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INSURING AI: THE ROLE OF INSURANCE IN ARTIFICIAL INTELLIGENCE REGULATION

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ABSTRACT

The artificial intelligence ("AI") industry is predicted to grow exponentially over the next decade, up to a 14.5% contribution share to Gross Domestic Product in North America by 2030. This growth will lead to a substantial economic impact on retail, transportation, banking, healthcare, and other markets, but it will also lead to AI-inflicted harms. These may include, for example, a robotic security guard running over a toddler, or an AI chatbot making slanderous comments online. The discussion about AI liability has thus far focused on what liability regimes should apply to AI-inflicted damages. An appropriate policy response, however, must include insurance as a regulatory mechanism. Insurance can help avoid legal issues of liability and blame-placing by acting as a governance and regulatory tool to incentivize and channel the behavior of regulated entities. It can enhance the integration of AI into daily commercial routines while mitigating the harms that may arise from this process.

By combining research in AI liability with insights from insurance literature, this Article aims to change the way researchers and policymakers approach AI regulation. Insurance has the power to better handle AI-inflicted damages, serving both a preventive and compensatory function. This Article offers a framework for stakeholders and scholars working on AI regulation to take advantage of the current robust insurance system. It will discuss the type of insurance policy that should be purchased and the identity of the policyholder. The utilization of insurance as a regulatory mechanism will alleviate the risks associated with the emerging technology of AI while providing increased security to AI companies and AI users. This will allow different stakeholders to continue to unlock the power of AI and its value to society.

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I. INTRODUCTION

At its core, "[i]nsurance is a business that specializes in risk management."[1] Although insurance is mainly viewed as an ex post tool for indemnification of disasters through risk pooling, loss spreading, risk reduction, and shifting,[2] insurance serves other important roles of risk reduction and management ex ante. In today's technological age, nothing requires more risk reduction and management than the emerging technology of AI commercial machines, robots, agents, and algorithms (hereinafter "AI entities"[3]), which are increasingly integrated into our everyday routine.[4] Usually, insurance companies can offer policies to cover different types of damages since they "know a thing or two" because they have "seen a thing or two."[5] This is not necessarily the case in the emerging field of AI.

So far, the discussion about AI and insurance has followed two distinct inquiries.[6] The first, and more prominent, concerns how AI influences actuarial science and the operation of the insurance market. This conversation has largely centered on using technology, in this case AI,

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1. Omri Ben-Shahar & Kyle D. Logue, *Outsourcing Regulation: How Insurance Reduces Moral Hazard*, 111 MICH. L. REV. 197, 199 (2012).

2. For a discussion about the gap between loss spreading and risk reduction, see George L. Priest, *A Principled Approach Toward Insurance Law: The Economics of Insurance and the Current Restatement Project*, 24 GEO. MASON L. REV. 635, 646–47 (2017).

3. This word is chosen for its relative neutrality. AI are not always robots or algorithms. For the purpose of this Article, the definition of AI is the one used in Section 238(g) of the John S. McCain National Defense Authorization Act for Fiscal Year 2019, Pub. L. No. 115–232, 132 Stat. 1636, 1695 (2018) (codified at 10 U.S.C. § 2358(g) (2017)):

(1) Any artificial system that performs tasks under varying and unpredictable circumstances without significant human oversight, or that can learn from experience and improve performance when exposed to data sets.

(2) An artificial system developed in computer software, physical hardware, or other context that solves tasks requiring human-like perception, cognition, planning, learning, communication, or physical action.

(3) An artificial system designed to think or act like a human, including cognitive architectures and neural networks.

(4) A set of techniques, including machine learning, that is designed to approximate a cognitive task.

(5) An artificial system designed to act rationally, including an intelligent software agent or embodied robot that achieves goals using perception, planning, reasoning, learning, communicating, decision making, and acting.

4. *See, e.g.*, Jessie Yeung, *Boston Dynamics' Robot Dog Is Now Available for Select Customers*, CNN (Sept. 25, 2019, 8:00 AM), http://www.cnn.com/2019/09/25/app-tech-section/robot-dog-sale-intl-hnk-scli/index.html [https://perma.cc/2AKT-NG3D] (discussing Boston Dynamics's robot dog, which is now offered for commercial and domestic use).

5. *Unbelievable Claims*, FARMERS INSURANCE, https://www.farmers.com/learn/unbelievable-claims/ [https://perma.cc/F5G9-DM9E].

6. These two lines of inquiry are evident in the ABA's Insurance Technology and Risk Committee, which "has a dual focus on the role of insurance in technology innovations, and the role of technology innovations in insurance." *SciTech Committees*, A.B.A., http://www.americanbar.org/groups/science_technology/committees/ [https://perma.cc/36MS-4WL5].

in the insurance sector "to create savings and efficiency in the insurance value chain."[7] This optimistic thread of AI literature expects the massive calculating power of AI to yield increasingly accurate premiums, revolutionizing the insurance industry.[8]

The second inquiry, which has yet to receive sufficient attention, considers not how AI will change the insurance industry but how the insurance industry can change AI. This inquiry considers insurers' ability to offer coverage when AI entities cause harm to humans or property.[9] This Article delves into this second problem and the important legal questions arising from the topic's intersection with emerging technologies, tort law, and insurance.

AI liability has been a prominent topic during the last several years, with scholars suggesting various liability regimes that should apply to AI-inflicted damages.[10] However, these scholars have failed to

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7. JENNIFER COLEMAN, RISK MANAGEMENT IMPLICATIONS AND APPLICATIONS OF ARTIFICIAL INTELLIGENCE WITHIN THE (RE)INSURANCE INDUSTRY, *in* THE IMPACT OF ARTIFICIAL INTELLIGENCE ON THE (RE)INSURANCE SECTOR 15, 16 (2018), http://www.scor.com/sites/default/files/focus_scor-artificial_intelligence.pdf [https://perma.cc/A7T2-V5RE]. *See, e.g.*, Sam Lewis, *Insurtech: An Industry Ripe for Disruption*, 1 GEO. L. TECH. REV. 491, 491–92 (2017); Yehonatan Shiman, *Expected Bad Moral Luck*, 25 CONN. INS. L.J. 112, 148–49 (2018); Lin Lin & Christopher Chen, *The Promise and Perils of InsurTech*, SING. J. LEGAL STUD. 1–13 (forthcoming 2020).

8. *See generally, e.g.*, Ramnath Balasubramanian, Ari Libarikian & Doug McElhaney, *Insurance 2030 — The Impact of AI on the Future of Insurance*, MCKINSEY & CO. (Mar. 12, 2021), https://www.mckinsey.com/industries/financial-services/our-insights/insurance-2030-the-impact-of-ai-on-the-future-of-insurance [https://perma.cc/P8U5-9J5W]; MICHAEL NAYLOR, INSURANCE TRANSFORMED — TECHNOLOGICAL DISRUPTION (2017) (exploring different disruptive technologies expected to have a significant impact on the insurance industry); Ronald Richman, *AI in Actuarial Science*, ACTUARIAL SOC'Y S. AFR. 2018 CONVENTION, Oct. 24–25, 2018. An example of this can be found in Patent No. US 10,650,469 B1. This patent protects the usage of information-gathering by drones for the underwriting process of insurance companies. *See* U.S. Patent No. 10,650,469 (issued May 12, 2020); Kevin H. Kelley, Lisa M. Fontanetta, Mark Heintzman & Nikki Pereira, *Artificial Intelligence: Implications for Social Inflation and Insurance*, 21 RISK MGMT. & INS. REV. 373, 374 (2018) ("Insurance companies will apply AI to greatly enhance large data analytics, evolve algorithms with transactional data faster, and combine data in new ways to discover better underwriting risks and appropriately price the risk of various insured's based on the true value of their business risks.").

9. *See, e.g.*, Andrea Bertolini, *Insurance and Risk Management for Robotic Devices: Identifying the Problems*, 16 GLOB. JURIST 291 (2016) [hereinafter Bertolini, *Risk Management for Robotic Devices*]; Andrea Bertolini, *Artificial Intelligence and Civil Liability*, POLICY DEPARTMENT FOR CITIZEN'S RIGHTS AND CONSTITUTIONAL AFFAIRS, 2020; Andrea Bertolini & Giuseppe Aiello, *Robot Companions: A Legal and Ethical Analysis*, 34 INFO. SOC'Y 130, 135 (2018).

10. *See, e.g.*, Ryan Calo, *Robotics and the Lessons of Cyberlaw*, 103 CALIF. L. REV. 513 (2015); Rebecca Crootof, *International Cybertorts: Expanding State Accountability in Cyberspace*, 103 CORNELL L. REV. 565 (2018); Rebecca Crootof, *War Torts: Accountability for Autonomous Weapons*, 164 U. PA. L. REV. 1347 (2016); Curtis E.A. Karnow, *The Application of Traditional Tort Theory to Embodied Machine Intelligence*, *in* ROBOT LAW 51 (Ryan Calo, A. Michael Froomkin & Ian Kerr, eds. 2016); Gary E. Marchant & Rachel A. Lindor, *The Coming Collision Between Autonomous Vehicles and the Liability System*, 52 SANTA CLARA L. REV. 1321 (2012); William D. Smart, Cindy M. Grimm & Woodrow Hartzog, *An Education Theory of Fault for Autonomous Systems* (manuscript), (*available at*

recognize the role of insurance in regulating AI-inflicted damages.[11] It is impossible to fully unpack AI liability without also discussing the insurance market, which has the potential to enable the AI industry to flourish despite its inherent unpredictability.

This Article will discuss the best way to utilize the existing insurance infrastructure to regulate current and future uses of AI entities. It argues that existing insurance infrastructure can be instrumentalized to regulate AI entities without need for a special AI insurance policy. Extending existing mandatory insurance compensation schemes, or "coercive insurance"[12] (i.e., no-fault accident compensation schemes) to AI activities will help bypass legal problems of liability and blame-placing, make more predictable which entity will compensate victims for damages,[13] and minimize insureds' dangerous behavior by mitigating moral hazard risks and requiring certain safety standards be met to maintain the validity of an AI insurance policy.[14] The existing insurance practices will adapt to the challenges presented by businesses using AI. Insurance companies underwrite policies for businesses all the time. Even though these businesses already use AI, this usage will not require creating new policies, only the adjustment of existing ones. And in situations where insurance is not legally mandated, users of emerging AI technology will still seek to buy optional insurance policies in order to hedge risks.[15]

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https://ndlsjet.com/an-educated-theory-of-fault-for-autonomous-systems/ [https://perma.cc/9HUN-2SYH]); Bryant Walker Smith, *Automated Driving and Product Liability*, 2017 MICH. ST. L. REV. 1 (2017); David C. Vladeck, *Machines Without Principals: Liability Rules and Artificial Intelligence*, 89 WASH. L. REV. 117 (2014); Sunghyo Kim, *Crashed Software: Assessing Product Liability for Software Defects in Automated Vehicles*, 16 DUKE L. & TECH. REV. 300 (2017); Karni A. Chagal-Feferkorn, *Am I an Algorithm or a Product? When Products Liability Should Apply to Algorithmic Decision-Makers*, 30 STAN. L. & POL'Y REV. 61 (2019); Omri Rachum-Twaig, *Whose Robot Is It Anyway?: Liability for Artificial-Intelligence-Based Robots*, 2020 U. ILL. L. REV. 1141 (2020); Steven Shavell, *On the Redesign of Accident Liability for the World of Autonomous Vehicles* (Nat'l Bureau of Econ. Rsch., Working Paper No. 26220, 2019), http://www.nber.org/papers/w26220 [https://perma.cc/2PL7-49AJ]. *See also* F. Patrick Hubbard, *"Sophisticated Robots": Balancing Liability, Regulation, and Innovation*, 66 FLA. L. REV. 1803, 1839 (2014); Bryan Casey, *Robot Ipsa Loquitur*, 108 GEO. L.J. 225, 271–72 (2019); Andrew D. Selbst, *Negligence and AI's Human Users*, 100 B.U. L. REV. 1315, 1323–26 (2020); Tim Engelhardt, *Who Pays? On Artificial Agents, Human Rights and Tort Law*, *in* RESEARCH HANDBOOK ON HUMAN RIGHTS AND DIGITAL TECHNOLOGY: GLOBAL POLITICS, LAW AND INTERNATIONAL RELATIONS 268, 277 (2019); Matthew U. Scherer, *Of Wild Beasts and Digital Analogues: The Legal Status of Autonomous Systems*, 19 NEV. L.J. 259, 280–81 (2018).

11. *See* Tom Baker, *Liability Insurance as Tort Regulation: Six Ways That Liability Insurance Shapes Tort Law in Action*, 12 CONN. INS. L.J. 1 (2005).

12. Alexander B. Lemann, *Coercive Insurance and the Soul of Tort Law*, 105 GEO. L.J. 55, 56–57 (2016).

13. JACOB TURNER, ROBOTS RULES: REGULATING ARTIFICIAL INTELLIGENCE IN THE 21ST CENTURY 114 (2018).

14. *See* Ben-Shahar & Logue, *supra* note 1.

15. One example is insurance policies available to police officers. *See, e.g.*, John Rappaport, *How Private Insurers Regulate Public Police*, 130 HARV. L. REV. 1539, 1553 (2017). Police officers may also potentially be substituted for by robo-cops, raising new liability

The framework offered in this Article stems from the regulatory effect of liability insurance.[16] Although this Article does not support enforcing a comprehensive mandatory insurance compensation scheme for businesses manufacturing and using AI, it is unavoidable that the vast majority of businesses with a significant effect on the public will purchase liability insurance in the long run. This is because it is highly likely that they will be sued, so they will need to acquire some sort of hedging mechanism, either because courts will impose strict liability or out of fear that they will do so.[17] While this Article does not take a position on the appropriate liability regime for AI, it is important to note that a system of liability insurance requires liability rules,[18] otherwise businesses will not purchase insurance policies. The best way to make sure that insurers have the ability to regulate these businesses is to impose strict liability on accidents involving AI;[19] this liability regime will encourage businesses using AI to purchase policies. To receive insurance compensation, businesses must alter their behavior to qualify under a no-fault accident compensation scheme. This creates two important benefits. First, businesses will adopt improvements required by their insurers following a "reasonable person" standard. Second, businesses will adjust their activity level to ensure they are operating in a safe and efficient manner that will enable them to pay for damages that they may incur under their insurance policy.

But not all AI accidents can be prevented by adjusting activity levels. When these inevitable accidents do occur, they have tended to receive significant attention across media outlets, giving rise to a debate about who should be held accountable both within the legal realm and outside of it.[20] The tort system possesses immense power to publicize

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concerns and insurance possibilities. *See* Mike Thomas, *Are Police Robots the Future of Law Enforcement?*, BUILT IN (updated Apr. 8, 2020), https://www.builtin.com/robotics/police-robot-law-enforcement [https://perma.cc/3ZWT-936W]; April Glaser, *11 Police Robots Patrolling Around the World*, WIRED (July 24, 2016, 7:00 AM), https://www.wired.com/2016/07/11-police-robots-patrolling-around-world/ [https://perma.cc/RR54-ATGL]; Susannah Breslin, *Meet The Terrifying New Robot Cop That's Patrolling Dubai*, FORBES (June 3, 2017, 6:17 PM), https://www.forbes.com/sites/susannahbreslin/2017/06/03/robot-cop-dubai/#2a1d169c6872 [https://perma.cc/J5J5-TMEW]; Elizabeth E. Joh, *Policing Police Robots*, 64 UCLA L. REV. DISCOURSE 516 (2016).

16. *See infra* Section V.B.1.

17. Tesla is already following this course of action. *See infra* note 114.

18. Meaning, the courts in a common law system have created a clear set of rules with regards to the question of liability once damages occur. For more on this, see Guido Calabresi & A. Douglas Melamed, *Property Rules, Liability Rules, and Inalienability: One View of the Cathedral*, 85 HARV. L. REV. 1089, 1092–93 (1972).

19. For more on strict liability in the context of AI-inflicted damages, see, for example, Anat Lior, *AI Entities as AI Agents: Artificial Intelligence Liability and the AI Respondeat Superior Analogy*, 46 MITCHELL HAMLINE L. REV. 1043 (2020); Anat Lior, *The AI Accident Network: Artificial Intelligence Liability Meets Network Theory*, 95 TUL. L. REV. 1103 (2021).

20. *See, e.g.*, Ron Schmelzer, *What Happens When Self-Driving Cars Kill People?*, FORBES (Sept. 26, 2019, 10:03 AM), www.forbes.com/sites/cognitiveworld/

high-profile cases involving new dangers that may potentially lead to their elimination or reduction.[21] Such is the case with autonomous vehicle ("AV") accidents, which have caused anxiety to drivers and pedestrians around the world. However, when it comes to new and unexpected technologies, which gain publicity by cherry-picking the most egregious cases, this negative attention may lead to the loss of an important technology that possesses enough advantages to outweigh its flaws. Insurance can provide a way to avoid this fate.

The concept of using insurance to manage damages caused by AI entities has been discussed in the UK and EU. In 2017, the European Parliament published a resolution recommending a set of civil law rules for robotics.[22] Article 59 of that resolution discusses different insurance principles that can apply to AI entities. These include establishing a compulsory insurance scheme for specific categories of robots (including AI entities) and establishing a compensation fund.[23] The usage of insurance to manage AI entities is already a reality in the UK's automobile industry, where the Automated and Electric Vehicles Act was enacted in 2018.[24] This Act applied the existing insurance infrastructure of non-autonomous vehicles to autonomous ones.[25] These two examples demonstrate potential ways insurance can be used to regulate AI. Legislators must consider whether to extend existing insurance infrastructure to AI, as was implemented in the UK, or develop new regulatory schemes, as was suggested in the EU. This Article expands on the debate and ultimately endorses the UK route of using existing insurance infrastructure to regulate AI.

Creating a novel insurance scheme specifically for AI entities would be impractical because regulators and insurers currently lack the knowledge, resources, and time to form new insurance policies before AI entities become an even more integral part of our commercial

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2019/09/26/what-happens-with-self-driving-cars-kill-people/ [https://perma.cc/NLF8-WFEJ]; Mihir Zaveri, *Prosecutors Don't Plan to Charge Uber in Self-Driving Car's Fatal Accident*, N.Y. TIMES (Mar. 5, 2019), www.nytimes.com/2019/03/05/technology/uber-self-driving-car-arizona.html [https://perma.cc/54E3-NRJK]; Jack Stewart, *Tesla's Autopilot Was Involved in Another Deadly Car Crash*, WIRED (Mar. 30, 2018, 10:34 PM), www.wired.com/story/tesla-autopilot-self-driving-crash-california/ [https://perma.cc/93MR-E56G].

21. *See* Alexandra D. Lahav, *Bellwether Trials*, 76 GEO. WASH. L. REV. 576, 603 (2008); Scott A. Moss, *Illuminating Secrecy: A New Economic Analysis of Confidential Settlements*, 105 MICH. L. REV. 867, 908–10 (2007); Lemann, *supra* note 12, at 76.

22. European Parliament Resolution of 16 February 2017 with Recommendations to the Commission on Civil Law Rules on Robotics (2015/2103(INL)) https://www.europarl.europa.eu/doceo/document/A-8-2017-0005_EN.html [https://perma.cc/5272-8MFL] [hereinafter EU Resolution]; *see also* Rachum-Twaig, *supra* note 10, at 1165.

23. *See* EU Resolution, *supra* note 22.

24. For the full text of the Act, see Automated and Electric Vehicles Act 2018, c. 18 www.legislation.gov.uk/ukpga/2018/18/contents/enacted [https://perma.cc/6YUU-9PR7].

25. For more on this Act, see Section IV.C.3.

lives.[26] Thus, the solution for AI-inflicted damages will have to stem from our existing insurance practices and infrastructure, which, given this technology's substitution effect, already cover most of the activities that AI entities will eventually perform.[27]

The existing insurance infrastructure offers stability and cohesiveness in regulating AI entities. Although a no-fault accident compensation scheme for AI entities, or any other voluntary AI insurance policy, has some drawbacks, these drawbacks are not unique to AI — they have arisen in the past whenever new technologies have emerged. History demonstrates the insurance industry's capacity to assimilate such emerging technologies. Moreover, the insurance industry is better placed to tackle this challenge than it has ever been: insurance companies will be able to use the forces of AI itself to better set premiums and identify the most efficient entity to make responsible for purchasing a liability policy. Here the two scholarly discussions about AI and insurance converge. By enhancing the art of risk assessment, AI helps to better regulate its own risks.[28]

This Article continues as follows. Part II introduces the unique features of AI entities in the insurance context. Part III focuses on the problems that may arise when discussing the insurability of AI. Part IV generally presents the intersection of insurance and new technologies and provides a brief review of how insurance can help mitigate the entry of new technologies into the commercial market. Part IV also reviews previous suggestions for using insurance in the AI context, mostly with regard to autonomous vehicles. Part V delves into the advantages and disadvantages insurance has to offer in the AI context and advocates for the adoption of liability insurance as an important societal-regulatory tool. Part V also presents AI liability challenges, focusing on causal ambiguity and hacking AI entities, and the way insurance can assist in addressing these issues. Part VI elaborates on the main suggestion of this Article to build upon existing insurance infrastructure, with some necessary adjustments to accommodate the unique features of AI entities and leverage the power of AI to enhance insurers' capability to cover AI activities.

II. ACTUARIAL SCIENCE MEETS AI

This Part begins with a brief introduction to actuarial science and how this field interacts with the burgeoning AI industry.

Insurance is the art of pricing risk. In order to offer insurance coverage for a certain activity, insurers try to predict the probability that a

26. See the discussion about terrorism insurance vis-à-vis AI insurance *infra* at Section V.A.3.a.

27. Jack M. Balkin, *The Path of Robotics Law*, 6 CALIF. L. REV. CIR. 45, 46 (2015).

28. *See infra* Part II.

specific policyholder will suffer a harm as a result of that activity and the predicted magnitude of that harm, should it materialize.[29] Actuarial science helps to calculate that probability via gathering and analyzing features and experiences of a potential policyholder and a specific activity. In order to achieve the benefits associated with the aggregation and segregation of risks, insurers are highly motivated to establish an accurate classification based on the predictive risk of a policyholder.[30] These benefits derive from the fact that an accurate classification will enable insurers to add lower-risk policyholders to its risk pool and thus reduce the risk level of its insureds by charging accurate premiums.[31] This will lead to a minimum payment of materialized accidents, which means maximum profit for the insurer.

