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THE REGULATORY SWEET SPOT FOR AUTONOMOUS VEHICLES

Mark A. Geistfeld

Although federal legislation governing highly automated vehicle ("HAV") technology has yet to be enacted, developments so far strongly indicate that Congress will finally settle upon a framework that establishes the same roles for federal regulatory law and state tort law that now exist for conventional motor vehicles. Like the HAV bills pending in Congress, the National Traffic and Motor Vehicle Safety Act of 1966 contains both an express preemption provision along with a saving clause, which says that "[c]ompliance with" a federal safety standard "does not exempt any person from any liability under common law." These two provisions of the 1966 Act were harmonized by the U.S. Supreme Court in Geier v. American Honda Motor Company, which held that the saving clause embodies a legislative purpose to retain a meaningful role for tort law that can be displaced by federal regulations only as a matter of implied preemption. Because the pending federal HAV bills establish the same roles for federal regulatory law and state tort law that exist under the 1966 Act, the Court's interpretation of that Act in Geier should extend to the HAV legislation.

As fully illustrated by the safety issue involving the reasonably safe performance of fully functioning autonomous vehicles, federal regulators meaningfully preserve state tort law when they base a federal safety regulation on the associated tort requirement enforced by the majority of states. By complying with this type of regulation, manufacturers would fully satisfy the associated tort obligations in these states, making regulatory compliance a complete defense. In the remaining minority of states, regulatory compliance would foreclose tort liability as a matter of implied preemption. This framework would uniformly regulate HAV technology across the national market while maximally preserving state tort law, thereby hitting the regulatory "sweet spot" that optimally solves the federalism problem.

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I. INTRODUCTION

Autonomous vehicles (“AVs”) and related automated driving technologies are developing rapidly. Self-driving vehicles with Waymo technology have already driven over five million miles on public roads and been subjected to computer simulations equivalent to five billion miles of driving.¹ Waymo and others are testing their AVs in the Phoenix area without anyone in the front seat.² Within the next couple of years, Waymo plans to deploy thousands of AVs in selected cities to carry paying customers anywhere within an area covering one hundred square miles.³ Meanwhile, the self-driving division of General Motors plans to put AVs on public streets in New York City and San Francisco.⁴

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². Waymo, like other manufacturers and commercial operators entering this market, is testing its autonomous vehicles in Arizona because the governor issued an executive order in 2015 requiring state agencies to take “any necessary steps to support the testing and operation of self-driving cars on public roads within Arizona.” Ian Bogost, Can You Sue a Robocar?, THE ATLANTIC (March 20, 2018), https://www.theatlantic.com/technology/archive/2018/03/can-you-sue-a-robocar/556007/.

³. Boudette, supra note 1.

Concerned that a patchwork of state laws will hamper development of this technology in the national market, Congress has started to address the regulatory issues. Last fall, the House passed a bill—without opposition—that would establish a regulatory framework for accelerating the development and safe use of automated driving technologies. A Senate committee then unanimously recommended passage of a similar bill, which is now pending on the Senate floor.

The rationale for the enactment of federal legislation is compelling. In addition to their immense commercial potential, AVs can make the world a safer place. Driver errors, and behaviors such as speeding, currently cause the vast majority of motor vehicle crashes, resulting in an estimated 40,000 traffic deaths in 2017. By eliminating the human driver, AVs programmed to operate safely and at reasonable speeds can substantially reduce the number of crashes, deaths, and associated injuries. AVs have hit a legislative sweet spot in which the commercial benefits of developing a highly lucrative market involve a technology that promises to make our roadways substantially safer.

Unity at the federal level does not necessarily extend to the local level. To attain regulatory uniformity across the national market, the federal bills prohibit state and local governments from enforcing their own laws that conflict with federally mandated performance standards. This federal prohibition encroaches upon the traditional role of state and local governments in ensuring the safe use of their public roads. Consequently, “as the U.S. Congress moves quickly to pass the first federal law governing self-driving cars, some state and city officials are pushing back over fears that the measure will limit their ability to regulate vehicle safety at the

5. The bill was first unanimously passed (54-0) by the House Energy and Commerce Committee, and the “next day, it passed the whole House on a voice vote, meaning no records of individual votes were cast as there was no significant opposition.” Summary of H.R. 3388: SELF DRIVE Act, GovTrack, https://www.govtrack.us/congress/bills/115/hr3388/summary#oursummary (last updated Oct. 18, 2017).


10. See infra Part II.
local level.” The federal bills might attain regulatory uniformity across the national market at the undue expense of important state and local interests.

The proposed legislation, however, retains a traditional state role within the federal regulatory regime. Both the House and Senate bills expressly preserve state tort law for determining the liability questions involving AV crashes, giving states the same authority that they currently have for conventional motor vehicles.12

Retaining the role for state tort law to resolve liability issues involving AV crashes is potentially problematic. Tort law functions as a demanding form of product safety regulation for construction, design, and warning defects.13 How can the states continue to enforce these liability rules within a regulatory regime that expressly prevents them from departing from federally mandated standards dictating the safe construction, design, and performance of automated driving technologies?

Unless clearly resolved, this issue could easily invite widespread litigation accompanied by uncertainties that would make it difficult for manufacturers to determine their legal obligations across the national market. This potential outcome would frustrate the federal legislative purpose of promoting the rapid implementation of automated driving technologies. To avoid these problems, the federal regulatory regime must adequately coordinate with state tort law.

What, then, is the regulatory sweet spot that harmonizes federal regulatory law with state tort law?14 This Article will argue that the solution resides in the regulatory approach that is likely to be mandated by the pending federal legislation, once enacted. Both the House and Senate bills contain preemption and related statutory provisions that are substantively identical to the federal statute governing the safe performance of conventional motor vehicles. Based on prior judicial interpretations of this statute, the similar provisions in the pending AV legislation imply that federal regulators should derive motor vehicle safety standards from the associated tort obligations enforced by most states. Under this


12. A potential exception involves the transitional phase when AVs are being tested on public roads but not subject to federal motor vehicle safety standards. See infra Part II.


approach, federal regulators would maximally preserve the traditional role of state tort law while ensuring uniformity across the national market.

The argument proceeds in three parts. Part II more fully describes the pending federal legislation and its potentially conflicting directives to uniformly regulate the national market while preserving state tort law. Part III shows how the two legislative directives can be unified. Instead of being regulatory substitutes that inherently conflict, federal regulatory law and state tort law can be regulatory complements that are harmonized by national performance standards derived from the associated tort obligations enforced by most states.

Part IV then illustrates the logic of this approach for federal regulations governing the reasonably safe performance of fully functioning AVs. Based on how the majority of states would resolve this tort issue, federal regulators could set the federally mandated performance standard. By complying with this standard, manufacturers would fully satisfy the associated tort obligation in these states, making regulatory compliance a complete defense. In the remaining minority of states, regulatory compliance would foreclose tort liability as a matter of implied preemption. This federally mandated performance standard would uniformly regulate the national market while minimizing the displacement of state tort law—an optimal solution to the federalism problem. In addition to hitting a legislative sweet spot, autonomous vehicles can also hit the regulatory sweet spot.

