INSURTECH: AN INDUSTRY RIPE FOR DISRUPTION

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I. INTRODUCTION

The global insurance industry has approximately $15 trillion in assets under management and $5 trillion in annual premium revenues.[1] $1.2 trillion of the annual premium revenues come from the United States alone.[2] Despite the financial appeal to investors, this industry has seen fewer technological improvements than any other financial services sector.[3] Insurance providers have among the lowest customer satisfaction and loyalty ratings of any industry, suggesting that a technological overhaul of the industry could bring welcome improvements.[4] Fewer than half of people in the United States aged twenty-five to sixty-four have life insurance coverage and more than half of all homes in the United States are underinsured.[5] This leaves the insurance market substantial room to grow and adapt if the market addresses needed

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[1] John Cusano, *Insurtech Boom Will Reshape the Global Insurance Market*, ACCENTURE (Jun. 20, 2016), http://insuranceblog.accenture.com/insurtech-boom-will-reshape-global-insurance-market [http://perma.cc/46BB-7BVY].

[2] *Id.*; Brendan Dickinson, *Insurance Is the Next Frontier for Fintech*, TECHCRUNCH (Aug. 5, 2015), https://techcrunch.com/2015/08/05/insurance-is-the-next-frontier-for-fintech/ [http://perma.cc/W78E-LM89].

[3] *See* Cusano, *supra* note 1.

[4] Dickinson, *supra* note 2.

[5] *Id.*

improvements to technology. Technology innovators have noticed this glaring need; in 2014, investors poured $2.6 billion into "insurtech," over ten percent of all fintech investment that year and over a three-fold increase from the previous year.[6] With the arrival of the insurtech revolution, the industry will likely continue to innovate and transform by adding efficiencies and growing the customer base.[7]

II. DISCUSSION

Insurance is built on data. Insurance companies must determine liability and assess how they can afford to cover individual consumers.[8] Insurtech is improving the ways in which data is gathered and processed. This essay will examine how these new capabilities allow insurance companies to improve their existing consumer offerings, alleviate their regulatory burdens, and create new products that better conform to modern society and behavior.

A. *Insurance: How it Works*

Insurance is a paid safeguard against loss.[9] Payment to the insurer, the premium, is determined through underwriting, a systematic process of measuring risks and assigning dollar amounts to them.[10] A premium varies based on how likely an individual is to experience adverse effects as compared to the average insured party.[11] Policies are pooled with other policyholders' premiums so those in the risk pool subsidize one another.[12] Money not spent on payouts, reinsurance,[13] or operating costs of the company is kept as profit.[14] Because inaccurate assessments might require higher-than-expected payout, the insurance industry's profitability depends primarily on

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[6] *See* Cusano, *supra* note 1.
[7] *Id*.
[8] *How Insurance Works?*, ASS'N BRIT. INSURERS (Nov. 13, 2014), https://www.abi.org.uk/Insurance-and-savings/Tools-and-resources/How-insurance-works [http://perma.cc/LM2H-U42Z].
[9] *Id*.
[10] *Id*.
[11] *Id*.
[12] *Id*.
[13] *Reinsurance*, INVESTOPEDIA, http://www.investopedia.com/terms/r/reinsurance.asp (last visited Feb. 18, 2017) [http://perma.cc/Q82A-PXQB].
[14] *FAQ,* LEMONADE, https://www.lemonade.com/faq#service (last visited Feb. 18, 2017) [https://perma.cc/RN4R-VQML].

accurate underwriting.[15] In traditional underwriting methods, underwriters assess historical data to consider the likelihood that a particular event might occur again. An ideal underwriting process consists of calculating variables for the specific risk type and covered individual to discern a premium that both entices the buyer and generates enough revenue to cover possible adverse events and create profit. In such an idealized process, the underwriter considers every factor that informs risk and remains entirely objective and unbiased. Perfect underwriting rarely exists in reality. Insurers sacrifice comprehensiveness for speed and cost. Underwriters often lack sufficient data or risk analysis techniques that reflect actual probabilities. Improving and underwriting data analysis represents a huge step forward for accurately calculating risk, to the benefit of the insurer and insured.