This methodology is called risk classification and has two main public justifications. First, insurers can better combat adverse selection[32] if they are able to set their premiums accurately based on risk classification.[33] This enables insurers to make sure low-risk policyholders enter their insurance pool by setting a tempting premium for their policy.[34] Second, risk classification is also a good instrument to mitigate the harms that may arise due to moral hazards. Risk classified premiums signal an assigned riskiness level to the insureds. This nudges them to lower that level in order to enjoy better premiums (assuming they have control over the features which were used for this classification process).

At its heart, an insurance policy is a contract between the insurer and the insured.[35] As such, both parties have an interest in identifying

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29. Rick Swedloff, *Risk Classification's Big Data (R)evolution*, 21 CONN. INS. L.J. 339, 344 (2014).

30. Priest, *supra* note 2, at 640–47.

31. Swedloff, *supra* note 29, at 345.

32. In the insurance context, adverse selection refers to the information gap (asymmetric information) between insurers and insureds and its influence on market participation and the willingness of insurers to provide insureds with accurate policies, given that gap. *See, e.g.*, Peter Siegelman, *Adverse Selection in Insurance Markets: An Exaggerated Threat*, 113 YALE L.J. 1223 (2004); John Fabian Witt, *Toward a New History of American Accident Law: Classical Tort Law and the Cooperative First-Party Insurance Movement*, 114 HARV. L. REV. 690, 780 (2001) ("Adverse selection describes the tendencies of high-risk insureds to seek out insurance and to stay in insurance pools, and of low-risk insureds to opt out of insufficiently subcategorized insurance pools that require them to subsidize the insurance of higher-risk insureds. . . . [A]dverse selection can lead to the eventual unraveling of insurance pools, as low-risk insureds abandon high-risk insureds.").

33. KENNETH S. ABRAHAM, DISTRIBUTING RISK: INSURANCE, LEGAL THEORY, AND PUBLIC POLICY 67 (1986); Tom Baker, *Containing the Promise of Insurance: Adverse Selection and Risk Classification*, 9 CONN. INS. L.J. 371 (2003).

34. For another related justification, see Swedloff, *supra* note 29, at 346 ("[P]ricing based on risk may be more fair to low risk insureds.").

35. Kenneth S. Abraham, *Four Conceptions of Insurance*, 161 U. PA. L. REV. 653, 658 (2013); Asaf Lubin, *Public Policy and the Insurability of Cyber Risk*, 6 J.L. & TECH. TEX. 30 (forthcoming 2022), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3452833 [https://perma.cc/7HFH-437Q]. The nature of the policy as a contract can also be valuable in that it provides a definitive party responsible for indemnification, thus answering the

the types of risks that will be covered — particularly when the contract involves novel technology like AI. Some of the damages caused by AI entities will be covered by overlapping policies,[36] such as the emerging cyber insurance market.[37] Cyber insurance broadly governs damages for "information security and privacy liability, and business interruption."[38] It will most likely cover instances of data leakage and model stealing attacks, but it will not be able to cover all damages inflicted by AI entities. Most importantly, it is not likely that cyber insurance will offer coverage for bodily harms, brand damages, discriminatory decisions made by algorithms, or property damages caused by AI entities, as they are not directly related to data breach or abuse. Thus, cyber insurance and other categories of policies can only operate as complementary mechanisms for damages inflicted by AI. In light of this, the insurance market will likely first focus its efforts on these uncovered types of damages — mainly bodily injuries and property harms — for actions carried out by AI entities. As more categories of perils inflicted by AI entities are established, coverage will grow.

The exponential growth of AI over the last several years can be partly attributed to the proliferation of big data sets,[39] on which tech companies can train AIs through machine learning or deep learning.[40] Without big data, AI would not be the massive force it is today.[41] The capability of AI to identify new correlations between collected information and chances of loss "are revolutionizing their business practices" throughout the insurance industry.[42] In addition to enhancing insurers' ability to set more precise premiums, AI allows insurers to

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pervasive inquiry as to who should pay within the AI manufacturing pipeline — the party who has insurance.

36. For a visual explanation of this notion in the cyber insurance context, see OECD, *Enhancing the Role of Insurance in Cyber Risk Management*, OECD PUBLISHING 103 (2017), https://dx.doi.org/10.1787/9789264282148-en [perma.cc/5HJR-G6VA].

37. Cyber insurance is considered the fastest growing insurance market. *See* Conner Forrest, *Why Cybersecurity Is the Fastest-Growing Insurance Market for SMBs*, TECHREPUBLIC (Oct. 12, 2018, 2:37 PM), http://www.techrepublic.com/article/why-cybersecurity-is-the-fastest-growing-insurance-market-for-smbs/ [https://perma.cc/JQ2V-4ECW].

38. Ram Shankar Siva Kumar & Frank Nagle, *The Case for AI Insurance*, HARV. BUS. REV. (Apr. 29, 2020), http://www.hbr.org/2020/04/the-case-for-ai-insurance [https://perma.cc/T6J7-YE5V].

39. Exec. Office of the President, Nat'l Sci. & Tech. Council, Comm. on Tech., *Preparing for the Future of Artificial Intelligence* 6 (2016), https://obamawhitehouse.archives.gov/sites/default/files/whitehouse_files/microsites/ostp/NSTC/preparing_for_the_future_of_ai.pdf [https://perma.cc/M4X3-DFHH].

40. For the distinction between these two types of learning, see Copeland, *infra* note 58.

41. Some have described big data as the "new oil." Joris Toonders, *Data Is the New Oil of the Digital Economy*, WIRED (2014), http://www.wired.com/insights/2014/07/data-new-oil-digital-economy/ [https://perma.cc/3GGZ-LAA6].

42. Rick Swedloff, *The New Regulatory Imperative for Insurance*, 61 B.C. L. REV. 2031, 2056 (2020).

individualize policies for specific insureds[43] and identify fraudulent claims more easily,[44] as well as other activities that can create better efficiency within the overall insurance process — from purchasing a policy to submitting a reimbursement claim.[45]

An example of utilizing AI in this context is the practice of China's biggest insurance company, Ping An. Ping An uses facial recognition software to refine its health insurance coverage and premiums by analyzing their prospect insureds' risks based on their facial features.[46] It is the ultimate tailor-made premium calculation, allowing Ping An to reinforce its classification method within its risk pool. The more accurate a given classification process, the more profits the insurer accumulates.

However, there are two main problems with using big data for risk classification.[47] First, there is an increased risk of bias. Machine learning relies on big datasets, which often contain entrenched biases against minority groups. During the process, the bias from the datasets can become reflected in the ultimate risk assessment.[48] This may lead to several negative effects, such as limited access to insurance as a social safety net, reinforcement of negative stereotypes, unfair burden being

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43. For example, new technology in the automobile insurance industry enables insurers to track the behavior of a driver and tailor coverage specifically to her. *See, e.g.*, Yu-Hung Chen & Baojun Jiang, *Effects of Monitoring Technology on the Insurance Market*, 28 PROD. & OPERATIONS MGMT. 1957 (2019).

44. Consider a case where a man was charged with insurance fraud based on the data collected from his pacemaker. Don Reisinger, *How a Pacemaker Led Police to Accuse Someone with Arson*, FORTUNE (Feb. 7, 2017, 3:43 PM), https://fortune.com/2017/02/07/pacemaker-arson-charges/ [https://perma.cc/85R8-TU7X].

45. *See* Swedloff, *supra* note 42, at 2035–36; Blake Morgan, *How Artificial Intelligence Will Impact the Insurance Industry*, FORBES (July 25, 2017, 12:16 PM), http://www.forbes.com/sites/blakemorgan/2017/07/25/how-artificial-intelligence-will-impact-the-insurance-industry/#614082416531 [https://perma.cc/DN6S-6RRM]; Mitul Makadia, *The Future of AI in the Insurance Industry*, TECH NATIVE (May 3, 2019), http://www.technative.io/the-future-of-ai-in-the-insurance-industry/ [https://perma.cc/L2NG-JETT]; Sushant K. Singh & Muralidhar Chivukula, *A Commentary on the Application of Artificial Intelligence in the Insurance Industry*, 4 TRENDS IN A.I. 75 (2020) (discussing what AI can do for automating underwriting, prospecting clients, targeting new business, personalized services, customer segmentation, customer churn prediction, customer lifetime value prediction, fraud prediction, loss prediction, claim rate prediction, life event marketing, recommendation engines, and insurance chatbots).

46. Zhou Wei, *What Your Face May Tell Lenders About Whether You're Creditworthy*, WALL ST. J. (June 10, 2019, 10:05 PM), http://www.wsj.com/articles/what-your-face-may-tell-lenders-about-whether-youre-creditworthy-11560218700 [https://perma.cc/QFG6-Y32X]; Cathy O'Neil, *China Knows How to Take Away Your Health Insurance*, BLOOMBERG (June 14, 2019, 7:00 AM), http://www.bloomberg.com/opinion/articles/2019-06-14/china-knows-how-to-take-away-your-health-insurance [https://perma.cc/HVF3-WQXU].

47. Swedloff, *supra* note 29, at 339; *see also* Lin & Chen, *supra* note 7, at 14. A third problem of risk classification is inefficiency. However, this is less related to the concept of big data. For more on this, see Swedloff, *supra* note 29, at 347–48; Ronen Avraham, Kyle D. Logue & Daniel Schwarcz, *Understanding Insurance Antidiscrimination Laws*, 87 S. CAL. L. REV. 195, 208 (2014).

48. *See, e.g.*, Swedloff, *supra* note 29, at 348; Avraham et al., *supra* note 47, at 215–17; Regina Austin, *The Insurance Classification Controversy*, 131 U. PA. L. REV. 517 (1983).

placed on specific populations, due to new types of correlations big data will discover that are *prima facie* unrelated to the insured activity,[49] and dignitary harms.[50]

Second, the usage of big data creates potential privacy violations.[51] Insurers may obtain information about potential policyholders from public sources that they cannot obtain directly from the insureds, either because they didn't have that ability before or because it is illegal for them to collect it. Moreover, insurers can also use big data as part of their predictive analytics algorithms to obtain private information to which they legally should not have access.[52]

The usage of big data in insurance predictive algorithms and premiums determinations is inevitable in both the near and far future. The pervasive usage of big data will exacerbate concerns of discrimination and privacy violations,[53] but these are not new threats to the insurance market. The insurance market has been facing these legal challenges from the moment it was created, albeit to a lesser extent.[54] They are not enough to render this market ineffective or insufficient, just imperfect, as most legal systems are.[55]

The use of AI in insurance will evolve and enhance the accuracy provided by actuarial science. We may choose to regulate the negative effects described above, but this will not diminish AI's computational power, nor will it reduce the important role insurance has. Thus, the

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49. For example, finding a strong correlation between liking a certain type of fruit to the possibility of being involved in an accident, which is proven by big data but is unintuitive.

50. For a discussion about the fairness question and elements that may exacerbate it, see Swedloff, *supra* note 29, at 360–68.

51. *See, e.g.*, *id.* at 351; Karl Manheim & Lyric Kaplan, *Artificial Intelligence: Risks to Privacy and Democracy*, 21 YALE J.L. & TECH. 106, 119 (2019); Sandra Wachter & Brent Mittelstadt, *A Right to Reasonable Inferences: Re-Thinking Data Protection Law in the Age of Big Data and AI*, 2019 COLUM. BUS. L. REV. 494, 495; Anita L. Allen, *Protecting One's Own Privacy in a Big Data Economy*, 130 HARV. L. REV. F. 71, 71 (2016).

52. *See* Swedloff, *supra* note 29, at 368–69; Swedloff, *supra* note 42, at 2033–35.

53. *See generally* Shauhin A. Talesh & Bryan Cunningham, *The Technologization of Insurance: An Empirical Analysis of Big Data and Artificial Intelligence's Impact on Cybersecurity and Privacy*, 5 UTAH L. REV. 967 (2021) (discussing the "technologization of insurance" and the sometimes-negative process whereby technology influences and shapes the delivery of insurance to the public). The authors highlight the problems of the AI approach and how data and technology can be manipulated. *Id.* at 976.

54. *See, e.g.*, Leslie Scism, *Insurance Group to Scrutinize Rate Guidelines for Racial Bias*, WALL ST. J. (July 23, 2020, 5:00 AM), http://www.wsj.com/articles/insurance-group-to-scrutinize-rate-guidelines-for-racial-bias-11595494800 [https://perma.cc/FEX2-FD3X]; Elizabeth Blosfield, *How to Help Insureds Manage Customer Privacy Risk*, INS. J. (Jan. 9, 2017), http://www.insurancejournal.com/news/national/2017/01/09/438290.htm [https://perma.cc/72QH-JSZB].

55. *See generally* Anya E.R. Prince & Daniel Schwarcz, *Proxy Discrimination in the Age of Artificial Intelligence and Big Data*, 105 IOWA L. REV. 1257 (2020). Prince and Schwarcz claim that AI creates a distinctive risk of a particular type of bias that is, in many ways, different in kind than traditional forms of discrimination. It seems that despite this fact, the insurance industry will not forgo the benefits of using AI. This Article doesn't intend to dismiss this point, as it has vast ramifications. However, delving into it exceeds the scope of this Article.

risks of bias and privacy violations will not dissuade the insurance market from using big data as it continues to grow and offer policies covering emerging technologies.[56] Before we turn to discussing how this can be accomplished, we must first review the challenges AI presents to the underwriting process of insurance, chiefly the "black-box" issue.

III. THE PROBLEM WITH AI'S INSURABILITY

When it comes to AI liability and AI insurability, there are two main reasons to worry about providing insurance to cover activities carried out by AI entities. First is the current lack of information about what damage AIs can cause, which is a function of AI being a new and not frequently used technology. This issue should be mitigated over time as new information is gathered about the uses and harms of AI. Second is the "black-box" problem, which is unique to AI.

The black-box issue refers to the fact that the decision-making process of an AI entity cannot be evaluated while the decision is being made, nor in the aftermath of a decision.[57] This issue creates unpredictability because it renders AI entities' actions and behavior in carrying out their assigned tasks unforeseeable. This in turn puts a substantial dent in actuarial science's ability to calculate accurate premiums for these activities.

A simplified explanation of AI states that it is a machine, a robot, or an algorithm that reaches conclusions and makes decisions without the intervention of humans. Machine learning, a branch of AI,[58] uses the initial code and database to teach itself the "correct" or "best" decision. As a result, the decision-making processes itself takes place in a virtual black-box[59] and is unknown to the human "creator"[60] or user.[61]

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56. This Article doesn't endorse the negative effects big data has in the risk classification process. Minimizing the harmful effects of AI usage should be a top insurance priority.

57. Suggestions that evidence of the AI decision-making process be available ex post only partially solve this problem. *See, e.g.*, Deven R. Desai & Joshua A. Kroll, *Trust But Verify: A Guide to Algorithms and the Law*, 31 HARV. J.L. & TECH. 1, 42 (2017); Joshua A. Kroll et al., *Accountable Algorithms*, 165 U. PA. L. REV. 633, 653 (2017).

58. Michael Copeland, *What's the Difference Between Artificial Intelligence, Machine Learning and Deep Learning?*, NVIDIA (July 29, 2016), http://www.blogs.nvidia.com/blog/2016/07/29/whats-difference-artificial-intelligence-machine-learning-deep-learning-ai/ [https://perma.cc/FJ3S-XA4N].

59. Broadly, this term refers to "anything that has mysterious or unknown internal functions or mechanisms." *Black Box*, MERRIAM-WEBSTER DICTIONARY, http://www.merriam-webster.com/dictionary/black%20box [https://perma.cc/2HV9-89A5]; *see also* AJ Abdallat, *Explainable AI: Why We Need to Open the Black Box*, FORBES (Feb. 22, 2019, 8:30 AM), http://www.forbes.com/sites/forbestechcouncil/2019/02/22/explainable-ai-why-we-need-to-open-the-black-box/#10aaf7391717 [https://perma.cc/8FLX-HSPK].

60. The word "creator" is used here to express different entities in the development and distribution chain, such as the programmer and the developer.

61. Will Knight, *The Dark Secret at the Heart of AI*, MIT TECH. REV. (Apr. 11, 2017), http://www.technologyreview.com/2017/04/11/5113/the-dark-secret-at-the-heart-of-ai/ [https://perma.cc/RCQ5-TMN2].

Neural networks or deep learning, another sub-branch of AI, operates on multiple layers composed of neurons, and these layers interact with each other through weighted connections.[62] The weight of these connections is determined by the AI algorithm and is rarely known or traceable outside of the black-box, in which the process takes place. The more layers a neural network has, the more difficult it is to fully understand and predict the weight assigned to each neuron and, as a result, the outcome of the AI entity itself. Given these unique features of the black-box, neither the users nor the creators can fully understand the process and justification which form the basis of an AI decision-making process. If the AI entity is self-taught based on multiple complex layers of decision-making, we cannot know for certain who or what is responsible for its final decision. This is a particular problem when that decision inflicts harm or injury.[63]

For these reasons, as of now, AI decisions are opaque, unpredictable and ultimately inexplicable.[64] The lack of foreseeability, the AI entities' varying degrees of autonomy, and the absence of complete human control with regard to the potential behavior of AI entities[65] lead to difficulty in establishing a legal nexus of causation between the victim and the tortfeasor and difficulty reasoning about causation in fact between the damage inflicted and the liable party.[66] For example, when a security robot guard runs over and injures a toddler, it is not clear if a "but for" test will be satisfied given the ambiguity between the actions of the AI entity and the human entities related to it, such as its owner, programmer, user, and manufacturer. This in turn hampers the attribution of legal responsibility to a specific liable entity.[67]

In the insurance context, this presents a puzzle over what type of insurance policy should cover AI entities. Should it be a first-party policy, purchased by the user, or a third-party policy, purchased by the AI company? The black-box issue also burdens insurers' ability to offer accurate coverage for AI-inflicted damages, given their inability to

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62. *See, e.g.*, Larry Hardesty, *Explained: Neural Networks*, MIT NEWS (Apr. 14, 2017), http://news.mit.edu/2017/explained-neural-networks-deep-learning-0414 [https://perma.cc/3828-L528].

63. For a basic review of concerns about AI-inflicted harms, see Stuart Russell, *Q&A: The Future of Artificial Intelligence*, http://people.eecs.berkeley.edu/~russell/research/future/q-and-a.html [https://perma.cc/2SGZ-C5M2].

64. *See* Roman V. Yampolskiy, *Unpredictability of AI*, 7 J.A.I. & CONSCIOUSNESS 109 (2020), arxiv.org/ftp/arxiv/papers/1905/1905.13053.pdf [https://perma.cc/4GND-7QHF]; Cliff Kuang, *Can A.I. Be Taught to Explain Itself?*, N.Y. TIMES MAG. (Nov. 21, 2017), http://www.nytimes.com/2017/11/21/magazine/can-ai-be-taught-to-explain-itself.html [https://perma.cc/Y32X-9LZY].

65. Matthew U. Scherer, *Regulating Artificial Intelligence Systems: Risks, Challenges, Competencies, and Strategies*, 29 HARV. J.L. & TECH. 353, 363 (2016).

66. Jos Lehmann, Joost Breuker & Bob Brouwer, *Causation in AI & Law*, 12 A.I. & L. 279, 281 (2004).

67. Curtis E.A. Karnow, *Liability for Distributed Artificial Intelligences*, 11 BERKELEY TECH. L.J. 147, 181 (1996).

precisely predict the type and scope of these future harms. The black-box issue thus presents a salient challenge to actuarial science in general, and to insurers specifically. It is unclear how insurers should appropriately calculate the premiums assigned to a given activity carried out by an AI entity in order to offer efficient and accurate coverage.

Further, the lack of current usage of these devices means there is no substantial data about the way they can inflict damages. This is distinct from the black-box issue as gathering information does not resolve the inherent difficulty the black-box presents in the context of AI. This lack of knowledge "challenges the very risk assessment method insurance companies employ in order to determine the premium for their products."[68] In Part VI, this Article offers ways to mediate this difficulty by building upon existing insurance practices, infrastructures, and databases as the starting point for offering coverage for AI entities and their activities.[69]

It is important to note that this lack of information is a problem that will abate over time as AIs are more widely deployed. The very operation of AI entities will generate data that insurers can then use to establish more accurate risk-adjusted premiums for those entities.[70] Increased use leads to increased data, enabling better risk assessment and premium determination.

While AI certainly presents challenges to insurers, the insurance industry has a long history of helping facilitate the entrance of new technologies into our society.[71] Insurance companies are uniquely suited to adapt to challenges presented by emerging technologies and provide a much-needed layer of protection to individuals and tech companies during the new technology's initial deployment. In doing so, insurance acts as a catalyzing force that encourages innovation and hedges associated risks. The next Part delves into this intersection of insurance and emerging technologies, emphasizing the important role the former has had in advancing the latter.

IV. INSURANCE AND EMERGING TECHNOLOGY

Emerging technologies have always been a cause of concern — and damages — since the days of the industrial revolution. While most

68. Bertolini, *Risk Management for Robotic Devices*, *supra* note 9, at 293.

69. *See infra* Section VI.A.

70. Geistfeld discusses this in the context of autonomous vehicles. *See* Mark A. Geistfeld, *A Roadmap for Autonomous Vehicles: State Tort Liability, Automobile Insurance, and Federal Safety Regulation*, 105 CALIF. L. REV. 1611, 1659 (2017). Geistfeld identifies a disclosed "annual, risk-adjusted premium" as a measurement to satisfy the manufacturer's "obligation to warn about the inherent risk of crash." *Id.* at 1623.

71. *See generally* KENNETH S. ABRAHAM, THE LIABILITY CENTURY — INSURANCE AND TORT LAW FROM THE PROGRESSIVE ERA TO 9/11 (2008) [hereinafter THE LIABILITY CENTURY].

scholarship in this field discusses the influence these technologies have had on the evolution of tort law and the role of tort law in their regulation,[72] this Article aims to shine a spotlight on how the insurance market has historically succeeded when faced with emerging technologies where tort law has struggled to adapt.

A. Insurance of New Technologies

New technologies present new challenges to tort law.[73] It takes time for any new innovation, such as AI technology, "to become fully assimilated within everyday tort law."[74] The exact same argument can be made with regard to the intersection of innovation and everyday insurance,[75] which helps society advance by providing a much-needed safety net to new innovators in the form of risk hedging.