II. THE EMERGENT FEDERAL REGULATORY FRAMEWORK FOR AUTONOMOUS VEHICLES

Autonomous or highly automated vehicle (“HAV”) technology is quickly improving, in part because manufacturers are “pouring billions of dollars” into its development. Nevertheless, “[a] patchwork of state laws governing the operation of self-driving cars threatens to stall their development, supporters told lawmakers as U.S. Senators began consideration of a national standard for robotic vehicles” in March 2016. Four industry insiders and an academic showcased this support through testimony to a Senate committee.


where they all urged Congress to enact laws that would uniformly regulate the safety of driverless vehicles across the country. The industry is calling for federal regulation out of concern that its absence will impede the commercial development of this important national market.

For example, carmakers at an industry show described autonomous vehicles as “a future that won’t materialize . . . unless legislators around the world create a new legal framework.” The industry seeks federal regulation because variations among state laws might expose manufacturers to different obligations across the national market, creating costs and legal uncertainties that could significantly increase the relative price of HAV technology, thereby reducing the rate at which the market switches to this technology from conventional motor vehicles. Consequently, “manufacturers and other entities developing this technology are closely watching State and Federal legislative activity to make decisions about research and development investments in the United States and in other countries.”

Recognizing the importance of this problem, the National Highway Traffic Safety Administration (“NHTSA”) has issued a series of policy statements outlining its proposed approach for regulating HAV technology. NHTSA is the branch of the U.S. Department of Transportation primarily responsible for roadway

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17. Hands Off: The Future of Self-Driving Cars: Hearing Before S. Comm. on Commerce, Sci., and Transp., 114th Cong. 10–27 (2016) (statement of Dr. Chris Urmson, Director of Self-Driving Cars, Google X; Michael F. Ableson, Vice President, Strategy and Global Portfolio Planning, General Motors Company; Glen W. De Vos, Vice President, Global Engineering and Services, Delphi Automotive; Joseph Okpaku, Vice President, Government Relations, Lyft; and Dr. Mary (Missy) Louise Cummings, Director, Humans and Autonomy Lab; Director, Duke Robotics; Professor of Mechanical Engineering and Material Science; Professor of Electrical and Computer Engineering, Duke University).

18. See Plungis & Naughton, supra note 16.


20. See Plungis & Naughton, supra note 16 (“If every state is left to go its own way without a unified approach, operating self-driving cars across state boundaries would be an unworkable situation . . . . Different state laws will significantly hinder safety innovation, interstate commerce, national competitiveness, and the eventual deployment of autonomous vehicles.”); see also Nakashima, supra note 19 (noting that because U.S. regulation on autonomous vehicles is a patchwork, it is currently “impracticable for automakers to sell these super-high-tech vehicles in America”).

21. HOUSE COMMITTEE REPORT, supra note 9, at 12.

safety. In its 2017 policy statement outlining a “path forward for the safe deployment of automated vehicles,” NHTSA “offers a nonregulatory approach to automated vehicle technology safety” based on voluntary industry guidelines and recommended best practices for state legislatures. While trying to facilitate a nationally uniform regulatory approach, NHTSA also envisions that the states will retain their traditional responsibilities of “regulat[ing] motor vehicle insurance and liability.”

Voluntary guidelines and recommended best practices, though helpful, do not offer a timely prospect of unifying manufacturer legal obligations across the national market. Federal legislation is required.

In September 2017, the House Committee on Energy and Commerce unanimously passed a report recommending that the U.S. House of Representatives pass the Safely Ensuring Lives Future Development Research In Vehicle Evolution Act (“SELF DRIVE Act”). The next day the House passed the bill without opposition.

The Committee Report recognizes that “[v]arying State and local laws regarding the design, construction, or performance of [highly automated] vehicles could create barriers preventing these vehicles from traveling across State borders, using the interstate highway system, or impede investment in the future automotive technology, including advanced or connected infrastructure, in the United States.” To address the problem, the SELF DRIVE Act

23. NHTSA’s legislative purpose is to “reduce traffic accidents and deaths and injuries resulting from traffic accidents.” 49 U.S.C. § 30101 (2012). To do so, NHTSA is authorized to “prescribe motor vehicle safety standards for motor vehicles and motor vehicle equipment in interstate commerce.” Id. § 30101(1). “Motor vehicle safety” for this purpose is defined as the “performance of a motor vehicle or motor vehicle equipment in a way that protects the public against unreasonable risk of accidents occurring because of the design, construction, or performance of a motor vehicle, and against unreasonable risk of death or injury in an accident, and includes nonoperational safety of a motor vehicle.” Id. § 30102(a)(9). A “motor vehicle safety standard” is “a minimum standard for motor vehicle or motor vehicle equipment performance.” Id. § 30102(a)(10). The regulations that NHTSA adopts are incorporated into 49 C.F.R. §§ 501 et seq. (2017). Within this statutory scheme, “NHTSA’s authority is broad enough to address a wide variety of issues affecting the safety of vehicles equipped with [automated driving] technologies and systems.” Stephen P. Wood et al., The Potential Regulatory Challenges of Increasingly Autonomous Motor Vehicles, 52 SANTA CLARA L. REV. 1423, 1501 (2012).


25. Id. at 20.

26. HOUSE COMMITTEE REPORT, supra note 9.

27. See GOVTRACK, supra note 5 and accompanying text.

28. HOUSE COMMITTEE REPORT, supra note 9, at 12.
“memorialize[s] the Federal role in ensuring the safety of highly automated vehicles as it relates to design, construction, and performance, by encouraging the testing and deployment of such vehicles.”

The SELF DRIVE Act “maintains” this Federal role by restricting the regulatory authority of state and local governments so that they can only “impose identical standards to those prescribed [by NHTSA pursuant to its statutory authority].” Eliminating the potential for variable state regulatory requirements ensures that federal standards will uniformly regulate the safe performance of HAV technology.

However, the SELF DRIVE Act does not alter the balance of federal and state regulatory authority that now exists with respect to conventional motor vehicles. It “maintains the current roles and responsibilities for States and localities regarding registration, licensing, driving education and training, insurance, law enforcement, crash investigations, safety and emissions inspections, congestion management on streets, and traffic laws and regulations.” These provisions also do not “preempt[] common law claims, or impact[] State motor vehicle franchise laws.” Consequently, “[t]he purpose of the Act is to uphold State and local governments’ authority” in these respects while “memorializ[ing] the Federal role in ensuring the safety of highly automated vehicles.”

The Senate version of this bill was unanimously reported out by the Senate Committee on Commerce, Science, and Transportation on November 28, 2017. The proposed legislation, the American Vision For Safer Transportation Through Advancement of Revolutionary Technologies Act (“AV START Act”), “is intended to encourage a gradual introduction of HAV technology in a way that would promote public safety and build public confidence and trust in the technology, while at the same time, avoiding unreasonable restrictions on the introduction of the technology into interstate commerce.” To facilitate deployment of HAV technology, the Senate bill establishes a nationally uniform regulatory framework while also retaining the existing role of state and local governments in ensuring the reasonable safety of their roadways—the same framework established by the House bill.

