account data is dependent on robust security – all participants in the ecosystem are aligned that security is a shared goal and a shared responsibility. There are a growing number of approaches designed to share securely consumer financial account data. We support the adoption of industry-wide technical protocols; however, both security challenges and technology will continue to evolve. Security standards must not box in any specific technology and should allow for technology to be updated, as needed, on an ongoing basis.

Reliability. Moreover, realizing the benefits of permissioned access to consumer financial account data is dependent on consumer confidence that the data obtained by the permissioned entity is current, accurate and complete. Industry will need to develop common expectations around the content of data, and should also consider developing a reporting and resolution mechanism for inaccurate or incomplete data. Finally, we understand that there may be circumstances under which account-holding financial institutions would need to discontinue access to consumer financial account data. Industry standards should ensure that these circumstances would be exceptional and reasonably justified, and that permissioned entities would be notified of the interruption and the timeline for resolution.

Consumer Consent. Fundamental components of permissioned access to consumer financial account data are appropriate consumer consent to such access, transparency regarding what data permissioned users may access, and the purposes for which the data may be used. Permissioned users should also provide a clear revocation option.

Industry-Driven Standards. Individual one-off partnerships enable certain consumers to benefit from permissioned access to financial account data, but these partnerships cannot scale to all account-holding institutions or third-party application providers. Industry standards would empower a broad class of consumers to permission access to consumer financial account data, and would promote innovation. For example, industry standards would enable many small financial institutions to facilitate permissioned access to consumer financial account data, minimizing the need to negotiate bilateral agreements with every third-party application provider. Standards should be developed by industry through a multi-stakeholder, consensus-based approach. Security standards should be risk based, so that security requirements match the risk posed, but do not constrain innovation. The need for standards to evolve as technology evolves makes a regulatory approach to setting standards for permissioned access to consumer financial account data insufficiently flexible.

In closing, FIN believes that consumers and small businesses should be empowered to permission access to financial account data securely and easily, using whatever secure application or technology they wish, without charges or restrictions that unreasonably favor any one application or technology over another. Thank you for your leadership and recognition of the potential benefits of data to improve financial health and access to new services.

LETTER FROM ELECTRONIC PRIVACY INFORMATION CENTER SUBMITTED BY SENATOR SHERROD BROWN

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September 26, 2018

The Honorable Michael Crapo
Chairman
U.S. Senate Committee on Banking,
Housing, and Urban Affairs
534 Dirksen Senate Office Building
Washington, DC 20510

The Honorable Sherrod Brown
Ranking Member
U.S. Senate Committee on Banking,
Housing, and 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 "Fintech: Examining Digitization, Data, and Technology."[1] The financial services industry is undergoing tremendous, rapid change, and ensuring that consumers remain protected must continue to be a top priority. While financial technology ("fintech") may provide consumers with new tools and opportunities, it also raises substantial privacy and data security concerns.

The Equifax breach of 143 million consumer records last year provides a stark reminder that Americans' most sensitive data is entrusted to companies who repeatedly fail to protect that information.[2] The Electronic Privacy Information Center ("EPIC"), founded in 1994, has long advocated for greater transparency and cybersecurity safeguards for consumer information held by financial and commercial organizations, and has repeatedly urged Congress to ensure that financial institutions and fintech companies adequately protect consumer financial data. EPIC submitted a statement to this Committee for the September 2017 hearing, "Examining the Fintech Landscape," and to the House Committee on Energy & Commerce for the June 2017 hearing, "Improving Consumer's Financial Options With FinTech."[3] As this Committee examines fintech, several security and consumer privacy issues should remain at the forefront.

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[1] *Examining the Fintech Landscape,* 115th Cong. (2018), S. Comm. Banking, Housing, and Urban Affairs, https://www.banking.senate.gov/hearings/fintech_examining-digitization-data-and-technology.
[2] EPIC, *143 Million US Consumers Suffer Massive Data Breach, Equifax at Fault* (Sept. 8, 2017), https://epic.org/2017/09/143-million-us-consumers-suffe.html.
[3] Statement from Electronic Privacy Information Center (EPIC) to Senators Crapo and Brown (Sept. 11, 2017), https://www.epic.org/testimony/congress/EPIC-SBHUA-FinTech-Sep2017.pdf; Statement from Electronic Privacy Information Center (EPIC) to Representatives Latta and Schakowsky (June 9, 2017), https://www.epic.org/testimony/congress/EPIC-HEC-FinTech-Jun2017.pdf.

Many new fintech platforms—and established firms entering the fintech space—rely on third-party data aggregators to provide them with consumer financial data.[4] When aggregators cannot legitimately obtain consumer financial information, they often simply take that information from consumers by "scraping"—or copying—the information when consumers input it, often without alerting the consumer.[5] Fintech platforms may also provide aggregators with consumer information through Application Programming Interfaces (APIs) that allow aggregators to simply access financial information in bulk.[6] Congress should take a proactive role in examining how consumer financial data is accessed, aggregated, and used. Specifically, this Committee should ensure that consumers' financial data is strongly protected no matter who holds it. Data aggregators should be held to the same standards as financial institutions, and should not be permitted to engage in reckless processing and distribution of consumer financial data.

Consumers must also have confidence that their data is being processed fairly and accurately. As EPIC Advisory Board member Professor Frank Pasquale told this committee, unmonitored data brokers poke holes in consumer protections by processing data in secret and using inaccurate information.[7] Companies using consumer financial data should instead be required to register with the Federal Trade Commission or another federal agency and should notify consumers when using their financial data.[8] Those consumers should be provided with the ability to challenge the use and accuracy of their data, and companies should be held accountable for improper use of personal data.[9] Extending the Fair Credit Reporting Act (FCRA) to data aggregators would benefit consumers and help ensure fair and accurate uses of personal information.