The first industrial revolution, from around 1760 until the late 1840s,[76] forever changed the way commerce and manufacturing was carried out, and in doing so, created new forms of harms that needed to be addressed. In the following decades, first-party liability insurance was invented and introduced in America.[77]

Fire insurance, health insurance, and liability insurance, among others,[78] had to be rapidly developed due to the pervasive nature of these then-new industrial technologies in order to better facilitate their adoption into commerce and everyday life.[79] Insurance for personal

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72. *See* Kyle Graham, *Of Frightened Horses and Autonomous Vehicles: Tort Law and Its Assimilation of Innovations*, 52 SANTA CLARA L. REV. 1241, 1242 (2012); Donald G. Gifford, *Technological Triggers to Tort Revolutions: Steam Locomotives, Autonomous Vehicles, and Accident Compensation*, 11 J. TORT L. 71, 72 (2018). *See generally* Mary L. Lyndon, *Tort Law and Technology*, 12 YALE J. ON REG. 137 (1995); Gregory N. Mandel, *Regulating Emerging Technologies*, 1 L. INNOVATION & TECH. 75 (2009).

73. *See* Tania Leiman, *Law and Tech Collide: Foreseeability, Reasonableness and Advanced Driver Assistance Systems*, 40 POL'Y & SOC'Y 250, 252 (2021) (discussing the interplay of tort law and technological change).

74. Graham, *supra* note 72, at 1242; *see also* James A. Henderson, Jr., *Tort vs. Technology: Accommodating Disruptive Innovation*, 47 ARIZ. ST. L.J. 1145, 1148–49 (2015) (claiming that tort law actually promotes innovation).

75. In the context of the industrial revolution, see Witt, *supra* note 32, at 777–79.

76. PHYLLIS DEANE, THE FIRST INDUSTRIAL REVOLUTION vii (2d ed. 1979).

77. Kenneth S. Abraham, *Liability Insurance and Accident Prevention: The Evolution of an Idea*, 64 MD. L. REV. 573, 580 (2005) ("Liability insurance was first marketed in the United States in the 1880s.").

78. *See, e.g.*, ROBIN PEARSON, INSURING THE INDUSTRIAL REVOLUTION: FIRE INSURANCE IN GREAT BRITAIN, 1700–1850 (2017); 1 THE HISTORY OF INSURANCE (David Jenkins & Takau Yoneyama eds., 2000). For a discussion about the origin of insurance and its role in ancient Rome, see generally C. F. TRENERRY, THE ORIGIN AND EARLY HISTORY OF INSURANCE: INCLUDING THE CONTRACT OF BOTTOMRY (1926).

79. THE HISTORY OF INSURANCE, *supra* note 78, at xi ("[I]ts role was essential in providing the means by which the individual could avoid some of the risks in industry, commerce and life.").

injury did not manifest until the end of the nineteenth century.[80] It was first introduced in the form of a first-party policy and later in the form of a third-party policy as employers sought out ways to protect themselves when their employees were injured on the job.[81]

The evolution of fire insurance is a good example of the challenges the insurance industry faced in the last quarter of the eighteenth century.[82] Factories presented a vastly more concentrated risk than the domestic workshops from which premiums had previously been calculated. Nonetheless, these insurers gathered new information and rapidly adjusted their premiums without changing their underlying policy. While they initially suffered losses due to the discrepancy between the premiums they charged and the damages which they were obligated to indemnify,[83] over time the system adapted.[84] In the AI context, this transitional process may be even smoother for insurers if the widely-held presumption that the usage of AI will make activities safer, not more dangerous, is borne out.[85]

It is important to clarify that the tort liability and insurance systems are not alternatives. Although each has distinct features and characteristics, they are deeply intertwined. Liability insurance is fundamentally shaped by tort law.[86] The strong influence emerging technologies have had on the development of tort law is also evident from the development and assimilation of insurance in our commercial and private lives. Graham has highlighted this inherent connection between innovations and tort law,[87] and his observations are relevant to the relationship between innovation and insurance. Exploring this connection will allow

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80. This is because, prior to that, most accidents occurred between family members and led to relatively minor damages, so there was no need for liability policies. *See generally* THE LIABILITY CENTURY, *supra* note 71, at 19–20.

81. *See* Abraham, *supra* note 77, at 580; Witt, *supra* note 32, at 777–79. This was later replaced by the enactment of the workers' compensation statutes. *See generally* PRICE V. FISHBACK & SHAWN EVERETT KANTOR, A PRELUDE TO THE WELFARE STATE: THE ORIGINS OF WORKERS' COMPENSATION (2000).

82. *See generally, e.g.*, M. W. Beresford, *Prometheus Insured: The Sun Fire Agency in Leeds During Urbanization, 1716–1826*, 35 ECON. HIST. REV. 373 (1982); THE DEVON CLOTH INDUSTRY IN THE EIGHTEENTH CENTURY: SUN FIRE OFFICE INVENTORIES OF MERCHANTS' AND MANUFACTURERS' PROPERTY, 1726–1770 (Stanley D. Chapman ed., 1978).

83. *See* Robin Pearson, *Fire Insurance and the British Textile Industries During the Industrial Revolution*, 34 BUS. HIST. 1, 4 (1992) ("From the 1790s textiles proved increasingly troublesome for the metropolitan insurers. Frequent mill and warehouse fires meant that often premiums failed to cover losses. The extension of some manufacturing activities into cotton warehouses, the increasing size and density of industrial plant in urban locations, and the expansion of multiple occupation, all complicated the underwriting of textile risks.").

84. *See id.* at 13.

85. In the context of AVs, see *Automated Vehicles: Summary of Joint Report*, SCOTTISH LAW COMM'N 9 (2022), https://s3-eu-west-2.amazonaws.com/lawcom-prod-storage-11jsxou24uy7q/uploads/2022/01/AV-Summary-25-01-22-2.pdf [https://perma.cc/7J9L-8UZC].

86. *See generally* THE LIABILITY CENTURY, *supra* note 71.

87. *See generally* Graham, *supra* note 72.

us to better understand the pivotal role insurance has in facilitating innovation and accommodating new technologies as they enter the commercial market.

B. Insurance and Its Assimilation of Innovations[88]

The insurance industry has several institutional advantages that are of particular value when it operates alongside the tort system, especially when it concerns the assimilation of emerging technologies.

First, the insurance industry is better equipped to handle "atypical early claims."[89] This refers to situations in which the initial kinds of accidents caused by a new technology may be very different than later cases after the technology has matured and stabilized itself in the market.[90] In the tort context, common law rules made by courts as a result of these early atypical cases may persist in later cases, even if these rules are no longer relevant given the technology's development.[91] The insurance industry possesses a more nuanced ability than the courts to course correct as technologies mature because it can more flexibly change its policies in real time. It is true that atypical early claims will still lead to insurers setting higher premiums — such was indeed the case with cyber insurance when it first emerged.[92] However, the risk of these premature and harmful decisions persisting, even when they are no longer relevant, is significantly lower in the insurance context than in the tort context. The insurance industry, unlike the courts, is not bound by judicial precedent. Further, insurers can proactively react to technology changes by amending their premium rates ex ante, as opposed to the judicial system, which can only act ex post after a claim has been brought.

Second, the tort system tends to underestimate the harms of new technologies. Admittedly, "the public can exaggerate the harms associated with an innovation,"[93] and some claim this is the case with AI,[94] but more often courts applying tort principles fail to understand the harms technologies may inflict and have difficulties identifying unreasonable risks, that is, risks that are difficult to predict once a new technology enters the market. Graham refers to this interplay between tort law and technology as a problem of "separating the good from the bad"

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88. This heading is based on Graham's article title. *See id.*

89. *Id.* at 1243.

90. *Id.*

91. Graham provides the example of automobile liability and the first cases it brought — frightened horses. *Id.* at 1247–52.

92. *See* Kumar & Nagle, *supra* note 38; Lubin, *supra* note 35, at 18.

93. Graham, *supra* note 72, at 1256.

94. *See, e.g.*, Adam Lashinsky, *Why At Least One AI Expert Isn't Worried About AI Taking Over*, FORTUNE (Oct. 18, 2017, 7:31 AM), fortune.com/2017/10/18/why-at-least-one-ai-expert-isnt-worried-about-ai-taking-over/ [https://perma.cc/QEC6-BTN9].

when suits are filed and regulations are created long after the innovation has been integrated into the market.[95] Insurance can help to quickly identify these so-called unreasonable risks using its actuarial data and the process of underwriting policies. This may enable insurers to embody these unreasonable risks in their premiums, and by doing so provide an incentivizing mechanism for insureds to take protective measures sooner than would have been incentivized via the tort system.

Third, *early adopters* are treated differently from a tort and an insurance perspective. While both systems sanction early adopters for performing new and dangerous activities, the insurance industry assimilates them more quickly. From a tort perspective, "the law often regards early adopters as taking their chances with a technology"; thus, the users are blamed for the damages they suffer and will not be compensated for their losses.[96] The insurance industry likewise can deny coverage to early adopters of new technology or charge excessively high premiums based on the lack of information to accurately determine the risks of these new activities. Nonetheless, insurance can provide remedies for damages more rapidly than the tort system. This is because insurers have the capability to provide coverage based on collected and analyzed data, which is constantly updated as the innovation develops. This constant update depends on the term of the policy, which is usually renewed annually. The renewal allows insurers to adapt their policy terms based on new developments, and it provides new insureds with policies that accurately reflect the risk of the technology at that time.

Fourth, it seems that new technologies receive a *grace period* when they first enter the commercial market, as well as over time when the benefits of a new technology become clear.[97] This is due to the regulator's inclination to value technological innovation over maintaining the safety of emerging technologies.[98] This can be seen in what Citron referred to as the "hyper-vigilant" stage of law's reaction to new technologies — "after the technology's benefits become apparent, the law abruptly reverses course, seeing its earlier awards of liability as threats to technological progress and granting sweeping protection to the firms in the new industry."[99] During these grace periods, tort law tends not to hold any party accountable for damages. Insurance can fill this regulatory vacuum. Although the insurance industry does not hold the liable

95. *See* Graham, *supra* note 72, at 1256.

96. *Id.* at 1260.

97. *Id.* at 1266. For a different approach to how "tort law routinely penalizes innovation, while rewarding manufacturers who adhere to the status quo," see *id*.; Peter Huber, *Safety and the Second Best: The Hazards of Public Risk Management in the Courts*, 85 COLUM. L. REV. 277, 315 (1985).

98. Jeffery L. Vagle, *Cybersecurity and Moral Hazard*, 23 STAN. TECH. L. REV. 71, 100 (2020).

99. Danielle Keats Citron, *Cyber Civil Rights*, 89 B.U. L. REV. 61, 115 (2009).

entity accountable for her tortious behavior, it at least provides the victim a monetary remedy.[100]

The case of AVs in the United States illustrates this principle. Since 2011, when Nevada first permitted AVs onto the roads, this market has enjoyed lenient regulation, allowing AV companies to experiment with few worries about liability.[101] In the United States, liability rests solely with the AV "driver," who usually has no actual control over the vehicle. This lack of regulation has granted these manufacturers a de facto grace period from liability. The utilization of insurance throughout this unofficial grace period is an important instrument that can ensure the negative implications of the implementation period of a new technology will not be borne solely by the victims.

Insurance will facilitate the adoption of new technologies faster than tort law alone, given the different incentives these institutions have in changing their current approach towards the new technology along with its growth. Two intertwined differences, one of them briefly discussed above, should be given more thought.

First, the tort system has to wait until a lawsuit is brought before it in order for it to make a decision ex post and set instructions on how one should behave to prevent accidents. The insurance industry, in contrast, has an ex ante incentive to prevent accidents proactively and thus minimize damage, reduce indemnification claims, and, as a result, increase profit. Second, liability insurance adjusters have the ability to convert complex tort standards set by courts into "simpler and more easily administered rules."[102] These rules can be based on aggregated data insurers have collected — data that the courts neither possess nor have any institutional competency to collect. Thus, insurers provide insureds with a much-needed guarantee as to how they should behave in order to be eligible for indemnification in case damages occur. Moreover, insurers do not have to necessarily wait for the courts — they can independently produce "bright-line rules."[103] This is especially true if a new form of technology has yet to be adjudicated by courts, but a demand exists for insurance policies to cover its potential risks and perils.

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100. This usually occurs when a company uses its insurance policy to compensate a victim without litigating the case in court and without obtaining a judicial decision with regard to the liability of the policyholder.

101. Nevada was the first state to permit the operation and testing of autonomous vehicles back in 2011. Ugo Pagallo, Marcelo Corrales, Mark Fenwick & Nikolaus Forgó, *The Rise of Robotics & AI: Technological Advances & Normative Dilemmas*, *in* ROBOTICS, AI AND THE FUTURE OF LAW 1, 4 (Marcelo Corrales et al. eds., 2018). Nevada was followed by California and Florida. These three states left future standards to be developed, and licensing requirements are rather flexible. *See* Nurus Sakinatul Fikriah B.T. Mohd Shith Putera, Hartini Saripan & Sheela Jayabala, *Artificial Intelligence Governance: A Heads up from Driverless Cars*, 34 WORLD APPL. SCI. J. 376, 378 (2016).

102. Baker, *supra* note 11, at 11; *see also* Ben-Shahar & Logue, *supra* note 1, at 234.

103. Ben-Shahar & Logue, *supra* note 1, at 234.

Like other emerging technologies, such as biotechnology, nanotechnology and synthetic biology,[104] AI is inherently embedded with scientific uncertainty due to limited knowledge about its capabilities, as well as the public's tendency to distrust new technologies. This uncertainty may create "fear and concern among members of the public and public interest groups . . . and produces a problematic environment for industry plans for investment and development."[105] This phenomenon is not unique in the AI context, but it is certainly more dominant and pervasive than in cases of previous emerging technologies.[106] To a certain degree, insurance can help alleviate and mitigate this uncertainty by providing an actuarial instrument to hedge the risks associated with AI. This will enable the faster and safer assimilation of innovations into the fabric of our commercial market.[107]

C. Current Suggestions for Insuring AI

This Section reviews regulatory proposals for insuring AI, which mostly focus on the field of autonomous vehicles. This review demonstrates the current discussion about the implementation of insurance in the context of AI and offers some normative criticism of these suggestions.

1. "Turing Registry"

One of the oldest proposals for AI insurance dates back to 1996. Curtis Karnow called his model a "Turing Registry."[108] He argued that an AI entity's behavior, although stochastic, is similar to risks that are underwritten by insurance agencies every day. Therefore risks associated with AI entity's usage can also be predicted and insured by insurance companies:

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104. Mandel, *supra* note 72, at 76.

105. *Id.* at 80.

106. Maria Nordström, *AI Under Great Uncertainty: Implications and Decision Strategies for Public Policy*, A.I. & SOC'Y § 3 (2021) (noting that "[n]ot every technology that requires policy concern is equally (greatly) uncertain in aspects that are relevant for policymakers" but that "AI has a significant level of uncertainty which is relevant to policy"). *See generally, e.g.*, DEYI LI & YI DU, ARTIFICIAL INTELLIGENCE WITH UNCERTAINTY (2nd ed. 2017); UNCERTAINTY IN ARTIFICIAL INTELLIGENCE: PROCEEDINGS OF THE NINTH CONFERENCE (David Heckerman & Abe Mamdan eds., 1993).

107. One could claim that a strict obligation to purchase an insurance policy would stifle innovation because manufacturers would choose not to enter the AI market, given the vast costs associated with policies' premiums. However, I believe insurance can actually act as a catalyzer of innovation in the AI market. This is because it will enable AI companies, big and small, to compete in this important market since they will be better able to hedge the many risks associated with AI manufacturing through insurance policies covering AI activities. For more on this notion, see Anat Lior, *AI Strict Liability Vis-Â-Vis AI Monopolization*, 22 COLUM. SCI. & TECH. L. REV. 90, 112 (2020).

108. Karnow, *supra* note 67, at 193.

> Just as insurance companies examine and certify candidates for life insurance, automobile insurance and the like, so too developers seeking coverage for an agent could submit it to a certification procedure, and if successful would be quoted a rate depending on the probable risks posed by the agent. That risk would be assessed along a spectrum of automation: the higher the intelligence, the higher the risk, and thus the higher the premium and vice versa.[109]

According to this model, only registered AI entities would be covered by insurance. Programmers would be required to obtain a Turing certification, pay the premium, and secure protection for the deployment of their AI entity before they were allowed to disperse and sell it.[110] This is an ex ante scheme that obligates the manufacturers, but not the end-users, to purchase a liability insurance policy to cover third-party damages caused by their AI entities.

The efficacy of this classification model depends heavily on the way one defines AI entities.[111] Given AI proliferation in recent years, it seems difficult to enforce this kind of vast general registry, let alone decide who should administer this system. This Article agrees with the basic notion of this scheme, according to which the features of the AI entities will define the premium one must pay in order to stay covered. However, creating a registry will not necessarily ensure that this will happen. This is because it is not clear which insurance company would be willing to insure such a vast array of AI entities with no clear division into sub-categories, and as a result, no ability to adequately spread risks. Insurers provide insurance policies for activities within their area of expertise, and a general registration will not take advantage of the existing infrastructure, which accounts for the specific expertise insurance companies have accumulated. This knowledge enables them to offer these policies in an accurate and responsible way. Insurance companies will not be able to offer a general registry with a general AI policy because they lack the knowledge and means to do so. If this registry were divided into nuanced sub-categories based on specific AI activities, it would be better able to offer a sustainable insurance scheme with the ability to track and hedge the most predictable types of AI-inflicted damages.

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109. *Id.* at 194.

110. For a similar suggestion in the context of nanotechnology, see Gary E. Marchant, Douglas J. Sylvester & Kenneth W. Abbott, *A New Soft Law Approach to Nanotechnology Oversight: A Voluntary Product Certification Scheme*, 28 UCLA J. ENV'T L. & POL'Y 123, 146–52 (2010).

111. *See, e.g.*, Bryan Casey & Mark A. Lemley, *You Might Be a Robot*, 105 CORNELL L. REV. 287, 325 (2020).

2. In-House Insurance

Other more specific insurance suggestions have been much deliberated in the context of autonomous vehicles.[112] For example, in August 2018, Volvo's CEO declared that the company will take full responsibility for all accidents caused by its AVs, freeing the car owner/operator from liability.[113] Alternatively, AI manufacturers could act as insurers, meaning they would offer in-house insurance schemes attached to each AI entity they sell. Tesla, for example, is already offering an in-house insurance program for its vehicles and aims to expand this program across the United States.[114] In this option, customers will purchase the AI entity with a built-in insurance policy.[115]

This in-house policy is appealing, since the manufacturer has both the knowledge necessary to offer an accurate premium for their AI entities as well as an interest in protecting its customers. Information asymmetries might favor AI manufacturers, who know more about the particular risks their AI technology may pose, over insurers. Despite the advantages of this approach, this scheme may lead to problems of adverse selection, diminished bargaining power of the customer, and logistics problems of manufacturers acting as insurers.[116] Nevertheless,

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112. *See* Zoe Sagalow, *Self-Driving Cars Raise Liability Questions for Insurers*, GOV'T TECH. (May 26, 2021), http://www.govtech.com/fs/self-driving-cars-raise-liability-questions-for-insurers [https://perma.cc/JPG3-G7R6]. Some even claim autonomous vehicles can reduce the need for insurance. *See Tesla: Autonomous Cars May Be The Solution To Louisiana's Insurance Cost Issues*, MARKET SCREENER (June 4, 2020, 2:18 AM), http://www.marketscreener.com/TESLA-INC-6344549/news/Tesla-Autonomous-Cars-May-Be-The-Solution-To-Louisiana-s-Insurance-Cost-Issues-30719636/ [https://perma.cc/J55D-QBQ6] ("[A]utonomous cars could deliver a massive reduction in insurance premiums, and perhaps even one day, an elimination of the need for liability insurance altogether."); *cf. Self-Driving Vehicles Could Struggle to Eliminate Most Crashes*, IIHS (June 4, 2020), http://www.iihs.org/news/detail/self-driving-vehicles-could-struggle-to-eliminate-most-crashes [https://perma.cc/5LLA-HXFR] ("[A]utonomous vehicles might prevent only around a third of all crashes if automated systems drive too much like people . . . . ").

113. Kirsten Korosec, *Volvo CEO: We Will Accept All Liability When Our Cars Are in Autonomous Mode*, FORTUNE (Oct. 7, 2015, 3:34 PM), http://fortune.com/2015/10/07/volvo-liability-self-driving-cars/ [https://perma.cc/PKV6-9LHE].

114. Fred Lambert, *Tesla (TSLA) Is About to Launch Its In-House Insurance Program in More States*, ELECTREK (Mar. 22, 2021), http://www.electrek.co/2021/03/22/tesla-tsla-launch-in-house-insurance-program-more-states/ [https://perma.cc/V834-WUVP]. Specifically, in California, Tesla is working on offering insurance for their autonomous vehicle in preparation for the liability shift from driver to the autonomous system and its manufacturer. *Id.*

115. This assumes there is no monopoly in the field and that consumers have a choice between different AI vendors. For an argument that this will be the case, see Lior, *supra* note 107, at 111.

116. The consumer does not have options when trying to purchase insurance and this puts immense unsupervised power in the hands of the manufacturer. Also, to offer insurance, besides the legislation regulating this field, an insurer has to be able to distribute risks across a vast number of insurers, which is not necessarily true if a company offers insurance policies only for its products. For more on what is necessary in order to offer sustainable insurance, see discussion *infra* Section V.A.3.b.

there is a strong possibility that, just like Tesla, more manufacturers will offer insurance policies to their customers in lieu of insurers. They will do so to show their confidence in their product and provide assurance to consumers in a manner that will boost the latter's confidence in the company and its activity.[117]

3. The Automated and Electric Vehicles Act and Road Traffic Act

Regulators in the UK have opted for yet a third liability scheme. Enacted in 2018, the Automated and Electric Vehicles Act[118] "extends the compulsory insurance scheme for normal road vehicles in the UK to cover automated ones."[119] If an accident is caused by an autonomous vehicle and it is insured, the insurer is liable for that damage. If the autonomous vehicle is not insured, the owner of the autonomous vehicle will be liable for the damage.[120] Because this is a coercive insurance scheme, it ensures that everyone who drives on UK roads purchases an auto-insurance policy. This means that more drivers on the road will be insured and widens the safety net offered by insurance. Thus, the act of driving generally, and autonomous driving specifically, becomes safer.