B. *Improving Underwriting and Data Analysis*

Ninety percent of the world's stored data was created in the past two years, much of this highly personal.[16] The Internet of Things has spread data sensors and transmitters throughout our environment.[17] These sensors identify changes or occurrences around them and send this data to cloud storage systems. Wearable devices and smartphones collect information on physical activity, heart rate, geolocation, and habits.[18] Telematics boxes in cars gauge how safe drivers are.[19] Sensors in buildings determine air quality, while those on the street track traffic patterns and weather conditions.[20] Individuals post their interests and state of mind on social media.[21] Insurers use this new wealth of data to underwrite more effectively, employing several techniques including (1) machine learning, (2) risk mitigation, (3) personalization, (4) continuous underwriting, and (5) fraud detection.

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[15] *Id*.
[16] *Bring Big Data to the Enterprise,* IBM, https://www-01.ibm.com/software/au/data/bigdata/ (last visited Feb. 18, 2017) [http://perma.cc/FXF4-RHHJ].
[17] Oliver Ralph, *Insurance Sector Worried as Insurtech Start-ups Cosy up to Customers*, FIN. TIMES (Oct. 14, 2016), https://www.ft.com/content/00168c14-7384-11e6-bf48-b372cdb1043a [http://perma.cc/D9Q4-52PE].
[18] Dickinson, *supra* note 2.
[19] *See* Ralph, *supra* note 17.
[20] Thomas Rubenacker, *Next-gen Underwriting: The Case for Continuous Underwriting*, TATA CONSULTANCY SERV. (2016), https://www.tcs.com/next-gen-underwriting [https://perma.cc/FE52-6K6Z].
[21] *Id*.

1. Machine Learning

Machine learning systems are a form of artificial intelligence that creating analytical models by adapting to the massive amounts of data they analyze with limited human intervention.[22] When applied to insurance, machine learning identifies norms of human behavior and finds risk-correlating patterns.[23] Previously, only humans could conduct pattern recognition. A human underwriter would identify an issue and then find the degree to which it correlated to the underlying risk. For instance, a calculable percent of the time, working in an environment with asbestos leads to death before the average lifespan of otherwise demographically similar individuals. Machine learning automates this process so that a human does not have to look for known risks or identify trends within the data, and will not misdiagnose degree of risk through bias. Machine learning can recognize patterns that human underwriters never thought to investigate, or those that correlate with risk so subtly that they were not previously identified.[24] Automating the underwriting process also makes it faster.[25] Finding and pinpointing these additional degrees of risk maximizes the calculation's accuracy. Machine learning has the potential to revolutionize a process built on human's limited quantitative and pattern recognition capabilities.

2. Risk Mitigation

The growing trove of personal data and corresponding analytics also allows insurance companies to limit major risks before they occur. Oscar, a new health insurer that integrates technology throughout its business, encourages its clients to wear connected devices and share collected data with the company.[26] Oscar provides discounts for customers who are proactive about their health, which can be demonstrated by high levels of activity on

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[22] *Machine Learning,* SAS, https://www.sas.com/en_us/insights/analytics/machine-learning.html (last visited Mar. 15, 2017) [https://perma.cc/9RES-JKQ6].
[23] Rubenacker, *supra* note 20.
[24] *See id*. (For example, this could find previously unconsidered traits that make a driver more likely to crash.).
[25] *Id*.
[26] *Fintech and the Evolving Landscape*, ACCENTURE, https://www.accenture.com/us-en/insight-fintech-evolving-landscape (last visited Feb. 15, 2017) [http://perma.cc/4TPU-FPT5].