Fintech and all companies in the financial services industry should be subject to strict privacy rules to protect consumers. While the Consumer Financial Protection Bureau provides principles on consumer-authorized access and use of consumer financial information, companies are not required to follow these.[10] The rising popularity of banking and finance apps—combined with the lack of meaningful oversight and consumer protection—will no doubt lead to another breach similar in scale to the Equifax breach, with millions of financial records exposed simultaneously. Congress should therefore require fintech companies to ensure that data transfers of consumer financial data are secure and that third parties receiving that data are subject to limitations on use and disclosure.

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[4] U.S. Dep't Treasury, *A Financial System that Creates Economic Opportunities: Nonbank Financials, Fintech, and Innovation* 24 (2018), https://home.treasury.gov/sites/default/files/2018-08/A-Financial-System-that-Creates-Economic-Opportunities---Nonbank-Financials-Fintech-and-Innovation_0.pdf 23-24.
[5] *Id.* at 25.
[6] *Id.* at 26. Similar APIs were at issue in the Facebook/Cambridge Analytica scandal, where Facebook allowed third-party developers to access troves of user information without alerting the users themselves. *See In re Facebook – Cambridge Analytica*, EPIC, https://epic.org/privacy/facebook/cambridge-analytica/.
[7] *Exploring the Fintech Landscape: Hearing Before the Senate Cmmte on Banking, Housing, and Urban Affairs*, 115th Cong. 6 (2017) (testimony of Frank Pasquale, Professor of Law, University of Maryland), https://www.banking.senate.gov/imo/media/doc/Pasquale%20Testimony%209-12-17.pdf.
[8] *Id.* at 8.
[9] *See id.*
[10] Consumer Fin. Prot. Bureau, *Consumer Protection Principles: Consumer Authorized Financial Data Sharing and Aggregation* (2017), https://files.consumerfinance.gov/f/documents/cfpb_consumer-protection-principles_data-aggregation.pdf.

Thank you for your attention to this critical issue. EPIC looks forward to working with the committee to ensure that consumers are protected and informed about their financial information. We ask that this letter be entered in the hearing record.

Sincerely,

/s/ *Marc Rotenberg*
Marc Rotenberg
EPIC President

/s/ *Caitriona Fitzgerald*
Caitriona Fitzgerald
EPIC Policy Director

/s/ *Jeff Gary*
Jeff Gary
EPIC Legislative Fellow

STATEMENT SUBMITTED BY INDEPENDENT COMMUNITY BANKERS OF AMERICA

September 18, 2018

Fintech: The Community Bank Perspective

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 "Fintech: Examining Digitalization, Data, and Technology." 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 Office of the Comptroller of the Currency's (OCC's) 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 and facilitate and speed transactions. 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 that doesn't unfairly disadvantage existing market participants and doesn't put the financial system or consumers at risk.

OCC special purpose charter fails to address these concerns

In August, the OCC announced that it would accept applications for a new special purpose charter for non-depository online marketplace lenders, other fintech companies, and any other company that the OCC considers to be in the "business of banking." While the special purpose charter will subject online lenders and fintech companies to more oversight and regulation than they have had, it fails to address the essential questions concerning the regulatory framework that will govern the supervision of these firms.

For instance, while the OCC Policy Statement on Financial Companies' Eligibility to Apply for National Bank Charters says that "grant(ing) special purpose charters does not alter existing barriers separating banking and commerce," it is unclear whether the owners or affiliates of an OCC chartered fintech company would be regulated in the same way that the Bank Holding Company Act restricts the commercial activities of a bank holding company. Allowing corporate conglomerates like Google or Amazon 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 should 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.

Fintech charter should have statutory authority

Because the scope of the chartering authority under the 150-year old National Bank Act is unclear, ICBA urged the OCC to obtain specific legal authority from Congress before creating a special purpose charter for fintech companies, 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.

A full bank charter is the best point of entry for fintech companies

Varo Money (which has rebranded itself as Varo Bank) recently received preliminary approval from the OCC for a full bank charter that will allow it to accept FDIC-insured deposits. Varo Money provides mobile payments and accounts services. This, in our view, is how fintech companies that want bank charters should enter banking. Varo Bank will be subject to full array of national bank regulation and supervision, and if it creates or is acquired by a holding company, the holding company will be subject to consolidated Federal Reserve examination and oversight, as would any other de novo national bank.

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. They could become a source of systemic risk. These companies have not experienced a serious economic downturn yet and already they have been subject to serious funding and capital issues.

Congress should close the industrial loan company loophole

A loophole in the Bank Holding Company Act allows fintech companies and commercial holding companies to acquire industrial loan companies (ILCs) without being subject to federal consolidated supervision. In recent months,

Square, SoFi Bank, and most recently, Nelnet Bank, have applied for ILC charters. All of these companies have holding companies and affiliates that engage in diverse, non-financial, commercial activities.

Expansion of ILCs through fintechs and commercial companies would put the federal safety net, and ultimately the American taxpayer, at risk. ILCs are the functional equivalent of full-service banks. Commercial holding company ownership of ILCs will effectively combine banking and commerce, contrary to long-standing American economic policy.

ICBA supports statutory closure of the ILC loophole and urges the FDIC to impose an immediate two-year moratorium on the approval of deposit insurance for ILCs.

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 urges Congress to exercise thoughtful and vigorous 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.