This scheme is not without flaws. Because the operator of an AV has no actual control over the car's driving process, she does not have the ability to minimize the potential risks associated with operating the car. To the extent that insurance operates on the theory that the insured party will modulate their risky behavior in order to avoid high premiums, that theory fails when the party buying the insurance lacks such control.[121]

James Davey has critiqued the Act for being more concerned with protecting "motor insurance as a mass-market product" than

117. Another reason for this is that large manufacturers that produce AI entities will probably not have good economic reasons to purchase insurance. This is because they are relatively risk neutral. Unless obligated, companies like Google, Apple, or Facebook might choose not to purchase insurance against the risk that their AIs will produce harm because they can more economically self-insure this risk.

118. For the full text of the Act, see Automated and Electric Vehicles Act 2018, *supra* note 24.

119. TURNER, *supra* note 13, at 114.

120. Anat Lior, *Insurability of Artificial Intelligence Algorithms and Robots — A Different Version of the Same Policy*, FEDERMANN CYBER SEC. RSCH. CENTER — CYBER L. PROGRAM (Aug. 5 2019), https://csrcl.huji.ac.il/blog/anat-lior-Insurability-AI [https://perma.cc/Y9Q2-QNPY].

121. Furthermore, it is not clear from the language of the Act which entity must purchase insurance. Article 2(1) states: "Where — (a) an accident is caused by an automated vehicle when driving itself on a road or other public place in Great Britain, (b) the vehicle is insured at the time of the accident, and (c) an insured person or any other person suffers damage as a result of the accident, the insurer is liable for that damage." Automated and Electric Vehicles Act 2018, *supra* note 24. It does not state who should purchase the relevant insurance policy. *See also* Felix Boon, *Two Bites of a Peculiar Cherry?* Res Judicata*, Time Bar and Illiquid Debts: Insurer Recoveries Under the Automated and Electric Vehicles Act 2018*, BRIT. INS. L. ASS'N J., Feb. 1, 2020, at 1, 6.

establishing a workable AV liability system.[122] He claims that the act is a product of private interest regulation pushed by insurance companies to "fix the consumer insurance product as a central piece in our transport system."[123]

Another interesting example is a German law amending the "Road Traffic Act and the Compulsory Insurance Act – Act on Autonomous Driving,"[124] which was adopted by the German federal parliament on May 20, 2021.[125] This amendment creates a legal framework for AV driving in Germany that requires the purchase of insurance when the vehicle is operated with "technical supervision."[126] This term is defined as a "live" person who is able to "deactivate or release driving maneuvers of a motor vehicle with autonomous driving function from outside the vehicle."[127] This suggestion focuses on technical supervision, rather than an automated vehicle, and attempts to provide an extra layer of insurance protection to the driver given this new technological development. While the law makes for a good starting point because it focuses on the human supervising the driving rather than the problem of autonomous driving as a whole, it ultimately fails to grapple with the complex challenges AV presents.

4. Manufacturer Enterprise Responsibility ("MER") for Autonomous Vehicles

Besides legislation and industry statements, the topic of autonomous vehicles insurance and autonomous vehicles in general has been regularly discussed in scholarly papers.[128] In a proposal titled "Manufacturer Enterprise Responsibility" ("MER"), Abraham and Rabin have suggested that once 25% of all registered vehicles[129] on the road are

122. James Davey, *By Insurers, For Insurers: The UK's Liability Regime for Autonomous Vehicles*, 13 J. TORT L. 163, 167 (2020).

123. *Id.* at 181. This enables insurance companies to continue to harvest consumers' data with the act's explicit protection. *Id.* at 186.

124. Regierungsentwurf [Cabinet Draft], Deutscher Bundestag: Drucksachen [BT] 19/27439, dip21.bundestag.de/dip21/btd/19/274/1927439.pdf [https://perma.cc/R3ES-2EZD] (Ger.).

125. Mike Oitzman, *German Bundestag Adopts Autonomous Driving Law*, ROBOT REP. (May 26, 2021), http://www.therobotreport.com/german-bundestag-adopts-autonomous-driving-law/ [https://perma.cc/4ABS-P8J9].

126. *Id.*

127. *Id.*

128. *See generally, e.g.*, Kenneth S. Abraham & Robert L. Rabin, *Automated Vehicles and Manufacturer Responsibility for Accidents: A New Legal Regime for a New Era*, 105 VA. L. REV. 127 (2019); Carrie Schroll, *Splitting the Bill: Creating a National Car Insurance Fund to Pay for Accidents in Autonomous Vehicles*, 109 NW. U. L. REV. 803 (2015); Jin Yoshikawa, *Sharing the Costs of Artificial Intelligence: Universal No-Fault Social Insurance for Personal Injuries*, 21 VAND. J. ENT. & TECH. L. 1155 (2019); Geistfeld, *supra* note 70.

129. Abraham & Rabin, *supra* note 128, at 149.

autonomous vehicles,[130] auto manufacturers should become responsible "for all injuries arising out of the operation of" autonomous vehicles.[131] With the rise of autonomous vehicles, the traditional focus of the insurance industry on the characteristics of the driver, e.g., age, previous driving experience, etc., will become irrelevant to the evaluation of potential risks. As a result, the new focus of the underwriting process should be the vehicle and not the driver.[132]

Abraham and Rabin describe their MER proposal as a "manufacturer-financed, strict responsibility bodily-injury compensation system, administered by a fund created through assessments levied on HAV [high autonomous vehicles] manufacturers."[133] In other words, the MER will provide compensation automatically, up to a specific benefit limit, for bodily injuries[134] that arise out of the operation of autonomous vehicles, excluding injuries caused by the owner's own negligence.[135] This regime would be the exclusive remedy for victims and no other tort cause of action would be available to them.[136]

Abraham and Rabin also discuss whether the MER should be financed by a third-party (manufacturer liability) or first-party (vehicle-owner and victim-purchased) insurance scheme: they opt for the former.[137] They base this choice on the fact that the manufacturers have control over the design and purchase of parts of the autonomous vehicle and thus are in a better position to manufacture a safer vehicle. This decision shifts from a driver-focused approach to a vehicle-focused one.[138] The MER proposal correctly emphasizes that insurance policies should focus on the manufacturers of these new vehicles, not their users or operators. The manufacturer is the party who truly possesses the

130. They define these autonomous vehicles, according to the five-tiered levels of automation developed by the Society of Automotive Engineers ("SAE") International, as SAE level 4 or 5. *Id.* For more on this ranking system, see Press Release, SAE International, SAE International Releases Updated Visual Chart for Its "Levels of Driving Automation" Standard for Self-Driving Vehicles (Nov. 12, 2018), http://www.sae.org/news/press-room/2018/12/sae-international-releases-updated-visual-chart-for-its-%E2%80%9Clevels-of-driving-automation%E2%80%9D-standard-for-self-driving-vehicles [https://perma.cc/FT5J-JJEK].

131. Abraham & Rabin, *supra* note 128, at 132.

132. *Id.* at 147; Gifford, *supra* note 72, at 75.

133. Abraham & Rabin, *supra* note 128, at 147.

134. Property injuries will still be covered by so-called conventional insurance policies and will be excluded from the MER. *Id.* at 152.

135. *Id.* at 151.

136. *Id.* at 156. It is important to note that this scheme can simply be viewed as manufacturer liability for AI harm separate from concepts of insurance. Abraham and Rabin's proposal is not conceptualized as insurance in the sense that the literature on insurance as governance envisions, as this Article will further discuss in Section V.B.1.

137. *Id.* at 153.

138. *See id.* at 153–55.

ability to proactively minimize damages via its vehicles' features, taking over the role of the previous *pressure point*, the human driver.[139]

Calo pushes back against the MER scheme, and in general emphasizes "the limits of legal scholarship in grappling with unfolding technologic change."[140] He argues that the authors' proposal works on the assumption that autonomous vehicles will be privately owned, which will not necessarily be the case in the near and far future.[141] He predicts that these cars will be owned by the companies who manufactured them "and deployed as a transportation resource."[142] Thus, the MER will not be applicable in this future scenario, or in his words, "the authors' proposal is certain; the future is not."[143] In response, Abraham and Rabin stated that inaction is not the appropriate path — "because doing nothing about the law governing accidents involving AVs would actually constitute mistaken action, we should do the sensible thing. In our view, MER is exactly that."[144] Despite this disagreement, the MER remains a brilliant and meticulous suggestion for a world where AVs are a reality. It provides the first comprehensive theoretical proposal for how the intersection of tort law and insurance could play out in the future, and in doing so it moves forward an important discussion about the role of insurance in the world of AI.

5. National Insurance Fund for Autonomous Vehicles

In her note, Schroll proposes to eliminate liability resulting from AV accidents and substitute it for a national insurance fund.[145] Her proposal is set in a world where the majority of autonomous vehicles are not privately owned but are provided by a third-party, such as Uber, Google, or LG.[146] Like Abraham and Rabin, her proposal emphasizes

139. It is important to note that the sums derived from this type of a third-party insurance scheme will eventually be rolled back to the consumers embedded in the price of the autonomous vehicle itself. *See* Gifford, *supra* note 72, at 73.

140. Ryan Calo, *Commuting to Mars: A Response to Professors Abraham and Rabin*, 105 VA. L. REV. ONLINE 84, 84 (2019).

141. *Id.* at 87.

142. *Id.*

143. *Id.*; *see also* Adam F. Scales, *Not So Fast: A Brief Plea for Muddling Through the Problems of Autonomous Vehicle Liability*, 13 J. TORT L. 189, 189 (2020) ("Attempts to anticipate the future and preemptively redesign the liability system around its imagined contours are likely to invite error and frustration. Discretion often being the better of valor, I suggest we muddle through a bit first.").

144. Kenneth S. Abraham & Robert L. Rabin, *The Future Is Almost Here: Inaction Is Actually Mistaken Action*, 105 VA. L. REV. ONLINE 91, 95 (2019); *see also id.* at 92 ("We cannot afford to wait and see what the future brings over a period of decades; a world in which there are privately owned AVs being operated on highways and city streets is just over the horizon. The failure to do something about that is not the equivalent of keeping our policymaking powder dry.").

145. Schroll, *supra* note 128, at 822.

146. *Id.* at 805. Some have argued this will be the future business model considering the high costs associated with purchasing an autonomous vehicle. *See, e.g.*, Sam Margo,

the shift from driver-focused insurance to vehicle-focused insurance, but this time focusing on the manufacturer or owner of the car-sharing company.[147] This proposal is based on a federal fund paid for by taxes on riders, car-sharing companies, and manufacturers. Taxes would be collected from these players "in proportion to how much they benefit from the use of" these autonomous vehicles.[148]

The establishment of a national fund for car accidents already exists, for example, in Israel.[149] This kind of statutory fund provides a necessary hedging tool for driving — an integral and widespread activity. Because everyone can be affected by it, everyone has an interest in ensuring that they are safe in the event of a car accident. However, unlike Schroll's suggestion, these governmental funds were created solely as complementary funds aimed to provide a remedy in cases where damages occurred, but the entity responsible for it cannot be identified, such as hit and run accidents or when the accident involves a stolen vehicle.[150]

Establishing a federal national fund for autonomous vehicles as the sole solution for car accidents has two major drawbacks. First, the administrative costs are high. Second, and more importantly, by splitting costs between all the parties involved, the plan fails to consider incentives. As a result, it is less efficient at preventing damages ex ante. The fund does address the concern that if AI becomes too expensive for society to manufacture and use, the technology will be rejected.[151]

However, creating a fund as the sole remedy scheme is not the optimal solution given its administrative costs and lack of true deterrence. Such a fund would work best to complement a coercive insurance scheme. Federal funds, as a stand-alone solution, are usually established for damages created by activities which have a significant health associated value to society as a whole (such as vaccination via the National Childhood Vaccine Injury Act),[152] or for important social issues

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Rental Cars & Car-Sharing in an Autonomous Future, MEDIUM (Apr. 8, 2019), http://www.medium.com/open-road/rental-cars-carsharing-in-an-autonomous-future-1d1b90a90b1c [https://perma.cc/Q9YN-BVR3]; Hamza Shaban & Peter Holley, *GM Launches a Peer-to-Peer Car-Sharing Service*, WASH. POST (July 24, 2018), http://www.washingtonpost.com/technology/2018/07/24/gm-launches-peer-to-peer-car-sharing-service/ [https://perma.cc/YUN5-A46C]; Gifford, *supra* note 72, at 73–74.

147. Schroll, *supra* note 128, at 810. In a way, Geistfeld also supports this approach. *See* Geistfeld, *supra* note 70, at 1659 ("For largely the same reasons that insurers can now tailor premiums to more closely match the risk characteristics of individual drivers, they will also be able to establish risk-adjusted premiums for insuring different types of autonomous vehicles by relying on the prior crash experience of their respective operating systems.").

148. Schroll, *supra* note 128, at 823.

149. OECD, ISRAEL: REVIEW OF THE INSURANCE SYSTEM, OECD PUBL'G 19 (2011), http://www.oecd.org/finance/insurance/49498074.pdf [https://perma.cc/69Q6-8U9J].

150. Ronen Perry, *From Fault-Based to Strict Liability: A Case Study of an Overpraised Reform*, 53 WAKE FOREST L. REV. 383, 389 (2018).

151. *See* Schroll, *supra* note 128, at 827.

152. National Childhood Vaccine Injury Act, 42 U.S.C. §§ 300aa-1 to 300aa-34 (1986).

we as a society wish to advance (such as Social Security and Medicare via the Federal Insurance Contributions Act ("FICA")).[153] It is true that autonomous vehicles specifically have an important social value since cars are the main means of transportation worldwide, and to the extent that AVs supplant traditional cars, AVs will become the main means of transport.[154] However, it is difficult to see how AI entities in general fall into either of these categories. The existing insurance infrastructure, with the necessary adjustments, can offer a more feasible, acceptable, and economical solution.[155]

This reasoning also explains the problem with creating federal or state reinsurance programs.[156] These programs are "insurance for insurance companies,"[157] meant to limit the risk of the total loss of insurance companies by limiting their exposure to large disasters. Examples of reinsurance programs include nuclear accidents[158] and terrorist attacks.[159] Creating federal or state reinsurance programs is not currently justifiable in the AI context, where the greater effect on society is still unknown, unlike that of nuclear accidents and terrorist attacks.[160] However, this scheme could be necessary and justifiable if used in combination with a cap set on the compensation amount, as will be elaborated below.

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153. Federal Insurance Contributions Act, 26 U.S.C. §§ 3101–3131 (2011); *see also* Carissa Rawson, *What is the FICA Tax?*, THE BALANCE (updated Dec. 16, 2021), http://www.thebalance.com/what-is-the-fica-tax-5093827 [https://perma.cc/GD8D-4WJK]; Schroll, *supra* note 128, at 822.

154. Toby Russell, *Why Cars Will Always Be A Main Form of Transportation*, FORBES (July 30, 2019, 12:06 PM), https://www.forbes.com/sites/quora/2019/07/30/why-cars-will-always-be-a-main-form-of-transportation/#6af99bbc2ab8 [https://perma.cc/S7R8-2LGU]; *The Importance of the Private Car*, EUR. COMM'N, https://ec.europa.eu/transport/road_safety/statistics-and-analysis/statistics-and-analysis-archive/miscellaneous/importance-private-car_en [https://perma.cc/3V5S-Z75L].

155. This critique is also relevant for suggestions of social insurance schemes. *See generally* Yoshikawa, *supra* note 128.

156. *See* Lubin, *supra* note 35, at 46 ("It is true that federal reinsurance programs are inherently flawed. Global reinsurance markets run on broader risk pools that can offset the risk load of a particular set of risks with premiums from coverage of other uncorrelated risks.").

157. *About Reinsurance*, REINSURANCE ASS'N OF AM., https://www.reinsurance.org/Landing.aspx?id=32 [https://perma.cc/TD5M-PNC4].

158. *See* Atomic Energy Damages Act (Price-Anderson Act), Pub. L. No. 85-256, 71 Stat. 576, 42 U.S.C. § 2210 (2012).

159. *See* Terrorism Risk Insurance Act, Pub. L. No. 107-297, 116 Stat. 2322 (2002); Lubin, *supra* note 35, at 44–46; Michelle E. Boardman, *Known Unknowns: The Illusion of Terrorism Insurance*, 93 GEO. L.J. 783, 806 (2005).

160. Reinsurance on its own is a vast and important topic. However, further delving into it will exceed the scope of this Article. For more on reinsurance, see generally R.L. CARTER, REINSURANCE (2d ed. 2013); *Insurance Handbook*, INS. INFO. INST., http://www.iii.org/publications/insurance-handbook/regulatory-and-financial-environment/reinsurance [https://perma.cc/6ZYN-KUZH]; *Reinsurance*, NAT'L ASS'N OF INS. COMM'RS, https://content.naic.org/cipr-topics/reinsurance [https://perma.cc/JD38-BFSA].

6. European Parliament Compensation Fund

A similar insurance fund suggestion has been made by the European Parliament in its *Report with Recommendations to the Commission on Civil Law Rules on Robotics* with regard to all AI entities.[161] Most of the suggestions made in Section 59 of this report focus on utilizing insurance as a civil liability tool via the creation of a compensation fund.[162]

Section 59(b) offers to ensure "that a compensation fund would not only serve the purpose of guaranteeing compensation if the damage caused by a robot was not covered by insurance."[163] A compensation fund should only be added to the current insurance infrastructure if regulators consider certain types of activities that AI entities will carry out to fulfill an important national interest.

Section 59(c) offers to allow "the manufacturer, the programmer, the owner or the user to benefit from limited liability if they contribute to a compensation fund, as well as if they jointly take out insurance to guarantee compensation where damage is caused by a robot."[164] The first part of this suggestion is a policy decision made by the regulator, offering limited liability in exchange for contributing to a designated AI compensation fund. The second part of the suggestion offers the same tradeoff in exchange for the joint purchase of an insurance policy. This type of tradeoff may lessen manufacturer incentives to proactively minimize risks because it essentially provides a safe harbor in exchange for a contribution to the fund. This should not be presented as a tradeoff. The manufacturer, programmer, owner, or user should be incentivized to make sure their AI entities are safe and are being used in a safe manner without being offered a de facto immunity mechanism in the form

161. *See* EU Resolution, *supra* note 22. Most of the attention was focused on Section 59(f) of this report, which suggested the creation of a new legal status of "electronic persons." This section described this possible legal solution as "creating a specific legal status for robots in the long run, so that at least the most sophisticated autonomous robots could be established as having the status of electronic persons responsible for making good any damage they may cause, and possibly applying electronic personality to cases where robots make autonomous decisions or otherwise interact with third parties independently." *Id.* For a critical approach to this suggestion, see Ivana Kottasová, *Experts Warn Europe: Don't Grant Robots Rights*, CNN (Apr. 12, 2018, 1:07 PM), https://money.cnn.com/2018/04/12/technology/robots-rights-experts-warn-europe/index.html [https://perma.cc/4KQY-E4KB]; Janosch Delcker, *Europe Divided over Robot 'Personhood,'* POLITICO (Apr. 11, 2018, 12:45 PM), http://www.politico.eu/article/europe-divided-over-robot-ai-artificial-intelligence-personhood/ [https://perma.cc/VQM5-LCHG]; *Open Letter to the European Commission — Artificial Intelligence and Robotics*, ROBOTICS, http://www.robotics-openletter.eu/ [https://perma.cc/BAL7-TDY4].

162. For more on the EU's insurance of AI in the context of autonomous vehicles, see Francesco Paolo Patti, *The European Road to Autonomous Vehicles*, 43 FORDHAM INT'L L.J. 125, 129–31 (2019).

163. EU Resolution, *supra* note 22, at 17–18.

164. *Id.* at 18.

of a safe harbor. They can do that by hedging their potential liability exposure via an insurance policy.

In Section 59(d), the report considers whether to create a "a general fund for all smart autonomous robots" or "an individual fund for each and every robot category and whether a contribution should be paid as a one-off fee when placing the robot on the market or whether periodic contributions should be paid during the lifetime of the robot."[165] As mentioned, creating any sort of fund can supplement the existing insurance infrastructure decided by regulators, which do not usually create funds for strictly commercial purposes.[166] However, it is important to note that designating individual robot categories is the more efficient approach. Creating specific insurance schemes divided into categories of AI entities will allow insurers with specific expertise to offer accurate and feasible policies based on the definite merits of an AI category, as well as their current knowledge base, rather than on the intangible notion of AI as a whole. Not all AI entities are the same, and they should therefore not be insured in the same manner. Creating a single general AI fund will probably be difficult to logistically and practically manage because damages caused by one AI entity — e.g., an autonomous vehicle — are not similar to damages caused by other AI entities — e.g., hiring algorithms. One fund to rule all AI-inflicted damages will not provide proper incentives to improve safety measures and may not create profitable risk pools for insurers. Furthermore, a fundamental trait of AI entities is their ability to advance and evolve while being on the market, mainly via software updates. In light of this, periodic adjustable contributions paid during the lifetime of the AI entity, based on its features, seem more fitting to incentivize safer AI development.[167]

Section 59(e) suggests that every robot be given an individual registration number "which would allow anyone interacting with the robot to be informed about the nature of the fund, the limits of its liability in case of damage to property, the names and the functions of the contributors and all other relevant details."[168] This suggestion creates a link between the national fund suggestions and Karnow's "Turing Registry."[169] If the regulator decides to create a compensation fund for specific AI categories, this logistic feature can ensure that the fund will be

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165. *Id.* at 18.

166. *Federal Grants to State and Local Governments*, GAO, http://www.gao.gov/federal-grants-state-and-local-governments [https://perma.cc/P44F-WPH4] ("These grants help finance a broad range of services, including health care, education, social services, infrastructure, and public safety."); *Helping Those in Need: An Overview of the Federal Grants Process*, THE WHITE HOUSE, http://georgewbush-whitehouse.archives.gov/government/fbci/guidance/helping.html [https://perma.cc/X546-LK2Z].

167. It is essentially identical to the "experience rating" feature of insurers via the constant adjustment of a policy's premium. *See* Ben-Shahar & Logue, *supra* note 1, at 206.