The AV START Act attains national uniformity by initially prohibiting state and local governments from adopting or enforcing any of their own laws regarding the design, construction, or

29. Id. at 19.
30. Id.
31. Id.
32. Id.
33. Id. at 11.
34. SENATE COMMITTEE REPORT, supra note 6. The full text of the proposed bill is provided in S. 1885, 115th Cong. (2017).
35. SENATE COMMITTEE REPORT, supra note 6, at 1.
36. See id. at 3.
performance of HAV technology with respect to virtually all issues relevant to safety performance, such as system safety, data recording, cybersecurity, human-machine interface, crashworthiness, capabilities, post-crash behavior, and automation function.\textsuperscript{37} For each of these subject areas, manufacturers must instead submit safety evaluation reports to NHTSA that describe “how the manufacturer is addressing the safety of such vehicle or system.”\textsuperscript{38}

Even though NHTSA cannot rely on these reports as a condition for regulatory approval, this statutory provision “would [not] alter NHTSA's enforcement authority” that it already has under existing law.\textsuperscript{39} If NHTSA identifies a defect in the HAV technology that a manufacturer is employing, it currently has regulatory authority to order a product recall to remedy the safety problem.\textsuperscript{40} According to the Senate Committee Report, this authority “would [be] enhance[d]” by the statutory provision requiring manufacturers to submit safety evaluation reports, which would also “provid[e] assurances to consumers and State and local governments” about the safety performance of HAV technology.\textsuperscript{41} This approach exclusively relies on federal law governing product recalls for ensuring the reasonable safety of AVs and related technologies.

This regulatory framework is only transitional. The Committee Report recognizes that it “could take several years to promulgate relevant [federal motor vehicle safety standards] specific to HAVs given the need for research, real-world experience, and data to develop standards for a complex new technology.”\textsuperscript{42} The Act establishes a process requiring NHTSA to engage in rulemaking within a prescribed time period.\textsuperscript{43} Before NHTSA completes that process, there will be a transitional period when AVs are being tested on public roads but not governed by federal performance standards, aside from the prospect of NHTSA mandating a product recall for an identified defect in the driving technology.

Due to the Act’s provision barring states from enforcing any of their own laws regarding the reasonably safe design, construction, or performance of HAV technology, manufacturers would not be subject to tort liability for injuries caused by negligent testing or

\textsuperscript{37} Id. at 15–19 (inserting proposed language of bill into existing law, with the revised § 30107(b)(3)(A) setting forth the requirements discussed in text).
\textsuperscript{38} Id. at 17 (inserting proposed language of bill into existing law, with the revised § 30103(a) setting forth the requirements discussed in text).
\textsuperscript{39} Id. at 12–13.
\textsuperscript{41} SENATE COMMITTEE REPORT, supra note 6, at 3.
\textsuperscript{42} Id. at 2.
\textsuperscript{43} Id. at 13.
defective AVs during this transitional period. Such a limitation of liability does not apply to conventional motor vehicles, nor is it contained in the companion House bill, the SELF DRIVE Act.

This provision of the pending Senate bill is controversial. On March 18, 2018, an AV operated by Uber in Tempe, Arizona failed to detect Elaine Herzberg as she was crossing a public road outside of the pedestrian crosswalk. The collision killed Herzberg. This first-known fatal crash of an AV involving a pedestrian “is likely to complicate efforts in Congress to speed the vehicles’ development by wiping away state safety regulations.” Even before the crash, some Senators had expressed concern that the AV START Act does not “guarantee sufficient protections for drivers, passengers and pedestrians, particularly given the lack of federal safety regulations so far.”

Disagreement about the Act’s framework for regulating AVs in this transitional period may produce a new approach, such as assuring compensation to those like Herzberg who are forced to participate in AV testing on public roads and are injured or killed as a result. But regardless of how Congress resolves this transitional problem, it apparently agrees upon the regulatory framework moving forward. Once NHTSA adopts a federal motor vehicle safety standard, both the House and Senate bills establish substantively equivalent roles for federal and state law in regulating that aspect of HAV performance.

The Senate’s AV START Act prohibits states from enforcing any performance standard for HAV technology that is not identical to a federal motor vehicle safety standard adopted by NHTSA—the same requirement that now applies to the state regulation of conventional

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44. Id. at 16 (inserting proposed language of bill into existing law, with the revised § 30103(e)(2) setting forth the requirements discussed in text).
45. See Mashaw & Harfst, supra note 40, at 250–51 (discussing how NHTSA’s recalls for defective vehicles have resulted in products liability and shareholder derivative suits filed against manufacturers).
47. Id.
49. Id; see also John D. McKinnon, Self-Driving Car Safety Legislation Stalls in the Senate, WALL ST. J. (Feb. 12, 2018, 2:31 PM), https://www.wsj.com/articles/self-driving-car-safety-legislation-stalls-in-the-senate-1518436800 (“At least three senators, all Democrats . . . have placed holds on the Senate legislation, citing safety and other concerns. This means that supporters likely won’t be able to get the unanimous consent they would need for a quick floor vote, absent major changes to the legislation.”).
50. For defense of such a compensation fund, see Mark Geistfeld, Why the Next Person Hit by a Driverless Car Might Not Be Able to Sue, TIME (Mar. 30, 2018), http://time.com/5221393/uber-autonomous-vehicle-death-settlement/.
motor vehicles.\textsuperscript{51} The AV START Act, however, does not wholly ignore the traditional state interest in ensuring the reasonable safety of motor vehicles.

The AV START Act expressly preserves state tort law and related civil actions by providing that compliance with a federal safety standard "does not exempt a person from liability at common law or under a State statute authorizing a civil remedy for damages or other monetary relief."\textsuperscript{52} Consequently, the Act provides the same preemptive effect to federal regulations governing HAV technology that already exists in federal law with respect to conventional motor vehicles.\textsuperscript{53} The evident purpose of this statutory provision is to protect traditional state interests by preserving common law tort claims and related civil actions seeking to impose liability on the manufacturers of AVs that perform in an unreasonably dangerous manner.

The regulatory regime established by the AV START Act is a composite of federal regulatory law and state tort law, the same type of regime established by the companion House bill, the SELF DRIVE Act. These two federal bills ("the federal HAV legislation") have not been enacted, but developments so far strongly indicate that Congress will finally settle upon a regulatory framework that attains national uniformity while preserving the existing role of state tort law.

III. STATE TORT LAW AND THE FEDERAL REGULATION OF AUTONOMOUS VEHICLES

For an obvious reason, state law cannot be fully incorporated into a federal regulatory system requiring uniform performance standards across the country. Differences among states and localities can produce variable performance requirements, making it possible to attain uniformity only if federal regulations wholly displace conflicting state and local rules.

This attribute of the regulatory problem explains why the federal HAV legislation limits states and localities to the enforcement of performance standards for automated driving technologies that are identical to federal motor vehicle safety standards.\textsuperscript{54} This same attribute, however, would also seem to

\textsuperscript{51} Senate Committee Report, supra note 6, at 15 (inserting proposed language of bill into existing law, with the revised § 30103(b)(1) setting forth the requirements discussed in text).
\textsuperscript{52} Id. at 16 (inserting proposed language of bill into existing law, with the revised § 30103(e) setting forth the requirements discussed in text).
\textsuperscript{53} 49 U.S.C. § 30103(e) (2012) ("Compliance with a motor vehicle safety standard prescribed under this chapter does not exempt a person from liability at common law."); see also Senate Committee Report, supra note 6, at 10 ("This provision would not alter current law with respect to [federal motor vehicle safety standards] and common law liability.").
\textsuperscript{54} See supra notes 30 & 51 and accompanying text.
require the identical preemptive effect for tort claims, yet the legislation expressly preserves the application of these laws. The question thus becomes, is the statutory purpose of national uniformity incompatible with the statutory purpose of preserving state tort claims?