their wearable device.[27] On the other hand, wearable health monitors can also identify warning signs of adverse health, altering insurers of potential issues ahead of time. Other sensors identify problems as they happen, long before the insured party notices them. For example, a sensor in a shipping crate can alert the insurance company that a claim will be filed and the insured company should take steps to mitigate supply chain disruptions that the insurance company may otherwise have to cover.[28]

3. Personalization

Among the more revolutionary and attractive innovations from a consumer standpoint is the industry's new, technology-driven policy personalization capability.[29] In a traditional "risk-pooling" underwriting system, insured individuals answer questions or undergo exams so the underwriter can determine their risk relative to their peers. The process produces an approximate risk profile for each individual. Insurers then group individuals into risk pools, which leads to the mitigation of miscalculations by collectively balancing out inaccuracies.[30] The more a person's risk profile reflects the actual odds that they will experience an adverse event, the less their policy needs a risk's pool's corrective effects. This in turn leads to smaller risk pools.[31] Data from the Internet of Things now produces a more accurate risk profile for individuals, making risk pools unnecessary.[32] Wearables, smart phones, other sensors, and social media profiles monitor specific and individualized information based on metrics such as activity levels.[33] They also provide more complex calculations such as behavioral trends and interests that differ from an average person's.[34] Insurers can use this data to charge individuals more accurately, reducing the need for any given insured individual to be subsidized by another.

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[27] *Why Oscar?*, OSCAR, https://www.hioscar.com/why-oscar (last visited Feb. 18, 2017) [perma.cc/6QWY-Q98Q].
[28] Rubenacker, *supra* note 20.
[29] David Thomson, *Disruptive Influences 2: The FinTech Revolution*, CICERO INS. INST. (July 2016), http://www.cii.co.uk/media/7118361/cii-cicero_disruptive_influences2_fintech_july2016.pdf [http://perma.cc/UXH6-SKEQ].
[30] *Id*.
[31] *See id*.
[32] *Id*.
[33] *Opportunities Await: How InsurTech is Shaping Insurance*, PWC (June 2016), https://www.pwc.lu/en/fintech/docs/pwc-insurtech.pdf [http://perma.cc/A2S2-LCNE].
[34] *Id*.

Personalized insurance plans also create corresponding harms to customers. Historically, individuals with greater risks face challenges obtaining insurance, a concern compounded by the use of personalized data. Those with high risk factors that normally would balance out as part of a risk pool may instead lose their subsidy and have to pay higher premiums. In extreme cases this may make groups of "uninsurables," people with risks so great that their premiums become exorbitant. While certain risk-carrying variables may be reversible, such as unsafe driving behavior,[35] others, like living in an impoverished area with bad air quality or having a previously unknown genetic predisposition to a disease, are difficult or impossible to change. Unfortunately, these factors may correspond both with the greatest need for insurance and an inability to pay.[36] Customers who refuse to generate and share data for insurers create an additional complication. Insurers, and companies generally, resolve imprecise pricing data by shifting risk to the consumer, and are almost certain to do the same for customers that limit an insurer's access to their personal data in the form of higher prices.[37]

4. Continuous Underwriting

The Internet of Things creates a consistent stream of data. Insurers can see information that reflects a client's health, driving speed, or home security in real time. Previously, insurers only received this information when a claim was filed or a policy renewed, and even then this information could often be imprecise or even fraudulent. Continuous data collection is useful in multiple ways. For example, insurers can create and compare information case studies. By looking at various factors leading up to a claim, including those that the insured did not see as pertinent, insurers can identify new risk factors and identify potential adverse events before they occur.[38] Moreover, rather than waiting for renewal, insurers can revise contracts as risks factors appear and disappear so that pricing remains accurate.[39] Technologies, in addition to those that gather and analyze risk, alleviate practical concerns and make continuous underwriting possible. For example, blockchain technology embedded in virtually tamper-proof smart contracts enables a rapid back and