168. EU Resolution, *supra* note 22, at 18.

169. *See* Karnow, *supra* note 67, at 149.

able to operate more efficiently since the victims would know about this type of registration as well as its conditions. This type of fund can be an important mechanism to ensure all victims of AI entities are compensated, but it should not be a stand-alone solution. This is because it weakens manufacturing incentives to improve security measures over time.

* * * * *

Reflecting on the current suggestions for insuring AI, some claim that the entrance of AVs and other AI-based entities into our commercial market will require a change in "the kind of motor insurance people will require," including the question of "how the coverage will function."[170] This Article claims that the current infrastructure will be the best starting point for these new technologies, but specific adjustments will need to be made to automobile insurance coverage, as well as other AI-based products and services, based on new data as technology advances.

It seems unwarranted and drastic to try to abolish tort law altogether in the context of AVs specifically, and AI entities generally, by implementing a stand-alone separate insurance scheme, whether it is a social insurance scheme, a federal fund, or any other tailored schemes meant to replace tort law. Using existing insurance policy infrastructure will be more efficient, intuitive, and beneficial to all stakeholders involved.

V. INSURANCE AS A CIVIL REMEDY FOR AI DAMAGES

This Part first reviews the disadvantages and advantages of utilizing insurance in the context of the AI market. It starts with the disadvantages of using this tool, delving into general arguments against insurance, such as the risk of moral hazard, as well as arguments specific to AI, such as premium estimation challenges. Next, it presents the benefits insurance has to offer in providing certainty and a safety net in the uncertain field of AI. Finally, this Part discusses potential liability caveats — hacking and joint causation — that insurance may help mitigate.

170. *Innovation in Insurance: How Technology Is Changing the Industry*, INST. OF INT'L FIN. 16 (Sept. 2016), http://www.iif.com/portals/0/Files/private/32370132_insurance_innovation_report_2016.pdf [https://perma.cc/2GR3-TVJG].

A. The Disadvantages

1. Moral Hazards and Insurance

It is difficult to discuss insurance without referring to its most significant counterargument: moral hazard. Moral hazard is a well-known risk embedded in the DNA of insurance. Much has been written about the perils of moral hazard and the adverse effects it may have on the effectiveness of the insurance mechanism as a whole.[171] This Section will briefly outline the issue of moral hazard before describing the unique features of the insurance context that render moral hazard less of a concern.

Moral hazard refers to the fact that insurance inherently removes, or at the very least reduces, insureds' incentives to prevent harm, since they know that they will not suffer liability as a consequence.[172] Moral hazard has been a prominent argument against the utilization of insurance since its emergence. In fact, in the nineteenth century, insurance was considered a violation of public policy due to moral hazard.[173] Its basic argument can be reduced into the catchphrase "less is more."[174] The less there is a "safety-net" for insureds against situations of loss, the more these insureds will be responsible for their own risk and will proactively behave in a manner that will better protect their interests. This will prevent an undesirable situation in which insureds will be able to make a gain from a loss.

However, the concept of moral hazard and the economics behind it ignore several crucial points about the insurance context. Moral hazard assumes that money can compensate for every loss and that the policyholder is in the best position to reduce harm by not engaging in risky behavior.[175] However, some injuries, such as bodily or emotional injuries, cannot be compensated by money alone, and external factors, such as a badly-paved road that makes a car swerve, will never be in the control of the policyholders, making their ability to proactively prevent loss limited or even nonexistent. Other damages, like those caused by malicious or wanton behavior, are excluded from coverage according

171. For a discussion about cybersecurity and moral hazard, separate from the context of insurance, see generally Vagle, *supra* note 98. Vagle highlights attributes of technological devices that he claims exacerbate the moral hazard problem. *Id.* at 85.

172. Kenneth J. Arrow, *Uncertainty and the Welfare Economics of Medical Care*, 53 AM. ECON. REV. 941, 961 (1963). For more on Arrow's work, see Tom Baker, *On the Genealogy of Moral Hazard*, 75 TEX. L. REV. 237, 267–69 (1996).

173. *See* THE LIABILITY CENTURY, *supra* note 71, at 17; Rappaport, *supra* note 15, at 1553.

174. Baker, *supra* note 172, at 238.

175. *Id.* at 277–80.

to the terms of the policy,[176] thus reducing the willingness of the insureds to behave recklessly.

Furthermore, by sharing the burdens of life, insurance protects the weaker segments of society that lack the power to negotiate their individual policies. Baker claimed that invocations of "moral hazard have helped to frame the debate over responsibility for harm in favor of the interests of the economically powerful."[177] In other words, by summoning the specter of the risk-taking insured, moral hazard arguments place the burden of preventing accidents on the single consumer or worker rather than the manufacturer or employer.[178] This is not always desirable from a social and economic perspective. After all, the manufacturer and employer usually hold greater power to reduce loss than their consumers and workers. Lastly, insurance institutions can mitigate the fear of moral hazard by channeling behavior, as elaborated in the next Section.[179]

Given the unpredictability of AI entities, there arguably should not even be an option to obtain policies for AI entities because of the salient danger of moral hazards they present. These moral hazards differ from traditional ones posed by auto, health, travel, and work accident insurance. Compared to the AI field, the gravity and manner of the potential risk, peril, or injury are more predictable in traditional industries, given their long history and existing data points. The expected risks are known, and exclusions have already been implemented that make explicit the risks insurers are unwilling to take upon themselves. This is not the case with regard to AI. This may encourage users, operators, or manufacturers of AI entities to experiment with them, knowing that the potential damages they may inflict will be covered by their insurance policy, regardless of their actions. As we will see below, this assumption is incorrect when the policy covering the AI entity excludes certain types of behaviors and sets safety conditions to prevent policyholders from acting recklessly.

Moreover, the notion of moral hazard as an insurance inhibitor is not unique in the AI context and can be raised in the context of most new technologies. This does not mean insurance should be foreclosed when emergent technologies appear. On the contrary, it should be viewed as a central lifeline and an inseparable instrument to facilitate the safe development of these emerging technologies.

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176. *See, e.g.*, *General Liability*, OFF. OF RISK MGMT., http://risk.gmu.edu/insurance/general-liability/ [https://perma.cc/G4K9-4WQ8] (last visited May 11, 2022) ("Coverage may not be provided to employees or agents of Mason if it is determined that liability was incurred by reason of . . . Acts of intentional, malicious, or willful and wanton conduct."); *Insurance*, SAFETY & RISK MGMT., http://srm.vcu.edu/about-us/units/insurance/ [https://perma.cc/3CSP-5CZS] (last visited Mar. 28, 2022).

177. Baker, *supra* note 172, at 291.

178. *See id.*

179. *See* discussion *infra* Section V.B.1.

Moral hazard is an inherent barrier to the insurance industry that should not be ignored, but it is not sufficient to render the tool of insurance undesirable. Moral hazards can be mitigated, and are indeed mitigated in practice, by the actions of insurers themselves, who are incentivized to encourage their insureds to avoid reckless behavior and prevent loss when possible. The fewer accidents caused by their insureds, the more profit they make. These insurer incentives keep the moral hazard problem in check.

2. The Lack of a Global Adoption of Insurance in the AI Context

A different problem, presented by Rachum-Twaig, is that AI entities will be ubiquitous and thus will cross national borders in a way that will present a problem to global enforcement and adoption of insurance guidelines. Rachum-Twaig argues that a uniform global insurance guideline should be adopted and that the lack of one will undermine the usage of insurance as an effective tool to regulate AI entities.[180]

According to this argument, "the lack of physical borders in many circumstances related to AI-based robots and the political impracticability of adopting global or cross-jurisdictional mechanisms make the no-fault model irrelevant as a *general* solution to the shortcomings of tort law doctrines in this context."[181] This concept is politically problematic even in a non-AI context given the difficulty of reaching and enforcing international agreements, and it may become even more complex when taking into account the novelty of AI technology.

This argument, however, does not disqualify the use of insurance, coercive or otherwise, in an AI context. For example, automobile insurance can still apply to autonomous vehicles, just as it applies today to non-autonomous cars and rental cars. As will be elaborated below, most AI entities are currently narrowly created to replace a human performing a specific narrow task or a predetermined range of tasks. Therefore, unless the singularity becomes a reality,[182] AI entities' activities can be insured based on the insurance market that existed exclusively for actions taken by humans in the past.

The conflicts of laws between different countries have not stopped international trade and economy thus far. The insurance industry has managed to coexist with this new age of globalization while continuing to provide a socially valuable service. Physical borders will always exist between countries, as well as political differences between diverse tort law systems. Insurance companies are not bound by politics, or even by domestic tort law, and they can tweak their policy so that it

180. *See* Rachum-Twaig, *supra* note 10, at 1166.
181. *Id.* at 1166–67.
182. For more on the singularity, see *infra* Section VI.B.

applies globally when multiple countries are involved.[183] Moreover, mandatory no-fault insurance should not be seen as a complete alternative for the tort system, as Rachum-Twaig attempts to claim.[184] It is a complementary system to the tort system, not a replacement.[185] As a result, the lack of a global standard should not be seen as meaningful enough to limit the utilization of an insurance regime, mandatory or otherwise, to govern AI liability.

3. Cost Allocation and Premium Estimation

A third challenge is the practical difficulty of setting accurate premiums for AI and deciding who should incur them. Information is critical to the calculations that the insurance industry makes about the probability and severity of future harms.[186] In the AI accident context, due to the novel nature of AI, information is severely lacking — the pool of information is too shallow in depth and narrow in scope. This puts a significant dent in insurers' ability to offer coverage for damages caused by AI entities.

a. Known Unknowns

AI accidents and AI-inflicted damages can be understood as "known unknowns."[187] These are "contingencies that we know exist, but to which neither a probability nor a magnitude can be actuarially assigned."[188] As a result, insurers will not offer coverage for these risks, usually leaving the government as the only entity which is able and willing to offer insurance. In essence, "insurance pools risk with others

183. Examples for this notion can be found in travel insurance services and insurance of shipping companies and other international entities that trade goods worldwide. *See, e.g.*, *Insuring Overseas: Your Guide to International Cargo Insurance*, ASCENT (Sept. 20, 2021), ascentlogistics.com/blog/insuring-overseas-international-cargo-insurance/ [https://perma.cc/2DMM-9K7P].

184. *See* Rachum-Twaig, *supra* note 10, at 1166 (suggesting that no-fault mandatory insurance is "intended to fully supplant the general tort system").

185. For more on the reciprocal relationship of tort law and insurance, see generally Lemann, *supra* note 12.

186. *See, e.g.*, Ben-Shahar & Logue, *supra* note 1, at 203.

187. This term was first used by U.S. Defense Secretary Donald Rumsfeld, *quoted in* Philip Stephens, *Donald Rumsfeld's 'Known and Unknown,'* FIN. TIMES (Dec. 12, 2003), https://www.ft.com/content/3027b618-3563-11e0-aa6c-00144feabdc0 [https://perma.cc/QYG6-AVPK]. *See, e.g.*, Boardman, *supra* note 159; Ben-Shahar & Logue, *supra* note 1, at 229. In the context of AI regardless of insurance, see generally James S. Azadian & Garrett M. Fahy, *Artificial Intelligence and the Law: Navigating "Known Unknowns,"* ORANGE CNTY. LAW. MAG., Oct. 2017, at 22. Some have even gone further by stating that "[a]ttacks on our ML [machine learning] models are unknown unknowns." Kumar & Nagle, *supra* note 38.

188. Ben-Shahar & Logue, *supra* note 1, at 229.

similarly situated, and balances the entire subset of risks with other independent risks."[189] This is a form of hedging one's bets.

Terrorism insurance coverage is a classic example of "known unknowns." Explaining the infeasibility of terrorism insurance policy in the United States, Boardman has written that when it comes to terrorism, "we are aware of the risk but are still too ignorant to calculate and redistribute the risk in an insurance pool."[190] Terrorist attacks would have to become more frequent to produce enough actuarial data to frame efficient terrorism insurance policy.[191] Uninsured or underinsured incidents are defined by the massive scope of their damage and the nigh impossibility of calculating the event's frequency. Do AI accidents fall into this category?[192]

Despite the great power AI potentially holds, against which scientists have warned,[193] AI entities likely resemble car or work accidents more than nuclear bombs or terrorist attacks. AI could certainly be used to facilitate terrorist attacks, but so can airplanes, and we have not stopped insuring them against more mundane forms of accident.[194] As a result, even if one views AI accidents as known unknowns, they are not similar enough to terror attacks to qualify as uninsurable events. AI incidents will probably be more frequent and cause damages that are more limited in scope. Unlike terrorism, AI accidents can be viewed as a *risk* rather than as an *uncertainty*.[195] We may not be able to predict the exact timing or magnitude of a loss caused by AI entities, similar to terrorist attacks, but we have far greater information about the statistical likelihood of AI causing harm than we do about widespread risks that are considered uninsurable. This suggests that the AI risk is indeed manageable, or at the very least, more manageable than other scenarios surrounded by profound uncertainty.

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189. Boardman, *supra* note 159, at 809.

190. *Id.* at 786.

191. *See id.* at 785.

192. Inherently, terrorism will usually be connected to a specific government or civilian population in a manner that does not characterize AI accidents. For an example for a definition of an act of terror, see *id.* at 804.

193. An example of this is the open letter on AI which was signed in January 2015 by, inter alia, Elon Musk and Stephen Hawking, calling for more research on the topic and warning of its potential pitfalls. *See An Open Letter: Research Priorities for Robust and Beneficial Artificial Intelligence*, FUTURE OF LIFE INST., http://futureoflife.org/ai-open-letter/ [https://perma.cc/AWS7-6JGJ].

194. Similarly, situations in which the AI entity is misused in a way that does not manifest its unique features (e.g., throwing a security robot at a crowd, causing damages) will not be considered an AI activity because the unique features of AI played no part in the process of causing the harm.

195. Boardman, *supra* note 159, at 811–12 ("The fact that the information we do have under risk is imperfect does not mean that we should be indifferent between risk and uncertainty when placing a bet. With uncertainty, we guess, but with risk, we can know how much to bet, when, and how often.").

With regards to government involvement in the AI context, it is important to note that once damages caused by AI entities exceed a certain predetermined cap, it is reasonable to expect that governments will step in to fill the void left by insurers. This is because in unlikely yet possible cases where AI entities cause excessive damage, equal in nature to nuclear or chemical attacks, governments have a compelling interest to intervene in the insurance market.[196] Furthermore, the U.S. government has publicly declared its interest in advancing and supporting AI technology[197] and has made it a national priority to secure this technology financially against extensive damages. The potential for rare catastrophic incidents that require government intervention is not in itself a reason that the insurance industry cannot manage more everyday AI harms.

b. The Feasibility of Insurance in the AI Market

Before insurers can offer policies for a specific risk, they must first answer three questions.[198] First, how much reserve do they need to set aside in order to meet future expected losses if those occur? Second, given the reserve decided upon, how much should they charge for that specific risk via premiums? These first two questions are answered by actuarial science. Third, how much does the insurer actually need to have available in order to remain solvent assuming the worst-case scenario occurs?[199] Boardman argues that in cases of true uncertainty, as with terrorism, one cannot fully answer these questions in a way that allows insurers to provide efficient insurance. However, as I previously argued, AI accidents should not be viewed as true uncertainties in the same way some may view terrorism as a true uncertainty, considering AI entities' different traits, characteristics, assigned tasks, and position within our commercial market.

When we examine insurers' ability to offer policies for AI losses and risks, we must evaluate three components: calculation, distribution,

196. For example, nuclear accidents insurance is mandatory, highly regulated, and backed by federal funds. *See Insurance Coverage for Nuclear Accidents*, INS. INFO. INST. (Mar. 17, 2011), https://www.iii.org/article/insurance-coverage-nuclear-accidents [https://perma.cc/EAN7-PZ47]. The Price-Anderson Act created a three-tier insurance scheme to handle "claims of members of the public for personal injury and property damage caused by a commercial nuclear power plant accident." *Backgrounder on Nuclear Insurance and Disaster Relief*, U.S. NUCLEAR REGUL. COMM'N, http://www.nrc.gov/reading-rm/doc-collections/fact-sheets/nuclear-insurance.html [https://perma.cc/JU2B-QA2Q].

197. *See, e.g.*, Maintaining American Leadership in Artificial Intelligence, 84 Fed. Reg. 3967 (Feb. 11, 2019), https://www.federalregister.gov/documents/2019/02/14/2019-02544/maintaining-american-leadership-in-artificial-intelligence [https://perma.cc/PFQ4-A6U6].

198. Boardman, *supra* note 159, at 812.

199. *Id.*

and profitability.[200] These components are intertwined with the three questions presented above and will provide the necessary information to answer them.

First, in order to *calculate* the risk, which takes the form of a premium estimation, insurers must evaluate a number of elements, chief among them the chance an accident will happen, the expected amount of loss from said accident, a set of premiums for each category of policyholders, and the amount the insurer must hold in reserve.[201] Because today's AI commercial entities are mostly substituting for products that already exist on the market, insurers already possess information about these risk factors.[202] This information sets an invaluable baseline for insurers' initial calculation in the AI context until new information incorporating the enhanced capabilities of AI-based commodities has been collected and analyzed.

The market assumes that AI entities will be safer than humans by nature — in fact, this is one of the main reasons cited to encourage their replacement of actions carried out by humans. For example, AVs are primarily justified by the claim that they will provide safer performance compared to a human driver.[203] The calculability of AI accidents is not perfect at the moment, and the premiums will probably be high at first.[204] The emergence of new AI entities into the commercial market, however, will allow insurers to recalculate and adjust their premiums. Insurers already carry out this refinement process today with regard to other potential risks and losses they offer coverage for.[205] This means early adopters of innovation usually pay high premiums, but that is the

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200. *Id.* at 813–14. *See generally* PAUL K. FREEMAN & HOWARD KUNREUTHER, MANAGING ENVIRONMENTAL RISK THROUGH INSURANCE (1997). In the context of terrorism policies, see, for example, James W. Macdonald, Commentary, *Terrorism, Insurance, and TRIA: Are We Asking the Right Questions?*, JOHN LINER REV., Summer 2004, at 1, 3.

201. *See* Boardman, *supra* note 159, at 812.

202. *See* Balkin, *supra* note 27, at 46.

203. *See* Geistfeld, *supra* note 70, at 1615 ("Autonomous vehicles would not eliminate all of these crashes, but they should significantly enhance motor vehicle safety."); John Markoff, *Google Cars Drive Themselves in Traffic*, N.Y. TIMES (Oct. 9, 2010), https://www.nytimes.com/2010/10/10/science/10google.html [https://perma.cc/NG4K-D7TN] ("Robot drivers react faster than humans, have 360-degree perception and do not get distracted, sleepy or intoxicated, the engineers argue."); Partners for Automated Vehicle Education, *On the Life Saving Potential of Autonomous Vehicles*, MEDIUM (June 4, 2020), http://medium.com/pave-campaign/on-the-life-saving-potential-of-autonomous-vehicles-b002a668b530 [https://perma.cc/96K4-UBDQ]. *But see* Aaron Smith & Monica Anderson, *Automation in Everyday Life*, PEW RSCH. CTR. (Oct. 4, 2017), https://www.pewresearch.org/internet/2017/10/04/automation-in-everyday-life/ [https://perma.cc/85VF-LGQH] (reporting that while 39% of the public think AVs will make the roads safer, 30% think AVs will make the roads less safe).

204. *See supra* note 92 and accompanying text.

205. We saw this process during the COVID-19 pandemic where travel insurers stopped offering insurance or significantly increased premiums. *See, e.g.*, Christopher Elliott, *This Is the Surprising Way Coronavirus Has Changed Travel Insurance*, FORBES (Apr. 5, 2020, 8:01 AM), www.forbes.com/sites/christopherelliott/2020/04/05/this-is-the-surprising-way-coronavirus-has-changed-travel-insurance/ [https://perma.cc/JZ6Y-BMHM].

price early adopters pay for their curiosity and willingness to take more risk on themselves.[206] New adopters of innovation will be willing to pay high premiums in order to hedge their risky bets and activities, as has already happened when other disruptive technologies emerged.[207] In light of the basic assumption that AVs are safer, the premiums of policyholders, which are based on previous non-AI entities, should decrease over time. The insurers should be better off, since the overall risk has decreased through the use of AI, and they are capable of creating a baseline calculation of the abovementioned elements based on their existing datasets.[208]

This premium adjustment process depends on AI users and manufacturers providing sufficient data. This may be problematic in cases where AI users and manufacturers — mainly the latter — wish to withhold important information about their AI entities, activities, and vulnerabilities, fearing reputational harm.[209] However, the way the mechanism of insurance is built, as will be elaborated below,[210] should ideally prevent this from happening. This is because, first, risk-averse AI manufacturers will want to purchase some sort of insurance policy to hedge their activities; and second, in order to purchase said policy, they will be required to provide extensive information about their AI entity and activity. Hiding or omitting information will most likely lead to the insurer rejecting the indemnification claims.[211] Thus, it is in manufacturers' best interest to provide complete and accurate information to ensure future coverage. Eventually, enough information will be

206. *See* Graham, *supra* note 72, at 120; Sally H. Clarke, *Unmanageable Risks:* MacPherson v. Buick *and the Emergence of a Mass Consumer Market*, 23 L. & HIST. REV. 1 (2005); Michael Gort & Steven Klepper, *Time Paths in the Diffusion of Product Innovations*, 92 ECON. J. 630 (1982); Arthur L. Newman, II, *Damage Liability in Aircraft Cases*, 29 COLUM. L. REV. 1039, 1044 (1929).

207. *See supra* Section IV.A.

208. For a different approach, see Bertolini, *Risk Management for Robotic Devices*, *supra* note 9, at 308 ("In cases where the activity is already performed through non-robotic applications, the data available may become obsolete and insignificant."). However, Bertolini's claim does not recognize that these activities are expected to be safer than their previous non-AI equivalents, and therefore should be a firm starting point from which to create and establish new data sets for risk management.

209. *See, e.g.*, Paula Vene Smith, *Risks That Hide Behind Reputation and Compliance*, RISK & INS. (Nov. 3, 2014), http://riskandinsurance.com/risks-hide-behind-reputation-compliance/ [https://perma.cc/3KJZ-2XS2].

210. *See infra* Section V.B.1.