A. Harmonizing Federal Regulatory Law and State Tort Law

Federal regulatory law could inherently conflict with state tort law.

[This] conventional view posits federal health and safety regulation and tort liability as regulatory substitutes. The growth of the administrative state poses a threat to the common law of torts, on this view, because it will replace the ex post, decentralized form of private regulation via litigation with ex ante, centralized public administrative rules.

When federal regulations only substitute for state tort law, the regulatory framework cannot coherently attain national uniformity while preserving state tort law. The federal regulations instead exist at the expense of state tort law. Regulations of this type would inject conflict and uncertainty into any statutory scheme—like the federal HAV legislation—that seeks to attain both uniformity and the preservation of state tort law.

Instead of assuming that these two purposes of the federal HAV legislation inherently conflict, an alternative interpretation assumes that they can be harmonized. To coherently work together, federal regulations and state tort law must be complements rather than mere substitutes.

Relying on this type of approach, the U.S. Supreme Court interpreted the meaning of substantively identical statutory provisions in Geier v. American Honda Motor Company. Similar to the federal HAV legislation, the National Traffic and Motor Vehicle Safety Act of 1966 contains a provision that expressly preempts “any safety standard that is not identical to a federal safety standard applicable to the same aspect of performance.” And like the federal HAV legislation, the 1966 Act contains a saving clause, which “says that ‘[c]ompliance with’ a federal safety standard ‘does not exempt any person from any liability under common law.’” The federal HAV legislation accordingly establishes the same roles

55. See supra notes 32 & 52 and accompanying text.
58. Id. at 865.
59. Id. at 868.
for federal regulatory law and state tort law that now exist for conventional motor vehicles under the 1966 Act. Therefore, the Court’s interpretation of that Act in Geier should extend to the federal HAV legislation.

In Geier, the Court recognized that the saving clause could inherently conflict with the statute’s preemption provision, which limits state regulatory authority to motor vehicle standards that are identical to federally mandated standards. This interpretation would permit the statute “to defeat its own objectives, or potentially . . . to ‘destroy itself.’” The Court observed that Congress might have “the constitutional power to write a statute that mandates such a complex type of state/federal relationship” but concluded “there is no reason to believe Congress has done so here.” Having found that the legislation is not self-defeating in this respect, the Court sought to harmonize the statute’s preemption provision with its saving clause that preserves state tort claims.

The Court recognized that a “broad reading of the pre-emption provision” would “pre-empt all nonidentical state standards established in tort actions covering the same aspect of performance as an applicable federal standard, even if the federal standard merely establishes a minimum standard.” Under such a broad interpretation, “few, if any, state tort actions would remain for the saving clause to save.” Because “[t]he saving clause assumes that there are some significant number of common-law liability cases to save,” the “broad reading” of the preemption provision “cannot be correct.”

The correct interpretation of the preemption provision must instead be more narrow, so that its reference to nonidentical state standards only refers to state safety regulations and not common-law tort obligations. “[A] reading of the express pre-emption provision that excludes common-law tort actions gives actual meaning to the saving clause’s literal language, while leaving adequate room for state tort law to operate—for example, where federal law creates only a floor, in other words, a minimum safety standard.”

But if the saving clause prevents the express preemption provision from applying to state tort claims, how can the federal regulatory scheme attain national uniformity? To resolve this issue, the Court concluded that the legislative purpose of uniformity entails the implied preemption of state tort claims when the

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60. *Id.* at 872.
61. *Id.*
62. *Id.*
63. *Id.* at 868 (emphasis added).
64. *Id.*
65. *Id.*
66. *Id.*
liabilities would frustrate or pose an obstacle to attainment of the federal regulatory objective.\textsuperscript{67}

For example, a federal regulation that establishes only a floor or minimal safety standard contemplates that the states may impose more demanding safety requirements. In those scenarios, national uniformity is not an evident regulatory objective, enabling the states to enforce their common-law tort requirements governing this aspect of motor vehicle performance.\textsuperscript{68}

By contrast, the federal safety standard at issue in \textit{Geier} was not a minimal requirement of this type.\textsuperscript{69} Thus, the Court concluded that it impliedly preempts any common-law tort actions not based on identical safety requirements, thereby attaining the statutory objective of uniform regulation across the country.\textsuperscript{70}

This interpretation of the statute harmonizes federal regulatory law and state tort law. The doctrine of implied preemption ensures that the federal regulatory purpose will be uniformly followed across the country. State tort law continues to govern safety issues not fully resolved by federal regulations (both minimum and non-existent standards), while providing a private enforcement mechanism for violations of the federal regulations.\textsuperscript{71}

\textbf{B. Implications for the Federal Regulatory Process}

Federal regulatory law can be adequately harmonized with state tort law only if the federal regulatory process is constrained in certain ways. For example, suppose that federal regulators simply proclaimed that the regulatory objective of national uniformity requires that a Federal Motor Vehicle Safety Standard ("FMVSS") preempts state tort law. If the mere invocation of "uniformity" were always sufficient for preemption purposes, then the statute’s saving clause would not have the independent meaning that the Court in \textit{Geier} ascribes to it. The regulatory invocation of "uniformity" would effectively function as a form of express preemption, but the saving clause bars the application of express preemption to state tort claims.\textsuperscript{72} In order to preserve state tort claims as required by the

\begin{itemize}
\item \textsuperscript{67} \textit{Id.} at 869–74.
\item \textsuperscript{68} \textit{See generally} Williamson v. Mazda Motor of Am., 562 U.S. 323 (2011) (relying on this reasoning to conclude that a federal motor vehicle safety standard giving manufacturers the choice to install either lap belts or lap-and-shoulder belts in the rear seat of minivans does not impliedly preempt a state tort claim that the lack of lap-and-shoulder belts makes the design defective and subject to tort liability).
\item \textsuperscript{69} \textit{Geier}, 529 U.S. at 869–74.
\item \textsuperscript{70} \textit{Id.}
\item \textsuperscript{71} \textit{See} \textsc{Restatement (Third) of Torts: Prod. Liab.} § 4(a) (AM. LAW INST. 1998) ("[A] product’s noncompliance with an applicable product safety statute or administrative regulation renders the product defective with respect to the risks sought to be reduced by the statute or regulation.").
\item \textsuperscript{72} \textit{Geier}, 529 U.S. at 868.
\end{itemize}
saving clause, federal regulators cannot obtain preemptive effect by engaging in such administrative fiat.

This reasoning explains why the Court in Geier concluded that in answering the preemption question, “[w]e place some weight upon [the agency’s] interpretation of [the FMVSS at issue] and its conclusion, as set forth in the Government’s brief, that a tort suit such as this one would “stand as an obstacle to the accomplishment and execution” of those objectives.” If the agency’s interpretation of a regulation’s preemptive effect is only given “some weight,” then its mere invocation of the need for uniformity will not decisively establish that the FMVSS preempts state tort law.