[35] Thomson, *supra* note 29.
[36] *Id*.
[37] *Id*.
[38] Rubenacker, *supra* note 20.
[39] *Id*.

forth.[40] Rather than regularly meeting with clients to review and sign contracts, smart contracts are written in embedded code which can automatically change according to external considerations, such as changes in risk profiles or market forces.[41] These smart contracts allow all parties to see changes in real time, share identical and up-to-date versions, and sign automatically.[42]

5. Fraud Detection

Insurers are also using this new wealth of data and analytical capability to detect fraud.[43] Weather sensors on streets and in cars can show whether a crash occurred because of traction failure or negligence. Geolocation on a smart phone can determine whether a home owner was present during, and possibly responsible for, a house fire. Social media usage may suggest financial distress as a motive for fraud. Natural language processing programs determine if an insurance claimant's speech patterns, generally keywords that rarely occur together in truthful expression, indicate lying.[44] In practice, many of these fraud markers are bundled with historical data to create comprehensive fraud-detection models.[45] Improving fraud detection could be as vital to the industry as improved underwriting. Fraud accounts for almost forty percent of all money paid out by insurers,[46] and fraudulent claims lead to losses for insurers that are largely shifted to consumers who pay a higher price.[47] Accordingly, eliminating fraud benefits both insurers and the insured.

C. *Regulating New Industry Entrants*

Increased data breadth, frequency, analysis, and specificity, and the streamlined traditional insurance functions that they improve, enable insurers

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[40] Thomson, *supra* note 30.
[41] *Id*.
[42] *Id.*
[43] Rubenacker, *supra* note 20.
[44] *Id*.
[45] *Id*.
[46] Paul Sawers, *P2P Insurance Firm Lemonade Launches out of Stealth, Powered by Chatbots, Morals, and Big Bucks*, VENTURE BEAT (Sept. 21, 2016), https://venturebeat.com/2016/09/21/lemonade-insurance-social-good-p2p/ [http://perma.cc/S6C9-BXH4].
[47] Rubenacker, *supra* note 20.

to offer new products. A primary reason it has taken a data-driven revolution for the insurance industry to see transformative development is that complex and expensive regulatory barriers exist.[48] In the United States, the federal government plays only a small role in the insurance regulatory system. Individual states issue most insurance regulations.[49] New entrants to the market have been rare because creating an insurer with nationwide coverage requires approval from fifty-one different regulators to begin operations. Ongoing compliance presents a significantly more time-consuming, and labor as well as cash-intensive, task for a startup than working with a single federal body. No other financial industry contends with such a disparate regulatory system.[50]

Capitalization requirements are common across insurance regulatory systems in the United States.[51] The need to have a large and unencumbered cash supply is a significant barrier to new entrants.[52] Insurers use trends within the tech start-up world to satisfy these obligations. Some start-ups, including Oscar, have capitalized through venture funding, treating this requirement as any other operation and growth cost for private investors to provide in exchange for an ownership stake.[53] Another capitalization method is peer–to-peer (P2P) lending in which clients of the company double as investors and capitalize their peer investors' policies. If claims, and associated fees, filed on the policies for which an investor provides capitalization do not exceed the capitalization amount, investors receive returns.[54] P2P insurance capitalization schemes have successfully fulfilled regulatory requirements in Germany, but are largely untested in the United States.[55]

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[48] Dickinson, *supra* note 2.
[49] Martin F. Grace & Robert W. Klein, *The Future of Insurance Regulation in the United States*, BROOKINGS INST. PRESS (2009), http://www.jstor.org/stable/10.7864/j.ctt1262wz.4 [http://perma.cc/63AL-DLNB] (explaining that there has been some movement in the past twenty years to shift regulation to the federal level. Despite some progress such as the Gramm-Leach-Bliley Act, which allows financial holding companies to own insurance providers along with banks, regulation is still overwhelmingly concentrated at the state level.).
[50] *Id*.
[51] Dickinson, *supra* note 2.
[52] *Id*.
[53] *Id*.
[54] Guy Chazan, *Tim Kunde's Peer-to-Peer Approach to Insurance*, FIN. TIMES (Sept. 7, 2016), https://www.ft.com/content/9f2de95e-49e6-11e6-8d68-72e9211e86ab [http://perma.cc/5HE3-XTZM].
[55] Dickinson, *supra* note 2.