211. *See, e.g.*, Garry Marr, *Lying on Your Insurance Policy Will Lead to Trouble Come Claim Time*, FIN. POST (July 10, 2012), https://business.financialpost.com/personal-finance/lying-on-your-insurance-policy-will-lead-to-trouble-come-claim-time [https://perma.cc/2JX4-JMCQ]. This practice is well-known in the context of health and life insurance. *See, e.g.*, Jill Insley, *Life Insurance: Missing Details that Could Leave Your Family Penniless*, GUARDIAN (Dec. 3, 2012), https://www.theguardian.com/money/2012/dec/03/life-insurance-missing-details [https://perma.cc/86C2-SUAM].

collected to create more accurate policies and the pool of risk-takers will expand, allowing insurers to adjust their premiums.[212]

This leads to our second component of insurability — distribution. To insure against a specific risk or loss, insurers must be confident in their ability to *distribute* the risk (i.e., risk shifting) and must believe that risk pooling is feasible in the field they are operating in.[213] The size of the pool is the main factor here — "grouping a large number of ventures in a pool increases the probability that the losses suffered by all the ventures will be spread over time."[214]

Insurance companies already operating in established fields should be able to incorporate AIs into their pools. Auto insurance companies, for example, already have large pools of pre-existing ventures using non-autonomous vehicles. These insurers can group owners of vehicles together to ensure risk shifting once damages occur. This is also true in other fields where AI will probably be widespread that already have risk pools, such as professional liability for lawyers and doctors.[215] Policies covering AI entities will be balanced out by policies covering non-AI risks within the insurer's pool. These insurance companies will be able to create new designated pools for AI entities, which operate within their field once enough users are willing to take part in this new AI activity and enough information is gathered.

Not all damages caused by AI entities are identical, and therefore there is no one-size-fits-all insurance policy that can successfully risk pool and cover all AI activities. Context is important. This is true with regard to the nature and character of a given AI, but also with regard to the timing the policy will be due. Unlike the fear of terrorism and other grand-impact events, such as global health pandemics that will affect many policyholders with identical damages at once, the AI market is far more diversified and specified. The pre-existing categories of specialized insurance policies allow insurers to issue policies to AI users, manufacturers, or whoever is obligated or desires to purchase this type of hedging within their field of expertise.

An important caveat to the distribution element is the possibility of catastrophic risk. Although AIs will conduct many of the same activities carried out by individuals, there is a greater risk of aggregation harm because AIs run on common technologies and may be subject to

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212. Kumar and Nagle have stated that AI insurance will initially be made available by large insurance carriers because "bespoke insurers may not have sufficient safety nets to invest in new areas. From a pricing perspective, using the past cyber insurance market as a template, businesses can expect stringent requirements when AI insurance is introduced to limit the insurance provider's liability with rates cooling off as the AI insurance market matures." Kumar & Nagle, *supra* note 38.

213. TOM BAKER & KYLE D. LOGUE, INSURANCE LAW AND POLICY: CASES AND MATERIALS 4–5 (2017).

214. Boardman, *supra* note 159, at 813.

215. *See infra* note 294 and accompanying text.

common risks. This very issue has hampered the development of the cyber insurance market, given that widespread damages may, and do, occur when many companies use the same online platforms to store their data.[216] Though this issue cannot be completely eliminated, it seems less significant in the AI context because AI can operate on different platforms in light of their different functions and aims, which are not limited to data storage as in the cyber context. Furthermore, this issue can be mitigated by manufacturers ensuring their products operate on different and protected platforms, thereby distributing risks, to prevent wide-spread damages. Such mitigation can be encouraged by insurers who have the incentive to prevent these types of aggregate disasters.

Third, is the element of *profitability*. While meeting the two first elements is sufficient to make a risk insurable, lacking the third element essentially means that there will be no market for insuring these types of risks.[217] If profitability is not achievable, but there is still a demand for insurance, the government will usually step in with government-subsidized premiums to bridge this gap. This government support allows insurers to offer policies to the public and still make a profit. In the AI context, the profitability of policies covering commercial AI damages should not be an issue. This is because there already exists a vast profitable market for activities and instruments that are supposed to be replaced by AI entities, such as truck drivers, security guards, lawyers, and doctors.[218] In order to ensure the safe use and dissemination of these AI entities into the market, there will most probably be a demand for insurance policies covering AI entities, whether by the users or by the manufacturers. This demand will allow insurers to profit from this market, even if the premiums offered will be high at first until information is gathered about the behavior of these AI entities.

Once insurers have determined an accurate premium, the next question is allocating cost among the relevant entities involved in an accident. This issue should also be resolved based on the previous

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216. Kenneth S. Abraham & Daniel Schwarcz, *Courting Disaster: The Underappreciated Risk of a Cyber-Insurance Catastrophe*, 26 CONN. INS. L.J. 1 (2021).

217. *See* Boardman, *supra* note 159, at 814; Howard Kunreuther, *Insurability Conditions and the Supply of Coverage*, *in* PAYING THE PRICE: THE STATUS AND ROLE OF INSURANCE AGAINST NATURAL DISASTERS IN THE UNITED STATES 17, 27 (Howard Kunreuther & Richard J. Roth, Sr. eds., 1998).

218. For lawyers, see, for example, Or Bakai, *An Interview with Anat Lior: AI and Practicing Law — High Potential, High Risks*, TECH & L. ISR., http://techlaw.co.il/en/an-interview-with-anat-lior/?fbclid=IwAR2V4bPDzNZ79TtClsE1SthZInTCZCjr9D-nSJEBCceymtxmcgKpND3j8QU [https://perma.cc/Z7XJ-KUWE]. For doctors, radiologists, and surgeons, see, for example, Alice Park, *Machines Treating Patients? It's Already Happening*, TIME (Mar. 21, 2019, 5:44 PM), http://time.com/5556339/artificial-intelligence-robots-medicine/ [https://perma.cc/8DUZ-6WBG]; Martin Lindner, *The Changing Role of the Radiologist in the Age of AI*, SIEMENS HEALTHINNERS (Nov. 6, 2018), http://www.siemens-healthineers.com/en-us/news/mso-radiologist-profile.html [https://perma.cc/H2QW-BMZS].

insurance infrastructure. This infrastructure will adjust itself once the AI activity proves that different entities should be responsible for purchasing coverage. This Article advocates for a liability insurance policy purchased by the manufacturers rather than the users. However, if information collected and analyzed by insurance companies proves that a different entity will be better equipped to purchase a liability policy, the policy and the entity who should be incentivized to purchase it will accordingly adjust over time.

4. Exceptions and Exclusions

A final potential problem with using insurance to manage AI liability is the ability of the insurer to exclude certain kinds of activity from coverage.[219] One standard kind of exclusion, for example, is deliberate or willful acts that cause damages.[220] Turner worries that "insurers might seek to exclude liability where the AI undertakes an activity outside a set range."[221] He gives the example of using a delivery robot to fulfill an activity that is outside the range of deliveries.[222] If insurance policies exclude any instance where an AI acted outside a set range, that could render the policy functionally inapplicable in practically every accident, since most accidents will occur when an AI acts abnormally. However, insurers who want to turn a profit by offering policies that cover AI activities, as discussed above, will have an incentive to reduce the exclusions and exceptions included in these policies.

Furthermore, as we will see below, exceptions and exclusions are not necessarily viewed as a disadvantage of insurance. Scholars have considered them to be an instrument used by insurers to channel behavior and regulate the conduct of policyholders by signaling to them which activities will not be covered. As insurers gather more information about the way commercial AI entities are utilized, they will be better able to decide which sets of activities should not be covered in an attempt to incentivize safer behavior while still offering applicable and useful policies for AI activities.

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219. TURNER, *supra* note 13, at 117.

220. *See, e.g.*, Craig F. Stanovich, *I Did Not Expect That! The CGL Exclusion for Expected or Intended Injury*, IRMI (Mar. 2008), https://www.irmi.com/articles/expert-commentary/cgl-exclusion-for-expected-or-intended-injury [https://perma.cc/7L8W-PMFK]; *Limitation and Exclusion of Liability: What Do the Phrases "Wilful Misconduct", "Deliberate Default" and "Gross Negligence" Really Mean?*, REEDSMITH (Apr. 28, 2011), https://www.reedsmith.com/en/perspectives/2011/04/limitation-and-exclusion-of-liability-what-do-the [https://perma.cc/67SE-5FBS].

221. TURNER, *supra* note 13, at 116–17.

222. *Id.* This is similar to the misuse doctrine in product liability law. *See, e.g.*, David G. Owen, *Products Liability: User Misconduct Defenses*, 52 S.C. L. REV. 1, 45 (2000) ("A user's 'misuse' of a product, putting it to a clearly improper use, generally bars recovery in a products liability action.").

Exceptions and exclusions can be silent rather than affirmative — that is, risks an insurance company has not foreseen will simply not appear in their existing policies. This tendency is particularly marked in the emerging technology space, where many risks have not yet materialized.[223] As new technologies start to cause damages, insureds turn to their existing policies to receive indemnification. In response, insurance companies begin to actively omit these new types of risks from their traditional policies. To cover these newly uncovered risks, new forms of insurance policies or special "riders"[224] are created.[225] The cyber insurance field illustrates this process.[226] Over time, many perils overlapping between cyber insurance and traditional policies, such as property, errors and omission liability, directors and officers, and general liability, were excluded from these traditional policies.[227] They are now covered exclusively by cyber insurance policies or specific riders.[228] This was a result of new damages relating to cyber space which

223. The distinction is between features that are explicitly covered by an insurance policy — affirmative features — and features that are neither mentioned nor excluded, and are therefore silent. In the context of cyber insurance, for example, "the distinction is between policies that offer explicit cyber protections and those that are silent and therefore 'non-affirmative' as to the scope of application of the insurance policy in instances of cyber harm. These policies pose significant risk of exposure and legal uncertainty to both insurers and the insured." Lubin, *supra* note 35, at 10; *see also Affirmative vs. Silent Cyber: An Overview*, GUY CARPENTER & CO. LLC (Oct. 2018), www.guycarp.com/content/dam/guycarp/en/cmp/Affirm%20vs%20Silent%20Cyber%20Briefing%20FINAL%20(2).pdf [https://perma.cc/9TXL-73MJ].

224. "Riders are essentially additional benefits added to an insurance policy that often require an additional premium payment. In this way, riders can customize a life [or any other] insurance policy to address specific needs or concerns." Allen Wastler, *Life Insurance Policy Riders Defined*, MASSMUTUAL (July 23, 2021), https://blog.massmutual.com/post/insurance-riders [https://perma.cc/TX6W-NY5M].

225. "A rider is an insurance policy provision that adds benefits to or amends the terms of a basic insurance policy." Julia Kagan, *Rider*, INVESTOPEDIA (updated May 31, 2021), www.investopedia.com/terms/r/rider.asp [https://perma.cc/G28N-3MFK].

226. *See generally* John Egan, *Cyber Insurance: What Is It and What Does It Cover?*, POLICYGENIUS (May 31, 2017), www.policygenius.com/blog/cyber-insurance-cover/ [https://perma.cc/HWQ4-AF8M]; OECD, *supra* note 36; *see also* Carpenter, *supra* note 223.

227. Table presenting the potential for overlapping coverage for cyber risk in stand-alone and traditional policies OECD based on JLT Re, fig 4.1 (2017) (table available from author by request).

228. Another example is the new damages created by the then-new World Wide Web. Traditional policies (such as Error and Omission ("E&O") insurance) have transformed into technological ones to accommodate new technological risks. *See Technology Errors and Omissions Insurance*, THE HARTFORD, http://www.thehartford.com/professional-liability-insurance/errors-omissions-insurance/technology [https://perma.cc/AV5U-VMFW] (last visited May 11, 2022) ("Today, most businesses run on technology. If that technology fails, it can have a big impact on their finances. And, if your business was the one that supplied that technology, they could come after you to help pay for their losses."); Hazel Glenn Beh, *Physical Losses in Cyberspace*, 8 CONN. INS. L.J. 55, 56 (2001) ("[G]aps in coverage and the current state of uncertainty will be transitory. Insurers will respond quickly to adverse judicial decisions by drafting more ironclad exclusions and by offering more suitable insurance products."); Robert H. Jerry, II & Michele L. Mekel, *Cybercoverage for Cyber-Risks: An Overview of Insurers' Responses to the Perils of E-Commerce*, 8 CONN. INS. L.J. 7, 8 (2001) ("Policyholders also face new challenges as they confront the possibility that their traditional

insurers did not have in mind when they first offered these policies. Once these damages appeared, insurers excluded them from their traditional policies, leading to the creation of cyber-insurance specific policies.

This process is likely to repeat in the AI context. Insurers will slowly exclude coverage for AI harms that their policies did not intend to cover. As a result, insureds will seek specialized riders to affirmatively cover these damages. This process of excluding previously silent AI damages will diminish the risk of exposure for insurers and increase legal certainty for both insurers and insureds, who will be motivated to obtain affirmative coverage. The end result is clearer knowledge of the risks posed by AI for insurers and clearer coverage of those risks for insureds.

B. The Advantages

1. Regulation by Liability Insurance: Behavior Channeling

Inherently, insurance policies and their issuers exert a behavioral channeling effect on their insureds, giving them the role of quasi-regulators.[229] Abraham called this the *governance conception* of insurance.[230] According to this conception, "in some settings, insurance functions like government by influencing policyholders' conduct and protecting them against misfortune," i.e., insurance acts as a surrogate for government.[231]

Like government regulation, insurance policies incentivize their insureds to minimize risky behavior or suffer consequences — the chance that their insurance policy will not cover them when damages occur. In a property context, for example, the insurer can require the insured to have locks on the doors and windows of a house as a prerequisite for insuring the property. In the AI context, Turner gives the example of setting minimum standards for the design of an AI entity.[232] However, for this standard setting to be effective, insurers must have access to

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insurance coverages are woefully inadequate either to secure their electronic and intellectual property assets or to guard against their potential e-commerce liabilities to third parties."). Another example is the transition from horses and carriages to cars and the implications it had on insurance. *See, e.g.*, Adam F. Scales, *Man, God and the Serbonian Bog: The Evolution of Accidental Death Insurance*, 86 IOWA L. REV. 173 (2000); Edson S. Lott, *Accident Insurance*, 26 AM. ACAD. POL. & SOC. SCI. ANNALS 303 (1905).

229. *See, e.g.*, TURNER, *supra* note 13, at 115; Ben-Shahar & Logue, *supra* note 1, at 199; Tom Baker & Rick Swedloff, *Regulation by Liability Insurance: From Auto to Lawyers Professional Liability*, 60 UCLA L. REV. 1412, 1414 (2013).

230. Abraham, *supra* note 35, at 683.

231. *Id.* at 684. Abraham also states that insurance acts, in effect, as a means to support the social welfare of the insureds. *Id.* at 686. For the limitations of this concept, i.e., viewing insurers as governmental entities, see *id.* at 686–93.

232. *See* TURNER, *supra* note 13, at 115–16.

highly specific knowledge. Insurance companies with specific expertise areas, such as auto insurance and professional liability insurance, will be better equipped to provide such specific standards.

Here a word of caution is required. Recent literature suggests that insurance as a regulatory mechanism still has a long way to go.[233] The theoretical framework is there, but it is not fully supported by the empirical work on this topic so far, which shows that insurers often lack the incentive and capability to transform the instruments elucidated below into effective governance tools.[234] Thus, it is important to note that the governance conception of insurance requires more nuanced empirical research focusing on the conditions under which insurers can "make positive regulatory interventions" in the field in which they are operating.[235] This cautionary precursory comment is meant to temper any overly optimistic evaluation of insurance as a regulatory tool that may arise from this Part. We must explore the conditions under which insurance can act as a proper regulatory means. I believe these conditions can be met in the context of AI activities, but more research should be conducted on the specific embodiments of the tools listed below in the AI context. This will ensure the tailoring of the insurance mechanism as a regulatory tool in the AI context will actually succeed in properly channeling the behavior of its insureds.

Scholars have thoroughly discussed this notion of regulating via insurance.[236] My discussion about the role of insurers as quasi-

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233. *See, e.g.*, Talesh & Cunningham, *supra* note 53, at 2; Shauhin A. Talesh, *Insurance Companies as Corporate Regulators: The Good, The Bad, and the Ugly*, 66 DEPAUL L. REV 463, 484 (2017) (discussing the pitfalls of insurance as a regulator in the cyber insurance context); Shauhin A. Talesh, *Legal Intermediaries: How Insurance Companies Construct the Meaning of Compliance with Antidiscrimination Laws*, 37 L. & POL'Y 209, 226 (2015) (discussing how insurance companies can actually make discrimination claims against employers more defensible); Tom Baker & Sean J. Griffith, *Predicting Corporate Governance Risk: Evidence from the Directors' & Officers' Liability Insurance Market*, 74 U. CHI. L. REV. 487 (2007).

234. *See* Kenneth S. Abraham & Daniel Schwarcz, *The Mirage of Regulation by Insurance*, 98 IND. L.J. (forthcoming 2023) (manuscript at 1, 6) (on file with author) ("[E]mpirical studies undertaken in the last few years have found that most insurers' involvement in their policyholders' risk-mitigation efforts is minimal, ineffective, or both."). For example, in the context of cyber insurance, it has been shown that cyber insurers often do very little to limit risk-taking behavior, do not condition premiums on effective discounts, and principally devote their efforts to ex post risk-management rather than ex ante. *See, e.g.*, Daniel W. Woods & Tyler Moore, *Does Insurance Have a Future in Governing Cybersecurity?*, IEEE SEC. & PRIV. (Sept. 2019).

235. Talesh, *Insurance Companies as Corporate Regulators*, *supra* note 233, at 467.

236. *See generally, e.g.*, Ben-Shahar & Logue, *supra* note 1, at 200; Steven Shavell, *On Liability and Insurance*, 12 BELL J. ECON. 12 (1982); Steven Shavell, *On the Social Function and the Regulation of Liability Insurance*, 25 GENEVA PAPERS ON RISK & INS. 166 (2000); KENNETH S. ABRAHAM, DISTRIBUTING RISK (1986); Tom Baker & Thomas O. Farrish, *Liability Insurance and the Regulation of Firearms*, *in* SUING THE GUN INDUSTRY 292 (2005); Victor P. Goldberg, *The Devil Made Me Do It: The Corporate Purchase of Insurance*, 5 REV. L. & ECON. 541 (2009); Haitao Yin, Howard Kunreuther & Matthew White, *Risk-Based Pricing and Risk-Reducing Effort: Does the Private Insurance Market Reduce Environmental*

regulators and channel-behavior entities in the new risky field of AI builds upon this extensive work. It aims to add another layer of technological application — the important role insurers will have in the AI liability context, given that the private insurance market possesses superior information[237] and is driven by domestic price-competition.[238]

One method insurers use to channel behavior is placing limitations in the form of caps on the amount of money that the liability insurer will be obligated to pay in case of an accident.[239] This practice is common in the field of mandatory automobile liability. For example, in Connecticut, the legislature has set a minimum limit at $25,000 per person and $50,000 per accident.[240] Insurance companies can also choose to, and often do,[241] set maximum liability caps with regards to other aspects of automobile liability, such as property damages. It is true that many people voluntarily purchase an automobile liability policy which is higher than the minimum requirement, but many others do not. The *prima facie* justification for setting a low mandatory bar is to allow people from different socio-economic backgrounds access to fundamental services, such as owning and driving a car. However, in many automobile accidents, the compensation sums greatly exceed the minimum requirement, meaning that, even when insured, getting into an accident will be costly. These limitation caps thus incentivize drivers to internalize that their actions may have severe monetary consequences if they do not take the necessary precautions. The caps also reduce the moral hazard problem since insureds know that any damage exceeding the cap will be paid for out of their own pocket. A cap on damages for AI incidents will similarly incentivize[242] the large tech companies that manufacture AI entities to act in a safer manner.[243] However, as mentioned above, excessive damages caused by AI should be backed up by

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Accidents?, 54 J.L. & ECON. 325 (2011). For a historical perspective, see THE HISTORY OF INSURANCE, *supra* note 79, at xii.

237. It is true that as of now, not enough information is available in the AI context to provide accurate predictions. S*ee supra* Part II. However, once that information is collected it can and will be used to induce efficient risk-reducing behavior.

238. *See, e.g.*, Daniel Schwarcz, *Regulating Consumer Demand in Insurance Markets*, 3 ERASMUS L. REV. 23, 43 (2010); Baker & Swedloff, *supra* note 229, at 1419; Ben-Shahar & Logue, *supra* note 1, at 228 ("Because of their superior access to information and their commercial sophistication, and because of the competitive pressure to find new ways to lower their costs and hence their prices, insurance companies employ a variety of strategies to improve the safety conduct of their policyholders.").

239. Baker, *supra* note 11, at 6.

240. *See Automobile Coverage Information*, ST. OF CONN. INS. DEP'T, http://portal.ct.gov/CID/General-Consumer-Information/Automobile-Coverage-Information [https://perma.cc/ZMK8-NATP].

241. *See, e.g.*, *Limit of Liability*, Lemonade, https://www.lemonade.com/insuropedia/dictionary/limit-of-liability/ [https://perma.cc/VDX6-23VU].

242. *See, e.g.*, Baker, *supra* note 11.

243. On the other hand, this may lead to troubling consequences when victims face insolvent tortfeasors.

governmental funds given the limited abilities of insurance companies to compensate for extreme damages.

Beyond insurance caps, Baker and Swedloff discuss five different tools insurers use to manage their insureds' moral hazards: (1) risk-based pricing, (2) underwriting, (3) insurance contract design, (4) claims management, and (5) loss prevention services.[244] These are considered traditional or conventional techniques for limiting moral hazards because they are common tools and features used in the traditional insurance process.[245]

First, risk-based pricing refers to situations in which insurers in a competitive market create and offer tailor-made policies based on the risk factors of the party who wishes to insure her activity.[246] This type of pricing "provides an incentive for people to do what they can to reduce exposure to liability claims to avoid higher insurance prices in the future."[247] AIs have been valuable in determining the premiums that should be assigned to these risk-based policies.[248] As discussed, however, risk-based pricing, especially when carried out by an AI entity, has its pitfalls. It may produce biased and discriminatory results when the AI takes into account proxies which one has no control over, such as gender and race.[249] Since the insureds cannot do anything to change these proxies, the behavior-channeling mechanism falls short.