The saving clause has further implications for the federal regulatory process. As the Court observed in a different case, the “saving clause . . . foresees the likelihood of a continued meaningful role for state tort law.” To identify what such a role might entail, consider more closely why the saving clause prevents preemption by administrative fiat.

Without the saving clause, the express preemption provision in the statute would enable federal regulators to adopt an FMVSS that preempts state tort law as a matter of administrative fiat. The regulators could simply declare that the federal interest in uniformity trumps the state interest in tort law, and the constitutional supremacy of federal law would virtually guarantee that preemptive outcome. This type of trumping power is foreclosed by the saving clause.

By giving federal recognition to the preservation of state tort law, the saving clause prevents federal regulators from simply invoking the federal interest in uniformity as a reason to wholly override another federal interest in preserving a meaningful role for state tort law. The one federal interest does not necessarily trump the other within the statutory scheme. Preemptive effect is instead limited to federal performance standards that adequately account for the two federal interests in national uniformity and in preserving a meaningful role for state tort law.

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73. *Id.* at 883 (emphasis added); *see also* Williamson, 562 U.S. at 330 (“We reached this conclusion [about implied preemption in Geier] on the basis of our examination of the regulation, including its history, the promulgating agency’s contemporaneous explanation of its objectives, and the agency’s current views of the regulation’s pre-emptive effect.”).


75. U.S. CONST. art. VI, cl. 2 (stating that the laws of the United States “shall be the supreme Law of the Land: . . . any Thing in the Constitution or Laws of any State to the Contrary notwithstanding”). “The Supreme Court has repeatedly identified the Supremacy Clause as the source of its authority to declare state law displaced (preempted).” Thomas W. Merrill, *Preemption and Institutional Choice*, 102 NW. U. L. REV. 727, 733 (2008).
To be sure, unless state tort rules are uniform across the country, uniformity will necessarily require the implied preemption or displacement of the state rules that vary from the nationally uniform standard. Some tradeoff between uniformity and state tort law is ordinarily inherent in the regulatory exercise. Nevertheless, the two statutory purposes can be harmonized; this regulatory approach is not self-defeating.

The two purposes would be complementary if regulators achieve uniformity in a manner that minimizes the displacement of state tort law via the doctrine of implied preemption. Federal regulations of this type preserve state tort law to the maximal extent that is consistent with the objective of national uniformity, thereby harmonizing these two purposes of the federal HAV legislation.

To determine the type of federal regulations required by this approach, consider an extreme example. Suppose federal regulators base the FMVSS on the most demanding tort requirement enforced by only one state. Compliance with the most demanding tort requirement necessarily satisfies the less demanding requirements adopted by all other states. This type of national performance standard accordingly attains uniformity across the country while preserving state tort law in the sense that the FMVSS necessarily satisfies the associated tort obligations in all states.

A regulatory approach that exclusively focuses on the tort requirement of the most demanding state, however, does not adequately account for tort law in all other states. Such a federal mandate would override the contrary decision reached by the vast majority of states that the more demanding requirement is excessively costly or not otherwise required for reasonably safe motor vehicle performance. This component of state tort law would be displaced by a FMVSS derived from the tort requirement of the most demanding state. To meaningfully preserve tort law across the country, federal regulators cannot follow this approach.

By implication, federal regulators meaningfully preserve state tort law when the FMVSS is based on the associated tort requirement enforced by the majority of states. This standard attains national uniformity while minimizing the displacement of tort law across the country, which optimally harmonizes these two statutory objectives.

In the majority of states, this type of FMVSS is no different from the associated tort obligation. By complying with the federal performance standard, the manufacturer also necessarily satisfies

76. Cf. Merrill, supra note 75, at 739–40 (discussing implied preemption in terms of the displacement of state law).
77. Cf. RESTATEMENT (THIRD) OF TORTS: PROD. LIAB. §§ 1–2 (AM. LAW INST. 1998) (defining liability rules for products containing construction, design, or warning defects that cause products to perform in an unreasonably dangerous manner).
its corresponding tort obligation, thereby avoiding liability for the associated tort claim under the tort doctrine known as the regulatory compliance defense. Tort law in these states fully determines the liability question, and so the FMVSS attains uniformity without displacing state tort law.

In the remaining minority of states, the federal constitutional doctrine of statutory preemption ensures that the FMVSS uniformly applies. The tort rules in these states impose safety requirements on manufacturers that differ from the performance required by both the FMVSS and the majority of states. Permitting this minority of states to impose different safety requirements on manufacturers would not only frustrate the statutory objective of national uniformity, but it would also elevate the interests of these states over the substantially larger number of other states, thereby frustrating the statutory purpose of maximally preserving state tort law. Consequently, the application of tort law in these states is impliedly preempted by the FMVSS.

At least some displacement of state tort law is ordinarily inherent in a regulatory regime that requires national uniformity, but federal regulators can minimize that outcome by deriving the FMVSS from the tort obligation enforced by most states. Federal regulations of this type do not simply substitute for or wholly displace state tort law; the two bodies of law instead complement each other.

IV. AN ILLUSTRATION: FEDERAL REGULATIONS ENSURING THE REASONABLY SAFE PERFORMANCE OF FULLY FUNCTIONING AUTONOMOUS VEHICLES

The foregoing approach for harmonizing federal regulatory law and state tort law might seem to be particularly inapt for deriving performance standards governing new automated driving technologies. “[W]ho should be held liable for crashes involving [autonomous vehicles]? Though manufacturers, insurers, news outlets, and academics have all posed this question, they have not found easy answers.” If states have not yet clearly resolved the liability issues, how can federal regulators rely on a majoritarian state tort rule to formulate the FMVSS for autonomous vehicles?

79. Cf. Geier, 529 U.S. at 881 (“Because the [tort] rule of law for which petitioners contend would have stood ‘as an obstacle to the accomplishment and execution of’ the important means-related federal objectives that we have just discussed, it is pre-empted [by the FMVSS in question].”).
As I have demonstrated at length in a previous article, uncertainty about liability for AV crashes is more apparent than real.\textsuperscript{81} Resolving the issue of liability requires detailed study of the varied technologies of automated driving and how they are likely to be governed by established tort doctrines across the full range of crash scenarios. Crashes are caused by a variety of factors, not all of which have the same liability implications. For many types of crashes, like those involving malfunctions of an AV's hardware or software, the liability question is clearly resolved in the same manner by a strong majority of states. A more difficult issue involves the minimal requirements for ensuring that a fully functioning AV performs in a reasonably safe manner. As this issue illustrates, state tort law can supply appropriate benchmarks for federal regulatory standards governing the performance of AVs and related automated driving technologies.

A. The Safety Issue

Different types of safety issues have different implications for the relation between an FMVSS and state tort law. Any effort to harmonize the two must begin by clearly defining the safety problem in question—what caused the AV to crash?

For example, as with conventional vehicles, hardware malfunctions can cause an autonomous vehicle to crash.\textsuperscript{82} Similar to conventional vehicles, these defects will subject AV manufacturers to tort liability in the vast majority of states.\textsuperscript{83} All crashes caused by defective hardware in the vehicle would be clearly resolved in the same manner by most states.