Other start-up "insurers" avoid regulatory strictures entirely by performing a subset of traditional insurance competencies. Rather than act as a full-fledged insurer, they occupy a portion of the vertically integrated insurance chain and can only create an insurance product available to the consumer by partnering with other companies that have sufficient capitalization, generally large, existing insurers.[56] This allows innovative data collectors, analyzers, and consumer facing platforms to symbiotically partner with companies that have the legal and financial infrastructure to create policies and pay claims. Often these companies are platforms with which users interface to purchase specialized contracts that are formally underwritten and held by more comprehensive insurers.[57] Though companies that satisfy only a portion of needed insurance capabilities forgo the potential revenues of operating a vertically integrated business, they still gain entry to the prohibitive industry. Existing insurers that previously held a monopoly over the industry face a more complex cost benefit calculation. They sacrifice a share of their profits for more efficient underwriting and improved user-facing products. However, they risk losing name recognition and brand loyalty by allowing partner companies to exclusively interface with consumers.[58] Insurers that contract with startups to interface with clients risk losing customer loyalty to their more public, undercapitalized partners. Nonetheless, these deals are seen as vital to both established insurer and modular and are becoming increasingly common. Recent trends in the banking industry, where such agreements are now standard practice, could provide a model for the future of insurance.[59] Large banks have launched open platforms and application programming interfaces through which start-ups can develop products that seamlessly integrate into a large bank's operations. The programs increase innovation and solidify partnerships by creating reliance on the bank or banks' proprietary programming system.[60]

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[56] Ralph, *supra* note 17.
[57] *Id*.
[58] Oliver Ralph, *Ten Fintech Start-Ups that Are Causing a Stir in Insurance*, FIN. TIMES (Oct. 2, 2016), https://www.ft.com/content/db833e5a-6eb1-11e6-a0c9-1365ce54b926 [http://perma.cc/AP24-MBN6].
[59] *Insurtech in 2017: Making Insurance Great Again*, BANKING TECH. (Feb. 6, 2017), http://www.bankingtech.com/712291/insurtech-in-2017-making-insurance-great-again/ [http://perma.cc/BSN8-CNTN].
[60] *Id*.

D. New Insurance Products

Specialization within the distribution chain means that many new industry entrants allow insurers to reach untapped markets. One way they do this is by developing microinsurance. Where traditional insurance is comprehensive, microinsurance is based on transactional consumption, covering more particular property and behaviors for short periods of time.[61] Microinsurance offerings are better suited to the sharing economy, particularly participants in the economy that can afford to pay insurance premiums but find that available coverage does not fit their lifestyle.[62] New offerings include mile-by-mile or hour-by-hour auto insurance for borrowed or rented vehicles, and property insurance for individual items.[63] New insurance models often do not come to fruition until other tech start-ups create a need. For instance, Slice did not launch its insurance for users of home-sharing services until AirBnB developed and popularized home-sharing.[64] None of these insurance products would be possible without partners that provide capital, infrastructure, and the advanced technologies already discussed. On-demand, particularized insurance requires constant data input, instant risk pricing, and smart contracts that can be signed from a smart phone as a customer gets into a borrowed car.[65]

Insurtech companies incorporate technologies other than those closely related to underwriting to further improve their specialized offerings. These companies provide accessible user interfaces so consumers can purchase on-demand coverage easily. One new vertically integrated property insurance company, Lemonade, enhances its in-house underwriting and capitalization capabilities with user-friendly technology.[66] Lemonade registers consumers

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[61] Dickinson, *supra* note 2.