As long as proxies are within the insured's control, risk-based pricing is an effective tool for incentivizing safe behavior, including in the context of AI users, owners, and manufacturers. Insurers will be able to refine the price of their policies to reflect the risk factors of their insureds because these risks will become clear over time. The insurers will have the tools to act as the best pressure point in order to influence their policyholders to behave in a manner that is safer for them and for their environment. Insurers are incentivized to do so because safer

244. Baker & Swedloff, *supra* note 229, at 1418.

245. *See* Abraham & Schwarcz, *supra* note 234, at 1, 14.

246. Baker & Swedloff, supra note 229, at 1419.

247. *Id.*

248. *See, e.g.*, Lior, *supra* note 120.

249. *See, e.g.*, Joy Buolamwini, *Artificial Intelligence Has a Problem with Gender and Racial Bias. Here's How to Solve it*, TIME (Feb. 7, 2019, 7:00 AM), http://time.com/5520558/artificial-intelligence-racial-gender-bias/ [https://perma.cc/FCD9-CSDW]; Matthias Spielkamp, *Inspecting Algorithms for Bias*, MIT TECH. REV. (June 12, 2017), www.technologyreview.com/s/607955/inspecting-algorithms-for-bias/ [https://perma.cc/H8H4-M9WF]; Gideon Mann & Cathy O'Neil, *Hiring Algorithms Are Not Neutral*, HARV. BUS. REV. (Dec. 9, 2016), hbr.org/2016/12/hiring-algorithms-are-not-neutral [https://perma.cc/E2DR-YHJK]; Cathy O'Neil, *Recidivism Risk Algorithms Are Inherently Discriminatory*, MATHBABE (Jan. 4, 2017), mathbabe.org/2017/01/04/recidivism-risk-algorithms-are-inherently-discriminatory/ [https://perma.cc/Q9MQ-GM2Y]; Claire Cain Miller, *When Algorithms Discriminate*, N.Y. TIMES (July 9, 2015), http://www.nytimes.com/2015/07/10/upshot/when-algorithms-discriminate.html [https://perma.cc/4A6G-Q37Y]; Moritz Hardt, *How Big Data Is Unfair*, MEDIUM (Sept. 26, 2014), medium.com/@mrtz/how-big-data-is-unfair-9aa544d739de [https://perma.cc/B5B8-TQPQ].

behavior on the part of their insureds means fewer indemnification claims, which leads to more profits.

Moreover, after a policy has been sold, insurers can adjust the premium based on their experience with that specific insured. This is known as "experience rating."[250] These adjustments signal to the insureds the precise safety measurements they can and should take in order to reduce expected accident costs, and as a result reduce the premium rate of their policies. The savings that can come from a favorable experience rating should lead insureds to adopt more efficient and safe behavior. If they fail to do so, their premium will be adjusted to their detriment.[251]

It is also important to note that insurers "play an important role in shaping levels of activity."[252] They do this "by converting the uncertain expected cost of liability into a certain cost of the insurance premium, insurance premiums enable insureds to make more informed choices regarding activity levels."[253] This is an important channeling behavior feature[254] which allows insurers to maintain appropriate levels of activities, and not solely levels of care, as part of their efforts to reduce accidents and damages.

Second, insurance underwriting "is the process of evaluating which risks to insure and at what price."[255] This is distinct from risk-based pricing because insurance underwriting allows insurers to collect and provide loss prevention information to the insured, which is not reflected through premiums. Whether to implement the loss prevention information is left up to the insureds themselves. It may be assumed that as risk-averse entities they will want to heed credible loss prevention advice from their insurers, but there are no immediate monetary consequences if they do not. Therefore, this is a softer tool than risk-based pricing, but one that still has the capability to channel insureds' behavior. Insurance underwriting may be particularly effective in the AI field, where insureds yearn for loss prevention information that will help them navigate this new and unpredictable industry.

Third, contract design tries to mitigate the risks of moral hazard through partial insurance, such as limitations caps (discussed above), deductibles, coinsurance, and the focus of this Section — exclusions.[256] Each of these techniques recognizes that a fully insured has nothing to fear and so no incentive to behave cautiously. Deductibles and

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250. Ben-Shahar & Logue, *supra* note 1, at 206.

251. For more on how experience ratings and differentiated premiums are determined, see *id.* at 207–08.

252. Ben-Shahar & Logue, *supra* note 1, at 233.

253. *Id.*

254. Usually in a strict liability context. *See* Steven Shavell, LIABILITY FOR ACCIDENTS, HANDBOOK OF LAW AND ECONOMICS 139, 146–47 (2007).

255. Baker & Swedloff, *supra* note 229, at 1420.

256. *See* Priest, *supra* note 2, at 647–50; Ben-Shahar & Logue, *supra* note 1, at 202.

coinsurance guarantee that some of the insured's own money is at stake in the event of an accident, reducing moral hazard.[257] Contracts can also exclude coverage of certain claims which are considered "to pose a high degree of moral hazard,"[258] or refuse to insure particular risks, such as harms caused intentionally or wantonly.[259]

In the AI context, there is a risk that some insurers may choose to exclude AI entities from coverage altogether due to their unpredictability, the lack of information needed to calculate premiums, and their ability to cause great damages in nature and scope.[260] This argument, however, does not justify the complete rejection of an insurance model in the AI context because all new technologies are dangerous and unpredictable to a certain degree when they are first introduced into the commercial market. This does not mean the insurance industry will ignore the opportunity to profit off policies for the AI market. Particular kinds of claims may be excluded for AI policyholders at first, but as insurance companies collect and analyze more information, their ability to offer coverage to these excluded activities will grow.

Fourth, claims management, unlike the previous tools, is an ex post moral hazard mitigation instrument[261] that typically provides insurers, rather than insureds, the exclusive authority to defend and settle claims.[262] This allows insurers to better control the lack of concern insureds may have regarding the cost of a claim once it has already occurred and while it is being litigated, because insureds have no control over the management claim process. Furthermore, insurers' claims management "directly regulates the litigation process, but it also promotes other aspects of regulation through insurance by providing an opportunity for insurers to learn about liability risks, both in general and in relation to the particular insured. Insurers can use this information in pricing, underwriting, and loss prevention services."[263] This is an important feature in liability claims in general, and in future AI claims specifically, because it gives insurers the relevant information

257. Baker & Swedloff, *supra* note 229, at 1420.

258. *Id.*

259. According to Priest, these mechanisms "can maximize the available insurance coverage to the society." Priest, *supra* note 2, at 650.

260. TURNER, *supra* note 13, at 117; *see also supra* Section V.A.4.

261. Ben-Shahar & Logue, *supra* note 1, at 213–16. Other ex post regulations presented by Ben-Shahar & Logue are mitigation of loss, exclusions, and ex post underwriting. *Id.* I consider the vast majority of loss mitigation tools to be incorporated within claim management. Similarly, I consider the exclusion tool to be a subset of the refusal to insure, which is embedded in contract design. Finally, I consider the ex post underwriting tool to be part of ex ante underwriting and risk-based pricing, given that these methods all allow the insurer to essentially refuse to pay claims based on incorrect information. This directly relates to the proxies given to the insurers at the policy creation stage.

262. Baker & Swedloff, *supra* note 229, at 1421 ("Commercial policies sold to larger entities often allow the entities to control their own defense, but the insurer has a voice in that defense and significant control over settlement."); Ben-Shahar & Logue, *supra* note 1, at 213.

263. Baker & Swedloff, *supra* note 229, at 1421.

to properly incentivize insureds to take proactive measurements concerning their unpredictable AI entities. Information gathered via claim management is used to provide loss prevention services, our final tool.

Fifth, given the aforementioned tools and the information they allow insurance companies to collect and analyze, it seems that insurers are in the best position to identify and spread information about "the best ways to reduce risk of loss."[264] This may be considered the most obvious way of regulation via insurance because insurers literally advise insureds on how to modify their actions in order to avoid losses.[265] This provides an immense and invaluable source of information in the AI context, where information is scarce and every piece of advice on loss prevention is welcomed and desired.[266]

Besides these five traditional mechanisms, Ben-Shahar and Logue also present nontraditional or unconventional tools of regulation via insurance. These tools operate outside the usual insurance process in which risk transfers from the insured to the insurer.

One such tool is private safety codes.[267] Insurers can decide to enforce safety codes on their policyholders that exceed governmental regulatory requirements.[268] Insurers are in a unique position to promote safety measures that advance not only the aggregated interests of all of their policyholders, but also their own interests in the form of higher profits when fewer accidents occur. This leads insurers to subsidize expensive technology that reduces risks and increases overall deterrence, such as anti-theft devices or anti-virus software.[269] In the AI context, new technological safety standards will inevitably be created, and insurers will be best placed to implement and enforce them. Government regulation takes time. Insurers can act significantly faster and prevent damages sooner by enforcing these private safety codes, rather than waiting on lawmakers.

However, empirical literature, particularly in the employment law area, has shown that internal privately-designed policies and internal

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264. *Id.*; *accord* Ben-Shahar & Logue, *supra* note 1, at 210. Baker and Swedloff refer to this as "loss prevention services," *supra* note 229, at 1421, while Ben-Shahar and Logue refer to it as "[c]oaching [s]afer [c]onduct," *supra* note 1, at 210.

265. *See* Baker & Swedloff, *supra* note 229, at 1422.

266. As stated in the beginning of this Section, further empirical research should be conducted in the context of these five tools to ensure that they are not hollowed out by insurers, and thus lose their value. The conditions under which these tools will be successful are still unclear in the AI context given its novelty. However, this does not render the notion of insurance as a regulatory tool irrelevant — it just means more nuance is required to ensure its success.

267. Ben-Shahar & Logue, *supra* note 1, at 211.

268. One such example could be insurance companies disseminating efficient safety technology by subsidizing the purchase of antitheft devices for vehicles or security systems for homes.

269. For a specific example of an antitheft transmitter device, see Ben-Shahar & Logue, *supra* note 1, at 211–12.

grievance structures do not always work as planned.[270] These policies may even be captured by the very organization they are meant to improve and end up being purely symbolic.[271] Thus, insurers should treat private safety codes with skepticism and monitor them to ensure that they are not hollowed out over time.

Two other nontraditional tools discussed by Ben-Shahar and Logue, as well as Baker and Swedloff, are research and education, and engagement with public regulation.[272] These are important in the context of AI because this field will require assistance from the academic and public sectors in order to grow safely.

Insurance company investment in research and education can eventually lead to regulatory techniques essential to the commercial field of AI entities. "Engagement with public regulation" refers to a trickle effect from the private sector of insurance companies to the public sector of regulators.[273] Insurers have considerable power to persuade regulators that a loss prevention mechanism is effective enough to be obligatory.[274] Airbag and seatbelt regulations in the automobile industry exemplify this — both these tools originated with insurance companies and were later adopted into written law.[275] Such tools do not directly influence the behavior of any specific insured, but they may eventually "offset the aggregate moral hazard impact of liability insurance by reducing the frequency or severity of liability claims."[276]

The notion that the insurance industry is more fit to act as a quasi-regulator rests on the assumption that insurance companies have better information than government regulators from the outset. The more information insurers have, the better their position relative to the government to proactively channel the behavior of their insureds through premiums, caps, and exclusions. In the AI context, it is less obvious that the insurance industry currently possesses superior information.[277] However, the insurance industry can obtain this information more quickly and efficiently than other actors.

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270. *See* Talesh, *Legal Intermediaries*, *supra* note 233, at 210.

271. Talesh & Cunningham, *supra* note 53, at 975–76.

272. Baker & Swedloff, *supra* note 229, at 1422–23; Ben-Shahar & Logue, *supra* note 1, at 212–13.

273. Baker & Swedloff, *supra* note 229, at 1423.

274. *See* Ben-Shahar & Logue, *supra* note 1, at 212–13.

275. *Id.*

276. Baker & Swedloff, *supra* note 229, at 1423.

277. This can also be seen in insured companies' lack of cooperation with their insurers despite their duty to do so. *See generally* Adrian P. Schoone & Michael M. Berzowski, *Liability Insurance: Effect of False Statements on Duty to Cooperate*, 52 MARQ. L. REV. 221 (1968); Nicholas J. Giles, *Rethinking the Cooperation Clause in Standard Liability Insurance Contracts*, 161 U. PA. L. REV. 585 (2013); Defense Research Institute, *Navigating The Murky Waters of The Insured's Duty To Cooperate*, FINEMAN KERKSTEIN & HARRIS, https://www.finemanlawfirm.com/about-us/publications/navigating-the-murky-waters-of-the-insureds-duty-to-cooperate/ [https://perma.cc/MWH7-BBVZ] (last visited May 11, 2022).

As time goes on, the insurance industry will be the best pressure point to regulate and channel their insureds' behavior, as has happened for other emerging technologies.[278] Insurers will do so via their unique capacity to distribute risks across a large pool of policyholders. The more data they gather, the more effective a regulatory role they will take on.

2. Questions of Liability and Predictability

Building upon existing insurance infrastructure for AI entities can help avoid legal dilemmas of liability and blame-placing, by making predictable who should pay damages, i.e., the policyholder.

The insurance framework essentially bypasses the difficulty of establishing a causal nexus between a human entity and the tortious behavior of an AI entity. Because the black-box problem prevents us from understanding the exact decision-making process that led the AI entity to inflict damage, proving a direct causal link between the damage caused and a liable human party is next to impossible. Circumventing these causality questions will save administrative costs and provide a clear legal path to compensation when AI accidents occur. While insurance does not solve core difficulties in AI, such as personhood[279] and foreseeability,[280] it helps ensure that no matter how these questions are answered, victims are not left without adequate compensation for their loss.

Second, the structure of an AI insurance compensation scheme can provide a partial solution to the unpredictability problem of AI entities.[281] The insurance market functions to offer relief in situations of uncertainty, mostly to risk-averse individuals and companies. "By passing on the cost of harm to insurers for a fixed price, parties can plan for unknown risks with much greater certainty"[282] through spreading the burden of potential losses caused by AI entities within the relevant pool. This does not mitigate the problems of cost allocation and premium estimation, which will remain a challenge considering the inherent unpredictable features of AI entities. However, the insurance market will help society to better understand the unforeseeability issue of AI entities. It will reassure policyholders about their insurers' ability to handle future losses. Insurers will initially shoulder a significant burden by offering policies when the scope and nature of AI damages is not entirely

278. *See supra* Section IV.A.

279. *See generally* Gerhard Wagner, *Robot, Inc.: Personhood for Autonomous Systems?*, 88 FORDHAM L. REV. 591 (2020).

280. Rachum-Twaig, *supra* note 10, at 1153 ("[T]he fact that the exact actions leading to the harms are unexplainable and perhaps unforeseeable to begin with does not lead to the conclusion that the harms themselves are unforeseeable.").

281. TURNER, *supra* note 13, at 115.

282. *Id.*

clear. However, insurers have an interest to do so, for the right premium. In the process, they will obtain invaluable information about AI entities, which they can use to further hone their premiums and policy terms as they expand into this emerging market.

An example may help illustrate the advantages insurance has when it comes to covering AI activities. Consider a 2016 incident in which a robot security guard ran over a toddler at a California shopping center.[283] As more incidents of this kind occur, insurers will be able to gather better information about the patterns and magnitude of risks posed by AI entities. This will enable them to better set premiums for their policies sold to first parties like the robot security guard company and third parties like the shopping center employing those services.[284]

As a result, the insurability of an AI entity will become more feasible. Insurers will have the capacity to offer accurate premiums in a short time span using the power of AI, while acknowledging its pitfalls.[285] This reinforcing loop will enable both insurers and insureds to better utilize the insurance market without compromising the development of emergent AI technologies.

C. Potential Liability Barriers and the Role of Insurance

Insurance can also play an important role in resolving barriers to liability that arise in the AI accident context. This Section discusses two examples of such issues — joint causation and hacking AI entities — demonstrating how insurance can address both these problems. A comprehensive legal mechanism should draw on both insurance and tort law in order to provide a holistic legal infrastructure for AI-inflicted damages.

1. Joint Causation

Joint causation here refers to situations where it is not clear to what extent the AI entity contributed to the harm. When the AI entity acts alone, without human cooperation, causal ambiguity is not usually an issue.[286] Examples of such standalone conduct include fully automated

283. Steven Hoffer, *300-Pound Security Robot Runs over Toddler at California Shopping Center*, HUFFPOST (July 13, 2016, 11:20 AM), www.huffpost.com/entry/security-robot-toddler_n_57863670e4b03fc3ee4e8f3a [https://perma.cc/YCX2-4QKH].

284. It is important to note that the specific context in which a firm or individual uses AI has implications for the practicability of insuring the risks associated with AI, the capacity of insurers to offer meaningful protection, and the extent to which insurers can effectively manage risk. The usage context of the AI entity must be considered by the insurer when offering coverage and is a crucial element of the policy determination.

285. *See supra* Part II.

286. *See* RESTATEMENT (THIRD) OF TORTS: LIABILITY FOR PHYSICAL AND EMOTIONAL HARM § 29 (AM. L. INST., 2010).

vehicles,[287] fully autonomous security guard robots, and hiring algorithms that base decisions on predefined proxies.

However, in some cases, determining the AI's role in causing the damage is nonobvious,[288] usually when an AI entity works in conjunction with a human. Examples include doctors aided by medical AI technology who set a harmful course of treatment or make a mistaken diagnosis;[289] lawyers aided by AI software, who decide upon a wrongful course of action;[290] or investment consultants aided by algorithms, which recommend a harmful route to invest their clients' money.[291] These joint human-AI scenarios will only multiply as AI technology increasingly embeds itself into the commercial and social aspects of our lives.[292]

Joint causation scenarios may be problematic in the insurance context if the insurer does not cover these types of damages because the AI entity itself did not solely cause them. It is also difficult to rely on the "substantial factor" test usually employed in these scenarios, given that the black-box issue hampers our ability to measure the AI entity's contribution to the damages.[293] However, this does not mean that insurance is impotent in these situations. In most cases, the humans operating in

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287. Fully automated here refers to what the Society of Automotive Engineers classifies as a "Level 5" operation, and not the current commercial practice, which expects human intervention when needed. *See supra* note 130.

288. Abraham and Rabin acknowledge this issue as a reason to make their MER proposal an exclusive remedy in the event of damages caused by autonomous vehicles. *See* Abraham & Rabin, *supra* note 128, at 156–59.

289. *See, e.g.*, Rob Matheson, *Automating Artificial Intelligence for Medical Decision-Making*, MIT NEWS (Aug. 5, 2019), news.mit.edu/2019/automating-ai-medical-decisions-0806 [https://perma.cc/GRJ7-TQMN]; Cade Metz, *A.I. Shows Promise Assisting Physicians*, N.Y. TIMES (Feb. 11, 2019), www.nytimes.com/2019/02/11/health/artificial-intelligence-medical-diagnosis.html [https://perma.cc/S4TE-KAT7].

290. *See, e.g.*, Neil Sahota, *Will A.I. Put Lawyers out of Business?*, FORBES (Feb. 9, 2019, 10:43 PM), www.forbes.com/sites/cognitiveworld/2019/02/09/will-a-i-put-lawyers-out-of-business/#26525c3031f0 [https://perma.cc/T5Q9-SPT7]; Steve Lohr, *A.I. Is Doing Legal Work. But It Won't Replace Lawyers, Yet.*, N.Y. TIMES (Mar. 19, 2017), www.nytimes.com/2017/03/19/technology/lawyers-artificial-intelligence.html [https://perma.cc/4PM7-MJL8].

291. *See, e.g.*, Ellen Chang, *How Artificial Intelligence Will Help Financial Advisors Provide Better Guidance*, THESTREET (Nov. 19, 2017, 9:44 PM), www.thestreet.com/story/14159924/1/how-artificial-intelligence-will-help-financial-advisors-provide-more-guidance.html [https://perma.cc/3VZX-VE2X]; Lorie Konish, *Firms Like Morgan Stanley Are Using Artificial Intelligence to Manage Clients' Money*, CNBC (Oct. 24, 2018, 9:59 AM), www.cnbc.com/2018/10/19/-artificial-intelligence-is-changing-how-investors-money-is-managed.html [https://perma.cc/4NZP-R4Y8].

292. *See, e.g.*, Miranda Katz, *Welcome to the Era of the AI Coworker*, WIRED: BACKCHANNEL (Nov. 15, 2017, 6:00 AM), www.wired.com/story/welcome-to-the-era-of-the-ai-coworker/ [https://perma.cc/JLE5-P9QW].

293. For more on the substantial factor test, see RESTATEMENT (SECOND) OF TORTS § 432(2) (AM. L. INST., 1965). *See also* Anderson v. Minneapolis St. P. & S. S. M. Ry. Co., 179 N.W. 45, 46 (Minn. 1920); Gerald W. Boston, *Toxic Apportionment: A Causation and Risk Contribution Model*, 25 ENV'T L. 549, 630 (1995). *See generally* Joseph Sanders, Michael D. Green & William C. Powers, Jr., *The Insubstantiality of the "Substantial Factor" Test for Causation*, 73 MO. L. REV. 399 (2008).

cooperation with these AI entities will hold their own policies to protect themselves from liability, regardless of whether AIs were used. Professionals such as accountants, lawyers, and physicians typically hold professional liability insurance policies.[294] These policies should cover the types of damage incurred in a joint causation scenario, given that AI entities can be seen as foreseeable "intervening causes" that may cause harm.[295] Even if AI cannot be viewed as foreseeable intervening causes, the consequences of the damages caused are likely of the type that the human cooperator could have foreseen. Thus, in either case, the human cooperating with the AI entity will be held liable or partially liable, and the victim will be compensated through her policy.[296]

As more damages arise from human-AI cooperation, these types of silent AI coverage hidden within traditional policies may be explicitly excluded to reduce risk. But, as discussed in Section V.A.4, exclusion of coverage for such cooperations will create demand for new insurance riders. The joint-causation scenario demonstrates how insurance can evolve to encompass foreseeable but legally tricky types of damages.

2. Hacking AI Entities

The vast majority of AI entities are connected to the Internet and thus inherently vulnerable to hacking by malicious third parties, who may hijack the AI entity to inflict damage.[297] Given that the third party

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294. CHRISTOPHER C. FRENCH & ROBERT H. JERRY, II, INSURANCE LAW AND PRACTICE: CASES, MATERIALS, AND EXERCISES 380 (2018); DAVID W. ICHEL & AMY J. LIPPMAN, PROFESSIONAL LIABILITY INSURANCE COVERAGE: AN OVERVIEW AND CURRENT PROBLEMS (1991).