Unlike conventional vehicles, AV crashes can be caused by the software components of the operating system—the hardware and software that execute the dynamic driving task.\textsuperscript{84} Just as hardware malfunctions, an AV's software can malfunction.\textsuperscript{85} Programming errors or bugs can cause the operating system to freeze, which in turn can cause the vehicle to crash.\textsuperscript{86} As with hardware malfunctions, these software defects will subject AV manufacturers to tort liability in the vast majority of states.\textsuperscript{87}

\textsuperscript{81} See Mark A. Geistfeld, \textit{A Roadmap for Autonomous Vehicles: State Tort Liability, Automobile Insurance, and Federal Safety Regulation}, 105 CALIF. L. REV. 1611, 1624–32 (2017). The ensuing discussion in this Part is largely drawn from this article.
\textsuperscript{82} Id. at 1692.
\textsuperscript{83} See \textit{id}. at 1632–33.
\textsuperscript{84} See Lipson & Kurman, \textit{supra} note 15, at 66–67 (adopting this term and explaining the similarities and differences between the operating system of a driverless vehicle and the operating system of a computer).
\textsuperscript{85} See Geistfeld, \textit{supra} note 81, at 1692.
\textsuperscript{86} Id.
\textsuperscript{87} See \textit{id}. at 1634–35.
Any vehicle containing such a defective component would also be subject to recall by NHTSA.\(^88\) A good example involves the exploding airbags manufactured by Takata, which have led to a flurry of product recalls.\(^89\) “Currently these recalls involve 19 vehicle manufacturers and approximately 46 million Takata air bag inflators in an estimated 34 million vehicles in the United States alone.”\(^90\)

The associated tort claims seek to hold the manufacturer responsible for its airbags that exploded (malfunctioned) and physically harmed consumers.\(^91\) By subjecting manufacturers to liability for these injuries, state tort law gives manufacturers a strong financial incentive to supply non-defective airbags as required by NHTSA. So, too, for crashes caused by malfunctions of an autonomous vehicle, the federal regulatory interest can be fully harmonized with the state interest in tort liability.

The most vexing safety problem involves crashes caused by the vehicle’s fully functioning operating system.\(^92\) These fully functioning AVs are not considered to malfunction nor be defective simply because they are not perfectly safe and cannot prevent all crashes. Reasonable safety is not absolute safety. What, then, determines the reasonably safe performance of such a vehicle?

The driving performance of a fully functioning AV is largely determined by its operating system.\(^93\) These systems “typically use machine learning algorithms that have been ‘trained’ to drive by analyzing examples of safe driving, and automatically generalizing about the core patterns that constitute effective driving from these examples.”\(^94\) The driving experience of an AV—or more precisely, all vehicles with the same operating system—provides the data for machine learning that enables the operating system to adapt accordingly.\(^95\) As NHTSA explains, while “human driver[s] may repeat the same mistakes as millions before them, an [AV] can benefit from the data and experience drawn from thousands of other

\(^{88}\) See supra notes 39–40 and accompanying text (discussing this regulatory authority).


\(^{90}\) Id.


\(^{92}\) See Geistfeld, supra note 81, at 1635–47.

\(^{93}\) Id. at 1620.

\(^{94}\) Harry Surden & Mary-Anne Williams, Technological Opacity, Predictability, and Self-Driving Cars, 38 CARDOZO L. REV. 121, 148 (2016).

\(^{95}\) See LIPSON & KURMAN, supra note 15, at 17 (“As cars pool their driving ‘experience’ in the form of data, each car will benefit from the combined experience of all other cars.”).
vehicles on the road. Consequently, the safety performance of a fully functioning AV is determined by its learning experience or amount of premarket testing for the fleet.

This attribute of the technology has important implications for the safety problem. Autonomous vehicles will transform the individualized behavior of human drivers into a collective, systemized form. Each vehicle with the same operating system executes the dynamic driving task in the same manner. Consequently, the entire fleet is effectively guided by a single driver—the operating system that determines how this class of AVs executes the dynamic driving task. Quite unlike the crashes of conventional vehicles that require case-by-case analysis of driver behavior, the crashes of AVs with fully functioning operating systems are properly evaluated in relation to the systemized safety performance of the entire fleet. Whether a fully functioning AV performed in a reasonably safe manner, therefore, does not depend on the circumstances of the crash. The appropriate safety question is whether the operating system has had sufficient learning experience to systematically drive the vehicle in a reasonably safe manner under these conditions.

Having defined the safety problem, we can now determine whether it would be clearly resolved in the same manner under the common law in most states. If so, we will then be in a position to determine whether NHTSA could usefully rely on the majoritarian tort standard to formulate the FMVSS that would ensure the reasonably safe performance of a fully functioning AV.

B. Tort Solution(s) to the Safety Problem

Premarket testing supplies the driving experience that machine learning uses to improve the safety performance of an autonomous vehicle. In this respect, premarket testing alters the software code that determines how the AV executes the dynamic driving task. Whether a manufacturer subjected the operating system to an adequate amount of premarket testing as required by state tort law, therefore, depends on whether this attribute of the product design is reasonably safe and not defective.

At first glance, the tort rule governing defective product designs appears to be highly variable across the country. After surveying the case law, the Supreme Court of South Carolina found in 2010

97. See Geistfeld, supra note 81, at 1645–46.
98. Id. at 1644–46.
99. Id. at 1645.
that “[s]ome form of a risk-utility test is employed by an overwhelming majority of the jurisdictions in this country. Some of these jurisdictions exclusively employ a risk-utility test, while others do so with a hybrid of the risk-utility and the consumer expectations test, or an explicit either-or option.”

This variability in the tort rules governing defective product design is largely eliminated once the rules are applied to the safety question we are addressing.

Regardless of whether a state relies on the consumer expectations test, the risk-utility test, or some combination thereof, the liability inquiry can be reduced to two different questions: (1) whether the crash of an AV is a malfunction, or (2) whether a vehicle that did not malfunction nevertheless has an unreasonably dangerous or defective design.

As previously discussed, the first issue is not relevant to the safety problem of ensuring the reasonably safe performance of fully functioning vehicles. The liability inquiry is whether an operating system that did not malfunction neverthelesssystemically performs in an unreasonably dangerous manner because it has not been adequately tested, and therefore was unable to make the necessary safety improvements via machine learning.

In the vast majority of states, this question is resolved by the risk-utility test or its substantive equivalent, the modified consumer expectations test. Under this test, a design is defective if there is a reasonable alternative design with a disutility (or increased cost) that is less than the associated reduction of risk (or safety benefit of the design modification).

As applied to the safety issue under consideration, the liability inquiry takes the same form in most states. To identify a reasonable alternative design of the AV’s existing operating system, the tort plaintiff must show that the costs of more extensive testing are less than the safety benefit of improving the operating system’s systemic safety performance via machine learning. Proof of this type would show that the existing design is unreasonably dangerous or defective as compared to the reasonable alternative design of the

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101. Geistfeld, supra note 81, at 1635–47.
102. For more extensive discussion, see id. at 1663–69.
103. Id. at 1641–43.
104. See Restatement (Third) of Torts: Prod. Liab. § 2 cmt. d (Am. Law Inst. 1998) (adopting “a reasonableness (‘risk-utility balancing’) test as the standard for judging the defectiveness of product designs,” which “asks whether a reasonable alternative design would, at reasonable cost, have reduced the foreseeable risks of harm posed by the product and, if so, whether the omission of the alternative design by the seller or a predecessor in the distributive chain rendered the product not reasonably safe”).
105. See Geistfeld, supra note 81, at 1641–47.
operating system that would be generated by more extensive premarket testing (and machine learning).  