[62] *Insurtech in 2017*, *supra* note 59; Ralph, *supra* note 58; Bernard Marr, *The Sharing Economy - What It Is, Examples, And How Big Data, Platforms And Algorithms Fuel It*, FORBES (Oct. 21, 2016), https://www.forbes.com/sites/bernardmarr/2016/10/21/the-sharing-economy-what-it-is-examples-and-how-big-data-platforms-and-algorithms-fuel/ - 31eaf4097c5a [https://perma.cc/BJN7-GH7U] (explaining that the sharing economy is based on limited ownership of property, real property, and funds by an individual, supplemented by extensive lending of these goods amongst groups of individuals).

[63] Ralph, *supra* note 58; Ralph, *supra* note 17.

[64] *Insurtech in 2017*, *supra* note 59.

[65] Ralph, *supra* note 58; Ralph, *supra* note 17.

[66] Andrew G. Simpson, *Startup Insurer Lemonade Is Going National; Files for Licenses Countrywide*, INS. J. (Dec. 22, 2016), http://www.insurancejournal.com/news/national/2016/12/22/436381.htm

with two different chat bots, a male and a female, that function similarly to Apple's Siri.[67] The process takes as little as ninety seconds and requires no human-to-human communication.[68] Lemonade's particular approach has attracted many customers that were previously uninsured.[69] Data suggests that ease of enrollment has contributed to this growth.[70] Twenty-five percent of people who price a Lemonade policy go on to buy one, an abnormally high number in the insurance industry.[71] Companies offer new functionality in other forms. For example, other property insurance companies are experimenting with damage assessment drones.[72] In addition, Oscar allows its policy-holders to receive a consultation from a doctor within ten minutes of making a request via their app.[73]

Recent industry shakeups have brought more than technological change. Lemonade's efficient underwriting process allows it to use a non-traditional premium structure. Consumers pay a certain premium which includes a fixed fee kept by the company.[74] The rest is used to pay claims. Anything leftover is then donated to a charity that the policy holder selects.[75] Because improved risk underwriting allows for more precise return and profit projections, Lemonade is able to structure its business to align the interests of the insurer and the insured.[76] Lemonade is not incentivized to deny claims and its customers are less likely to file fraudulent claims in a more trusting environment.[77]

[http://perma.cc/8M62-2W68] (explaining that Lemonade is currently only available in New York, but is in the process of registering nationwide. It aims to be available to 97% of the United States' population by the end of 2017).

[67] *Id*.

[68] *FAQ,* LEMONADE*, supra* note 14.

[69] John Peters, *Transparency Chronicles Part 3: The Insurance Update*, LEMONADE (Jan. 25, 2017), https://www.lemonade.com/blog/transparency-chronicles-part-3-insurance-update/ [http://perma.cc/V5FX-LTXJ].

[70] *Id*.

[71] *Id*.

[72] *Insurtech in 2017*, *supra* note 59.

[73] *Why Oscar?*, *supra* note 27.

[74] *FAQ*, *supra* note 14.

[75] *Id*.

[76] Sawers, *supra* note 46.

[77] *Id*.

III. CONCLUSION: INSURTECH IN THE NEAR FUTURE

The insurtech revolution is here, but not yet at its apex. If other fintech areas are any guide, innovation will continue. Underwriting methods will improve, new offerings will become available, and beneficial new partnerships will form. As with any data heavy industry, privacy concerns will arise and innovations in other areas are likely to force further transformation in ways that have not yet occurred. For example, autonomous vehicles are expected to decrease car insurance premiums sixty-three percent by 2060 and the insurance is likely to revolve around technology warranties and cyber-attacks rather than human error.78 The new data gathering and analysis techniques that currently exist, and likely ones that will in the future, will continue to analyze risks with increasing accuracy. Corresponding user-facing innovation will lead to insurance products for self-driving cars and whatever other societal trends arise.

[78] Ralph, *supra* note 17.