295. When intervening causes are foreseeable, that means the insurer took these elements into consideration when issuing the policy and so is bound by that policy. If, however, the involvement of an AI entity was unforeseeable and amounted to an intervening factor, the insurance company could claim that it lies beyond the scope of the policy and turn to the phrasing of the policy itself to make its case. *See* Kenneth Wollner, *The Enigma of Causation in Insurance Contract Interpretation*, INT'L RISK MGMT. INST. (Jan. 2003), www.irmi.com/articles/expert-commentary/the-enigma-of-causation-in-insurance-contract-interpretation [https://perma.cc/23EF-EN53].

296. For more on intervening causes, see RESTATEMENT (THIRD) OF TORTS: LIABILITY FOR PHYSICAL AND EMOTIONAL HARM § 29 (AM. L. INST., 2010); Comment, *Torts: Independent Intervening Cause*, 22 IND. L.J. 289 (1947); David A. Fischer, *Products Liability — Proximate Cause, Intervening Cause, and Duty*, 52 MO. L. REV. 547 (1987); and David G. Owen, *The Five Elements of Negligence*, 35 HOFSTRA L. REV. 1671, 1684 (2007). In an AI context, see Sabine Gless, Emily Silverman & Thomas Weigend, *If Robots Cause Harm, Who Is to Blame? Self-Driving Cars and Criminal Liability*, 19 NEW CRIM. L. REV. 412, 432–33 (2016).

297. *See, e.g.*, Amy B. Wang, *'I'm in Your Baby's Room': A Hacker Took over a Baby Monitor and Broadcast Threats, Parents Say*, WASH. POST (Dec. 20, 2018), www.washingtonpost.com/technology/2018/12/20/nest-cam-baby-monitor-hacked-kidnap-threat-came-device-parents-say/ [https://perma.cc/L6RC-R43K]; Andy Greenberg, *Hackers Remotely Kill a Jeep on the Highway — With Me in It*, WIRED (July 21, 2015, 6:00 AM), www.wired.com/2015/07/hackers-remotely-kill-jeep-highway/ [https://perma.cc/5ZXK-E9LC].

who caused the damage is often difficult to identify and seek redress from in court, liability is uncertain.[298] Building upon cyber-insurance in cases of data breaches, the manufacturer of the AI entity should be viewed as liable for the AI-inflicted damages.[299] This is because there is an expectation that the manufacturer will safeguard their AIs from hackers and proactively fix any vulnerabilities. In other words, "the manufacturer's tort obligations encompass the cybersecurity of the" AI entity.[300] Furthermore, hackers can be characterized as foreseeable intervening causes, especially for critical infrastructure known to be a target for malicious hackers.[301]

Attributing liability to manufacturers when an AI is hacked is reasonable but risks stifling innovation. Companies are likely to shun an emerging technology like AI if failing to stay on top of the cyber arms race invites boundless liability.[302] However, insurance helps alleviate this fear.

Cybersecurity insurance today offers a wide range of protection to companies that wish to defend themselves from future liability claims in case of malicious hacks.[303] Manufacturers and other distributors of AI entities can and should purchase these insurance policies to hedge against the risk that their AI entities will be hacked. This will allow companies to continue pursuing the development of AI technologies while also allowing insurers to better incentivize AI companies to proactively ensure their AI entities are less prone to hacks.

Terrorism may present an exception to this cybersecurity coverage since terrorism insurance is more problematic to issue and obtain.[304] However, in the commerce context that is the focus of this Article, this will represent a small subset of cases that will have to be handled by the government. Setting these fringe cases aside, cybersecurity

298. *But see* Geistfeld, *supra* note 70, at 1661 ("For well-established reasons, the manufacturer's tort obligations encompass the cybersecurity of the vehicle.").

299. *See generally* Alicia Solow-Niederman, *Beyond the Privacy Torts: Reinvigorating a Common Law Approach for Data Breaches*, 127 YALE L.J. F. 614 (2018) (discussing the limitation of privacy torts against the data owner in cases of data breaches, and calling to recognize a tort of breach of confidentiality as a cause of action). In the analogy between data breaches and AI inflicted harms, the equivalent to the AI's manufacturer will be the software developer or any other entity who has the ability to ensure the safeness of the software.

300. Geistfeld, *supra* note 70, at 1661.

301. *Cf. Critical Infrastructure Vulnerability Assessments*, CYBERSECURITY AND INFRASTRUCTURE SEC. AGENCY, http://www.cisa.gov/critical-infrastructure-vulnerability-assessments [https://perma.cc/HB48-CPJ5]. For more on intervening causes, see *supra* note 296.

302. *See, e.g.*, Yavar Bathaee, *The Artificial Intelligence Black Box and the Failure of Intent and Causation*, 31 HARV. J.L. & TECH. 889, 932 (2018); Brandon W. Jackson, *Artificial Intelligence and the Fog of Innovation: A Deep-Dive on Governance and the Liability of Autonomous Systems*, 35 SANTA CLARA HIGH TECH. L.J. 35, 60 (2019) (noting that strict liability for AI could "stifle innovation," but suggesting that might be for the best); Geistfeld, *supra* note 70, at 1673.

303. With certain caveats. *See generally* Lubin, *supra* note 35.

304. Boardman, *supra* note 159, at 784.

insurance allows manufacturers to hedge their risks in cases where they would be found liable for damages caused by the hacking of their AI entities. Insurers have an incentive to provide such policies for the AI market while regulating the behavior of the policyholders to optimize their cybersecurity efforts and methods.

VI. A PROPOSAL FOR INSURANCE IN THE AI REALM

Having reviewed the positive and negative aspects of insurance in Part V, this Part suggests how insurance, while by no means a panacea, can provide a meaningful tool for both AI companies and AI users to continue exploring the potential commercial benefits AI has to offer.

A. Building Upon Existing Infrastructure

Insurance for AI should consider the type of AI, the activity the AI will perform, its unique features, and the associated risks. It should also consider the identity of the insured, and whether it should be a first- or third-party insurance policy. A liability insurance policy purchased by the companies manufacturing AI or dispersing it to the public is preferable at this point given their inherent ability to minimize damages.[305]

Certain insurance regimes, such as automobile and professional liability insurance, take the form of coercive or mandatory, insurance schemes in most US states.[306] Such schemes regulate the market by obligating one side of a potentially harmful relationship from which damages may occur to purchase a minimum amount of coverage before she can partake in a certain activity.[307] This holds greater value to the community of consumers participating in the covered activity because it

305. However, in the context of cyber insurance, it is not the software producers (e.g., Microsoft, Amazon, etc.) that purchase insurance, but rather the technology users themselves. This can be attributed to the lack of regulation in this field leading consumers to hedge their risks, though their ability to minimize the risk is low. This may very well happen in an AI context, but it is economically undesirable. *See, e.g.*, *Small-to-Medium-Sized Enterprises More Likely to Adopt Cyber Insurance*, SECURITY (June 18, 2020), https://www.securitymagazine.com/articles/92632-small-to-medium-sized-enterprises-more-likely-to-adopt-cyber-insurance [https://perma.cc/KKT8-SHY9]. For examples of technology users purchasing general insurance to hedge their cyber risks, see Complaint, Mondelez Int'l, Inc. v. Zurich Am. Ins. Co., No. 2018L011008, 2018 WL 4941760 (Ill. Cir. Ct. Oct. 10, 2018), https://assets.documentcloud.org/documents/5759256/397265756-Mondelez-Zurich.pdf [https://perma.cc/742C-J3MW]; and Catalin Cimpanu, *Merck Wins Cyber-Insurance Lawsuit Related to NotPetya Attack*, THE RECORD (Jan. 21, 2022), http://therecord.media/merck-wins-cyber-insurance-lawsuit-related-to-notpetya-attack/ [https://perma.cc/M2YC-JNCG].

306. For auto insurance, see, for example, *Facts + Statistics: Auto Insurance*, INS. INFO. INST., www.iii.org/fact-statistic/facts-statistics-auto-insurance [https://perma.cc/2VVZ-V4KU]. For professional liability, see, for example, *Professional Liability Insurance*, INS. INFO. INST., http://www.iii.org/article/professional-liability-insurance [https://perma.cc/AR67-BUWC].

307. Swedloff, *supra* note 42, at 2049–50.

leads to "more coverage for more people, thus creating additional security and spreading risks more broadly."[308] Coercive insurance provides security not only for the policyholder herself but also for potential bystander victims. For example, in the automobile context, the insurance protects not just the driver, but the victims as well, who will be covered if a driver injures them.[309] Mandatory or compulsory insurance schemes also avoid market failure, primarily in the form of insolvency on the part of the liable party.[310] Thus, a mandatory liability insurance scheme ensures all victims will be able to collect the compensation they deserve.

However, despite legislatures' general enthusiasm to impose compulsory insurance,[311] they are unlikely to mandate the acquisition of an insurance policy for every AI entity purchased, rejecting such a policy as overbroad, invasive, and inefficient.[312] Instead, whether insurance is voluntary or mandatory should turn on the type of AI and the activity it performs. For particularly dangerous but essential AI activities, or those that may lead to a serious market failure, insurance should be mandatory. Existing mandatory insurance policies should continue to be mandatory even when the activity they cover is handed over to AI entities. On the other hand, mandating a coercive insurance policy for Roomba vacuum cleaners is less advisable, given the low-risk nature of the activity this AI entity carries out.[313] Roombas can still lead to physical and property damages, but the likelihood of this occurring is far lower than with other AIs, like AVs.[314] Although this Article does not support

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308. *Id.* at 2050.

309. *See, e.g.*, ROBERT E. KEETON, ALAN I. WIDISS & JAMES M. FISCHER, INSURANCE LAW: A GUIDE TO FUNDAMENTAL PRINCIPALS, LEGAL DOCTRINES, AND COMMERCIAL PRACTICES 335–38 (2d ed. 2017); THE LIABILITY CENTURY, *supra* note 71, at 78 ("[B]oth the courts and regulators came to understand that insurance protected not only the policyholder but also his victim. Expansions in the scope of coverage, and therefore in the availability of an insured source of recovery for victims, were increasingly encouraged by both regulatory and judicial authority."). For more on the benefits of coercive insurance vis-à-vis tort law, see Lemann, *supra* note 12, at 68.

310. Michael G. Faure, *Economic Criteria for Compulsory Insurance*, 31 GENEVA PAPERS 149, 154–55 (2006).

311. *Id.* (noting worries from insurers and academics that "policymakers too easily impose a duty to obtain insurance coverage").

312. United States lawmakers' compulsory insurance preferences can be inferred from the current compulsory liability insurance schemes in place in the United States on a federal level. These schemes mainly focus on terrorism, pollution, shipping, and natural disasters. *See* Yueyun Chen & Dongmei Chen, *The Review and Analysis of Compulsory Insurance*, 4 INS. MKTS. & COS.: ANALYSES & ACTUARIAL COMPUTATIONS 6, 7 (2013).

313. For more on the problems with enforcing compulsory insurance, see Bertolini, *Artificial Intelligence and Civil Liability*, *supra* note 9, at 102.

314. One should not belittle the damages a Roomba vacuum can cause; however, they are far less in scope and degree than damages caused by vehicles and the sorts of professionals who hold mandatory liability insurance. *See, e.g.*, Crootof, *supra* note 10, at 598–99; Justin McCurry, *South Korean Woman's Hair 'Eaten' By Robot Vacuum Cleaner as She Slept*, GUARDIAN (Feb. 8, 2015), http://www.theguardian.com/world/2015/feb/09/south-korean-womans-hair-eaten-by-robot-vacuum-cleaner-as-she-slept [https://perma.cc/B7BE-VH26];

mandatory insurance for *all* AI entities, just those already subject to mandatory insurance, it anticipates that the vast majority of businesses that use AI and have a significant effect on the public will, as a matter of course, purchase a liability insurance policy to hedge themselves from certain future lawsuits.

An important issue arising from the usage of the existing insurance infrastructure is *who* should be responsible for purchasing an insurance policy — the consumer side of the transaction (e.g., owner or user of an autonomous vehicle) via a first-party policy, or the manufacturing or distributing side of the transaction (e.g., the company producing the AI entity or providing it to consumers) via a third-party policy. As mentioned previously, the main burden of purchasing insurance policies should be put, at least initially, on the company side of the AI transaction. Manufacturers and distributors are the best *pressure point* to ensure that future research and development practices strive to provide a safer AI product. This does not prevent the consumers from purchasing a first-party policy if they wish, but it does not burden them with outside risks they have little to no control over.

In the AI automobile context, shifting towards a system that places the initial burden of policy purchase not on the consumer side, but rather on the manufacturer side, is sensible. When vehicles are autonomous, consumers have little control over the actual operation of the car. Thus, placing the burden of purchasing an insurance policy on them will diminish the benefits insurance has to offer — insurers will be less able to regulate the driver's behavior, nor will they be able to mitigate risks of moral hazards. Other shifts in the current insurance infrastructure will be necessary depending on which actors emerge as pressure points for insurers to influence. The identity of these pressure points may also evolve over time, changing the suitable party to purchase an insurance policy.[315] The insurance industry is the institution best suited to monitor and adapt to evolution in the AI landscape due to its ongoing collection and review of data, as well as its ability to implement change faster than the traditional tort system.[316]

The EU Report on Robotics suggests establishing "a compulsory insurance scheme where relevant and necessary for specific categories of robots whereby, similarly to what already happens with cars, producers, or owners of robots would be required to take out insurance

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Macrina Cooper-White, *Robot Suicide? Rogue Roomba Switches Self On, Climbs Onto Hotplate, Burns Up*, HUFFPOST (Nov. 13, 2013), http://www.huffingtonpost.com/2013/11/13/robot-suicide-roomba-hotplate-burns-up_n_4268064.html [https://perma.cc/JF4T-U7VY].

315. I frame this process as part of identifying the AI agent's principal. *See* Lior, *AI Entities as AI Agents*, *supra* note 19, at 1087.

316. Ben-Shahar & Logue, *supra* note 1, at 233 (locating this advantage in "the fine-grained, individually adjusted, feature- and experience-rated, and continuously updated costs that insurers uniquely collect").

cover for the damage potentially caused by their robots."[317] The report does not explain when it is "relevant and necessary" to create such a policy, but this Article asserts that such compulsory policies are relevant and necessary when they are needed to prevent market failure or ensure a beneficial activity is accessible to all.[318] As the EU Report acknowledges, cars belong to the category that requires a compulsory insurance scheme, similar to our existing infrastructure today and the approach taken by the Automated and Electric Vehicles Act.[319]

Given the current uncertainty surrounding AI entities, the most logical path to insuring AI is to start with what we already know. Creating a novel insurance scheme specifically for AI entities would be impractical. Regulators and insurers currently lack the knowledge, resources, and time to form new insurance policies before AI entities become an even more integral part of our commercial and personal lives. These policies cannot be set in stone. They will have to allow for the growth of the AI industry while creating a hedging infrastructure for both consumers and manufacturers. Insurers are uniquely capable of regulating industry behavior via insurance policies, such as caps, risk-based pricing, deductibles, limitations, co-pay etc., and formulating an appropriate insurance policy specific to the risks of each AI entity category. As more data is gathered, these policies will change to reflect the additional information. This does not mean creating new specific AI policies but instead building upon the information we already have and providing adjusted policies or riders to encompass newly perceived AI risks.

B. What About the Singularity?

Further problems arise, however, when we consider ways in which AI technology might advance so far that the existing insurance infrastructure will not suffice. This may happen if the singularity is fulfilled. The singularity refers to "strong" or "general" AI where an AI entity "may exhibit sentience or consciousness, can be applied to a wide variety of cross-domain activities and perform at the level of, or better than a human agent, or has the capacity to self-improve its general cognitive abilities similar to or beyond human capabilities."[320] The

317. *See* EU Resolution, *supra* note 22.

318. For an economic perspective on compulsory insurance, see Faure, *supra* note 310.

319. *See supra* Section IV.C.3.

320. OFF. OF MGMT. & BUDGET, EXEC. OFF. OF THE PRESIDENT, DRAFT MEMORANDUM FOR THE HEADS OF EXECUTIVE DEPARTMENTS AND AGENCIES, "GUIDANCE FOR REGULATION OF ARTIFICIAL INTELLIGENCE APPLICATIONS" (2020), http://www.whitehouse.gov/wp-content/uploads/2020/01/Draft-OMB-Memo-on-Regulation-of-AI-1-7-19.pdf [https://perma.cc/6CAZ-DDL2]; *accord* Jayshree Pandya, *The Troubling Trajectory of Technological Singularity*, FORBES (Feb. 10, 2019, 12:58 AM), http://www.forbes.com/sites/cognitiveworld/2019/02/10/the-troubling-trajectory-of-technological-singularity/#4ebb17496711 [https://perma.cc/9R4Y-E8N7]. *See generally* MURRAY SHANAHAN, THE TECHNOLOGICAL SINGULARITY (2015).

singularity will not necessarily manifest itself as it is presented in science fiction books and movies (e.g., Skynet and the Matrix). It will most likely appear as a full-fledged AI entity that for all intents and purposes operates as a human being. In that case, the question of insurance coverage would not be trivial since the singularity presents a new type of subject matter to be covered by insurance policy, as well as a new type of policyholder. It is true that the singularity has the potential to radically alter all of human society, but it also has important implications on the realm of insurance and its ability to facilitate the safe entrance of new technologies and their future advancements into our society.

When, or if, the singularity occurs, building upon existing insurance infrastructure will not be helpful as there are no general AI policies capable of offering such wide coverage. Furthermore, the perils inflicted by strong AI can be classified as unknown unknowns, meaning the types of risks, as well as the way in which they will be manifested, are simply unknowns.[321]

It seems three alternatives are possible. First, insurance companies might accumulate specific policies covering specific activities the singularity will perform. If the singularity does occur, an AI superintelligence entity will be akin to a human being, and should be able to purchase policies for specific activities it will carry out. This option still relies on existing infrastructure and will be able to offer coverage for AI entities. However, this approach may not be enough if new kinds of risks are inflicted by strong AI entities. Second, in this unique case of an AI superintelligence entity, it seems that a registry along with a general fund is adequate. This will enable the tracking of these new entities and ensure that the right parties, such as the developers, users, and even the strong AI entities themselves,[322] contribute proportionally to the compensation fund.[323] Third, a coercive insurance scheme could be imposed on these new strong AI entities. That could prevent a market failure, since it is unclear whether these entities will be solvent or have a solvent party backing them financially.[324]

The scenario of the singularity is still essentially theoretical, and it should be decades before it becomes a reality, if it ever does.[325]

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321. *See supra* Section V.A.3.a. The singularity would be more unpredictable than the "known unknowns" of events like terrorism.

322. This covers cases where the AI itself has legal personhood. For more on this notion, see Lior, *AI Entities as AI Agents*, *supra* note 19, at 1065–68.

323. *See supra* Section IV.C.5.

324. *See* Faure, *supra* note 310, at 164.

325. *See, e.g.*, John Markoff, *When Is the Singularity? Probably Not in Your Lifetime*, N.Y. TIMES (Apr. 7, 2016), http://www.nytimes.com/2016/04/07/science/artificial-intelligence-when-is-the-singularity.html [https://perma.cc/9UCZ-ZKHZ] ("[M]ost artificial intelligence researchers still discount the idea of an 'intelligence explosion.'"); Cem Dilmegani, *When Will the Singularity Happen? 995 Experts' Opinion on the AGI*, AI MULTIPLE (Feb. 3, 2022),

Nonetheless, it should not render the instrument of insurance archaic. The existence of an AI superintelligence entity is likely to create a market failure, given the inherent insolvency of strong AI entities, at least at first. Coercive insurance, or a mandatory registry accompanied by a compensation fund, can help fix this market failure, as long as these schemes name the party responsible for purchasing the policy or contributing to the compensation fund, assuming it will not be the strong AI entity itself. The singularity presents great potential risks of damages. At its core, insurance aims to mitigate these kinds of risks for the right price. Should the singularity materialize, it will be able to do so in this context as well.

VII. CONCLUSION

Insurance has a vital role to play in adopting, and in the process regulating, emerging technologies such as AI. It offers a hedging tool to deal with the many risks associated with AI, and it translates them into a manageable scope. By doing so, insurance facilitates the adoption of AI into our commercial market. Given the unknown potential risks AI entities may inflict upon their users and third parties, the insurance policy premium offered to manufacturers purchasing liability insurance is bound to be high. However, the premium should decrease as these AI entities become safer, and their actions become more explainable and predictable, or at the very least after enough data has been gathered for actuarial calculations. This means insurance policies may not be accessible to all, whether companies or users, in the beginning, but like other emerging technologies, everyone who wishes to will be able to hedge their participation in the AI market eventually.

This Article argues that the assessment of risks posed by various AI entities will evolve and that the current insurance infrastructure provides a solid starting point for managing activities that were once conducted by humans and are now conducted by AI entities. Moreover, the vast majority of activities carried out by humans are embedded with the chance of a catastrophic risk. Insurers still offer policies for the vast majority of these activities and can decide to *exclude* specific AI frameworks, such as AI utilization in war and terrorism. These cases certainly present challenges to insurers, but they are remote from the commercial context that is the focus of this Article.

Like other life-threatening activities society still chooses to conduct as a matter of policy and for the assumed aggregated positive social utility, the usage of AI entities is predicted to prevail, and these entities will slowly but surely be integrated into our technological

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http://research.aimultiple.com/artificial-general-intelligence-singularity-timing/ [https://perma.cc/H9RT-5WK8].

ecosystem. This will inevitably lead to different and sometimes novel types of harms. While insurance as a regulatory instrument has its flaws, it has nonetheless proven to be a valuable tool to facilitate emergent technologies.

The expectations surrounding AI are enormous. If we wish to further explore this field, despite the uncertainty surrounding it, the insurability of AI should be discussed and encouraged. The specific elements of AI insurance policies (e.g., caps, deductibles, exceptions, etc.) should be left to actuaries and insurance companies. Insurers also have a lucrative incentive to offer policies to a fast-growing industry that is expected to be an inseparable part of our lives in the near and far future.[326] Elevating discussion about insurance for AIs will allow different stakeholders to further unlock the power and potential of AI for society.

326. Janna Anderson & Lee Rainie, *Artificial Intelligence and the Future of Humans*, PEW RSCH. CTR. (Dec. 10, 2018), http://www.pewinternet.org/2018/12/10/artificial-intelligence-and-the-future-of-humans/ [https://perma.cc/7EQJ-Y3S9].