The costs and benefits of more extensive testing depend on various factors. The requisite amount of premarket testing is an empirical question. Therefore, by adopting a set of factual assumptions that bias the risk-utility analysis in favor of more extensive testing, we can identify the relative safety performance that would conclusively satisfy the manufacturer’s obligation to subject the operating system to adequate premarket testing.

During the period when the market transitions from conventional vehicles to AVs, there is a clear benchmark to conclusively satisfy a manufacturer’s tort obligation to adequately test an AV. Taking into account the safety trade-off between a conventional vehicle and an imperfect but safer AV, the fully functioning AV will systematically drive in a reasonably safe manner if prior driving experience shows that the operating system at least halves the incidence of crashes relative to conventional vehicles.

To see why, consider a set of driving conditions—total miles, proportion spent on expressways, proportion spent in urban areas, and so on—that make it possible to reliably compare the safety performance of the operating system with the safety performance of conventional vehicles. Suppose that under these conditions, on average there are ten fatal crashes involving conventional vehicles driven by human drivers. An AV that halves this rate would be expected to cause only five fatal crashes under these same conditions.

The case for more extensive testing would be strongest if further testing of the AV under these same conditions would virtually eliminate these crashes. At most, then, more extensive testing would eliminate five fatal crashes, and so this risk can be imputed to the current design of the vehicle’s operating system.

This risk must then be compared to the cost or disutility of reducing it by altering the current design via more extensive testing (and machine learning for the operating system). The delayed deployment of the AV determines the expected cost of additional testing. At minimum, the cost equals the lost safety benefit of eliminating the five fatal crashes that a conventional vehicle’s human driver would otherwise cause across the same operating conditions.

106. See generally id. (describing the role of premarket testing in defective design claims).

107. The cost of delayed deployment is not limited to safety concerns but also includes any benefits consumers would lose by not having autonomous vehicles, such as the time someone saves by not having to drive the vehicle. By ignoring these other lost benefits (or costs of delayed deployment), the assumption minimizes the costs of more testing and accordingly provides the strongest case for requiring such testing.
Consequently, the minimum expected cost of more extensive testing (five fatal conventional vehicle crashes that immediate deployment of the AV would prevent) equals the maximum expected safety benefit or reduced risk (five fatal AV crashes that further learning of the operating system would prevent). Expected minimum costs (or disutility) equal expected maximum benefits (or risk reduction), but because the risk-utility analysis so far has been biased in favor of more extensive testing, the balance at this point does not justify such testing. Therefore, more extensive testing is not required by the risk-utility test and by extension, the modified consumer expectations test.¹⁰⁸

In the vast majority of states, the liability rule yields an identifiable solution to the safety problem of how much testing is required in order to ensure that a fully functioning operating system performs in a reasonably safe manner. To meaningfully preserve this component of state tort law, federal regulators can derive the federal motor vehicle safety standard for adequate premarket testing from this majoritarian tort standard.

C. Deriving the Federal Safety Regulation from State Tort Law

NHTSA regulations are embodied in FMVSSs that specify minimum performance requirements for motor vehicles.¹⁰⁹ As required by statute, these performance standards “shall be practicable, meet the need for motor vehicle safety, and be stated in objective terms.”¹¹⁰ “To avoid impeding . . . innovation,” NHTSA cannot prescribe “how manufacturers should meet the requirements through their product design, development, and production processes.”¹¹¹ Manufacturers instead certify that their products satisfy the mandated performance standards.¹¹²

¹⁰⁸ Geistfeld, supra note 81, at 1679.
¹⁰⁹ NHTSA’s legislative purpose is to “reduce traffic accidents and deaths and injuries resulting from traffic accidents.” 49 U.S.C. § 30101 (2012). To do so, NHTSA is authorized to “prescribe motor vehicle safety standards for motor vehicles and motor vehicle equipment in interstate commerce.” Id. § 30101(1). “Motor vehicle safety” for this purpose is defined as the “performance of a motor vehicle or motor vehicle equipment in a way that protects the public against unreasonable risk of accidents occurring because of the design, construction, or performance of a motor vehicle, and against unreasonable risk of death or injury in an accident and includes nonoperational safety of a motor vehicle.” Id. § 30102(a)(8). A “motor vehicle safety standard” is “a minimum standard for motor vehicle or motor vehicle equipment performance.” Id. § 30102(a)(9). The regulations that NHTSA adopts are incorporated into 49 C.F.R. § 501 (2016).
To specify the FMVSS for the reasonably safe performance of a fully functioning AV, NHTSA can use the associated tort standard adopted by the majority of states. By complying with such a performance standard, the manufacturer would satisfy the associated tort obligations and avoid liability for the crash of a fully functioning AV in most states under the regulatory compliance defense, and in the remaining states, under the constitutional doctrine of implied preemption.\textsuperscript{113} The regulation would attain national uniformity while preserving a meaningful role for state tort law—the type of regulation contemplated by the HAV legislation.\textsuperscript{114}

In addition to preserving this component of state tort law, the FMVSS would improve upon the tort solution. The performance benchmark can be clearly identified as a matter of state tort law—the fully functioning AV must at least halve the crash rate relative to conventional vehicles,\textsuperscript{115} but it depends on underlying criteria for evaluating the safety performance of an AV. What are the necessary road conditions? How many miles should be driven on freeways and in urban conditions? How many total miles must be logged by an operating system to generate sufficiently reliable crash data? What other metrics are required for adequately measuring safe performance? These issues are not readily resolved under widely adopted tort rules, leaving the safety issue for NHTSA to address with its policymaking expertise about such technical matters.

As compared to the tort system, NHTSA is better situated to determine the appropriate testing conditions for evaluating the safety performance of an autonomous vehicle. The tort system would resolve these issues through the adversarial presentation of evidence addressing the particular claims before a court. NHTSA, by contrast, would use its specialized expertise to comprehensively address these matters through the administrative rule-making process, giving it a comparative institutional advantage for determining the appropriate testing criteria for evaluating the safety performance of a fully functioning AV.

A federal regulation of this type would also solve a difficult policy problem posed by the tort claim: What is the relevant baseline for evaluating the relative safety of an AV? To prove that the design of a product is defective, the tort plaintiff must identify a reasonable alternative design that is within the “state of the art”—a requirement that could permit the plaintiff to compare the AV’s safety performance to other (reasonably designed) AVs that have already been commercially distributed by

\begin{flushleft}
\textsuperscript{113} See supra notes 78-79 and accompanying text.
\textsuperscript{114} See supra Part III.
\textsuperscript{115} See supra Subpart IV.B.
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other manufacturers. This baseline is problematic because it would provide a considerable competitive advantage for the “first movers” in the commercial distribution of AVs. Due to machine learning, the collective driving experience of a fleet already on the road will significantly enhance the safety performance of each vehicle. Without such experience to draw upon in the design of its operating system, a new entrant would often face a substantial cost disadvantage (of more extensive testing) to match the performance of other commercially available vehicles. Requiring new entrants to equal or exceed the safety performance of AVs already on the road, therefore, could easily undermine competition in the market by entrenching the first movers, thereby suppressing the technological innovations otherwise offered by new entrants.

This dynamic presumably will change as the market matures, but those are not the market conditions federal regulators now face. To allow new entrants sufficient access to this newly developing market, the regulatory approach should evaluate the safety performance of a fully functioning AV in relation to conventional vehicles. The foregoing analysis is based on this approach, which is clearly within NHTSA’s statutory mandate to formulate its performance standards in a technologically neutral manner that does not impede innovation.

The federal HAV legislation requires NHTSA to initiate the administrative rule-making process for resolving these issues within the next few years, which will give state and local governments the opportunity to express their concerns about the appropriate standards. Once NHTSA has identified the appropriate premarket testing conditions, it can then harmonize the FMVSS with state tort law by requiring that such performance data show that the autonomous vehicle at least halves the rate of crashes as compared to conventional vehicles. Instead of posing a problem for a regulatory approach that harmonizes the federal interest in uniform regulation with the state interest in tort law, the safety issues involving the reasonably safe performance of fully functioning AVs illustrate the appeal of this approach.

V. CONCLUSION

The regulatory framework for autonomous vehicles implicates the balance between state and federal power. States and localities have traditionally been responsible for ensuring the safety of their

116. See Restatement (Third) of Torts: Prod. Liab. § 2 cmt. d (Am. Law Inst. 1998) (discussing how the term “state of the art” has been variously defined by a multitude of courts; for some it refers to industry custom or practice; for others it means the safest existing technology that has been adopted for use; for others it means cutting-edge technology).
117. See supra note 111 and accompanying text.
118. See supra note 43 and accompanying text.
public roadways, as reflected in their extensive motor vehicle laws and various requirements involving licensing and insurance. The states further ensure public safety by imposing tort obligations on drivers and the manufacturers of motor vehicles. This exercise of the “States' historic police powers,” however, could vary across the country and conflict with the federal interest in national uniformity, creating a difficult problem of federalism.

In a series of articles, Catherine Sharkey has persuasively shown why federalism requires federal agencies to adequately account for state interests when promulgating regulations that will preempt state tort law. Since 2000, such a regulatory approach has been required by executive order. This type of regulatory approach is grounded in the constitutional concern for federalism, which requires the federal government to adequately respect “the constitutional role of the States as sovereign entities.”

However, this regulatory approach does not provide sufficient guidance on how federal regulators ought to account for state interests when mandating performance standards for automated driving technologies. There are multiple “values of federalism,” including “protecting liberty, encouraging diversity and innovation, ensuring political accountability, promoting democratic participation, and protecting local values and interests.” Consequently, a regulatory approach that strives to account for the constitutional concern of federalism necessarily confronts a difficult question: How should regulators strike “the proper balance between the demands of the various ‘values’ of federalism?”

122. Sharkey, supra note 56; see generally Catherine M. Sharkey, Federalism Accountability: “Agency-Forcing” Measures, 58 DUKE L.J. 2125, 2185–91 (2009) (proposing that although courts should resolve questions of implied preemption by relying on the views of the federal agency in question, they should do so only when the agency’s position is supported by persuasive data or factual determinations); Catherine M. Sharkey, Inside Agency Preemption, 110 MICH. L. REV. 521, 582–90 (2012) (proposing various reforms to expand the role within the federal regulatory process for the appropriate representatives of state regulatory interests, particularly in the context of consumer health and safety issues).
124. Geier, 529 U.S. at 887 (Stevens, J., dissenting).
126. Id. at 682.
Resolution of this difficult question need not be left to federal regulators; the federal legislation that authorizes a federal regulatory scheme can instead specify how federal regulators ought to account for important state interests. Such a legislative solution to the federalism problem is embodied in both the National Traffic and Motor Vehicle Safety Act of 1966 and the pending HAV federal legislation that supplements this Act. Both contain an express preemption provision that prohibits states and localities from enforcing standards not identical to a federal safety standard applicable to the same aspect of motor vehicle performance, and both also contain a saving clause that preserves the ability of states to impose tort liability on manufacturers that have otherwise complied with the federal performance standard. When harmonized, these two provisions solve the federalism problem with federal regulations that attain national uniformity in a manner that minimizes the displacement of state tort law through the constitutional doctrine of implied statutory preemption.

This legislative solution is a form of “cooperative federalism,” which assumes “that the various levels of government ha[ve] overlapping interests and shared functions.” These two overlapping bodies of law can be coordinated in an appealing manner by a federal regulatory approach that draws on the comparative institutional advantages of the two systems.

As compared to the decentralized system of state tort law, federal regulation is required to ensure that AV manufacturers are uniformly regulated across the national market. Uniformity minimally requires that federal safety standards displace or preempt conflicting rules of state tort law. But due to the overlap of federal and state interests with respect to roadway safety, federal regulations must also preserve a meaningful role for state tort law. Consequently, if a majority of state tort systems across the country clearly reach the same conclusion about a particular policy issue of relevance to the federal regulatory scheme, then the federal regulators ought to account for this state interest by deriving the associated safety performance standards from the majoritarian tort solution. Under this regulatory approach, federal regulators can attain uniformity while also maximally accounting for the manner in which states across the country have defined the requirements of reasonably safe motor vehicle performance.

127. See supra Part II.
128. See supra Part III.
129. Purcell, supra note 125, at 685 (contrasting the idea of cooperative federalism with other conceptions of federalism).
130. Cf. Merrill, supra note 75, at 727 (arguing that the constitutional inquiry on implied preemption should be guided by a comparative institutional analysis of the federal and state laws in question).
For example, this approach can guide NHTSA in promulgating the FMVSS for ensuring that the AV's operating system can systemically perform in a reasonably safe manner across its intended operating domain. To proceed, NHTSA must initially resolve two important components of the safety problem. First, what are the appropriate testing conditions that would reliably establish the safety performance of a fully functioning AV? Once this question has been answered, NHTSA must then define the appropriate benchmark against which that safety performance ought to be measured. Is it conventional vehicles or other commercially distributed AVs that are already on the road? For these two issues, the majority of states will not clearly reach the same conclusion in tort cases. NHTSA has a comparative institutional advantage and should resolve these issues without resort to the associated rules of state tort law.

In contrast, state tort systems are better situated than NHTSA to resolve the hard policy issue of how much manufacturers should be required to expend (on more extensive testing) in order to reduce the risk of physical harm and make the product reasonably safe. This tort question is clearly resolved by a majority of states in the same manner, requiring that AV manufacturers test the vehicle until the costs of more extensive testing exceed the safety benefits. If NHTSA defines the performance benchmark for AVs in relation to conventional vehicles, this majoritarian tort standard would require that manufacturers test an AV until it systematically performs at least twice as safely as conventional vehicles. As a matter of comparative institutional advantage, NHTSA should defer to this policy conclusion and use the majoritarian tort standard as the minimal safety performance required by the FMVSS.

This regulatory approach for resolving the federalism problem has obvious appeal. NHTSA can promulgate the FMVSS for adequate premarket testing based on the performance benchmark adopted by the majority of states while drawing on its comparative expertise to determine other policy and technical issues for which state tort law does not offer a comparative institutional advantage. This type of regulation would fully further the federal interest in uniformity while also maximally accounting for the historic state interest in tort law—the regulatory sweet spot.

131. See supra Part IV.