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Burdens of Proof in Establishing Negligence: A Comparative Law and Economic Analysis

Francesco Parisi* and Giampaolo Frezza**

Abstract

Inherent in any judicial system is the need to allocate the burden of proof on one party. Within the realm of negligence torts, that burden is traditionally placed on the plaintiff, meaning that the plaintiff must bring forth sufficient evidence to establish negligence by the defendant. In effect, this is a legal presumption of non-negligence in favor of the defendant. In some jurisdictions for specific torts, defendants are, instead, presumed negligent, therefore requiring defendants to come forth with sufficient evidence to prove their due diligence. In this paper, we discuss the legal origins and effects of these differences in a comparative law and economics perspective. We explore the interesting interaction between evidence and substantive tort rules in the creation of care and activity level incentives and discuss the ideal scope of application of alternative legal presumptions under modern-age evidentiary technology.

I. Introduction

Recent scientific and technological innovations have changed the landscape of evidence practice quite substantially. New frontiers of evidence have been made possible by genetic testing, computer recording of data, digital timestamping, third-party certified data storage systems, black-box technology, traffic surveillance cameras, satellite imaging, Snapshot® technology, and GPS tracking devices. Though the usefulness and invasiveness into our private lives remain relevant normative questions, these transformations have changed our routine information protocols. Scientific and technological advances will continue to provide new opportunities and open new horizons in the domain of legal evidentiary discovery.

Legal presumptions play two interrelated roles in negligence cases. First, legal presumptions allocate the burden of proving negligence between the parties.¹

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¹ The way in which allocation of the burden of proof affects both care decisions and incentives to invest in information is well known outside the area of negligence liability, such as pointed out in the context of US toxic torts by W.E. Wagner, 'Choosing Ignorance in the Manufacture of

Given the differing accessibilities to relevant evidence and information by the parties, this may affect a court's ability to assess the defendant's negligence in the case at hand. Second, the use of different legal presumptions can affect the parties' expected liability and their incentives with respect to both care and activity levels.

In this paper, we employ a comparative law and economics perspective to attempt to understand the interdependent relationship between new evidentiary technology, legal presumptions, and discovery rules, with special focus on negligence liability. The paper is structured as follows. In Section 2, we survey the different legal presumptions of negligence used in European legal systems from a historical and comparative perspective, with special attention to the rules governing traffic accidents. Our analysis builds upon two separate bodies of literature looking at the interaction between evidentiary and substantive rules in tort law. We consider some of the theoretical and practical difficulties in the adoption of presumptions of negligence. We examine the 'cheapest evidence-producer' criterion elaborated in the current literature and discuss the applications of this criterion in the context of the US and European rules. In Section 3, we consider the interrelated effects of legal presumptions on the parties' tort incentives and incentives to invest in private evidence technology. We discuss the possible diluting effects of alternative discovery regimes on the parties' incentives to adopt evidence technology. Section 4 concludes with policy considerations.

II. Presumptions of Negligence

The need to allocate the burden of proof on one party is inherent in any judicial system. Traditionally, within the realm of negligence torts, that burden is placed on the plaintiff. This means that the plaintiff must bring forth sufficient evidence to establish negligence by the defendant. In effect, this is a legal presumption in favor of defendants.² In some European jurisdictions, defendants

Toxic Products' 82 *Cornell Law Review*, 773, 774–75 (1997). See also, eg, Restatement (Third) of Torts: Products Liability §2 comment a ("To hold a manufacturer liable for a risk that was not foreseeable when the product was marketed might foster increased manufacturer investment in safety. But such investment by definition would be a matter of guesswork").

² To frame the scope of our analysis, we should clarify some of the terminology that will be used in our analysis, distinguishing interrelated concepts that are commonly associated with the notion of 'burden of proof.' These concepts are operationally interdependent, but theoretically distinct: 'legal presumptions,' 'burden of production,' and 'burden of persuasion.' Legal presumptions are rules that allocate the initial burden of production of evidence, specifying which party is required to 'produce' the evidence (or, as J. Adler and M. J. Michael, *The Nature of Judicial Proof: An Inquiry into the Logical, Legal, and Empirical Aspects of the Law of Evidence* (1931), 63 put it, which party has the 'burden of coming forward with the evidence'). A favorable presumption shifts the burden (and costs) of producing evidence on the other party. The concept of burden of persuasion, instead, defines how evidence should be weighted and 'how much' probative evidence should be offered to convince the fact finders. Standards of proofs, such as 'reasonable possibility,' 'preponderance of the evidence,' 'clear and convincing evidence,' or 'beyond a reasonable doubt,' are standards that determine the applicable burden of persuasion. In this paper, we focus on the

are presumed negligent for specific torts, therefore requiring the defendant to produce sufficient evidence of their non-negligence. These rules have gone through periods of reformulation as the underlying principles of evidentiary production and presumptions of negligence have changed.

1. Legal Socialism and the Origins of Presumed Negligence

Across European legal systems there are many diversified models of presumptions of negligence.³ In several countries, the fault principle of ‘no liability without negligence’ is strongly rooted, so most presumptions of negligence have been introduced by special legislation. Because presumptions of negligence can easily lead to presumed liability, or ‘semi-strict liability’, many countries have found difficulty in accepting alternative presumption of negligence regimes. This creates a tension with the underlying traditional general fault principle: in the absence of proof of negligence, judges must leave things as they are.⁴

Outside the area of traffic accidents, we can find trace the earlier examples of rules of presumed negligence in modern codifications to the provisions contained in the *code Napoléon* of 1804.⁵ In particular, Arts 1384, 1385, 1386 (in the original version of the *code*) established liability for (i) custodians of property that cause harm; (ii) parents for the harm caused by their cohabiting minor children; (iii) employers for the harm caused by their employees; (iv) teachers and craftsmen for the harm caused by their students and apprentices; (v) owners of animals, or whoever is using the animal, for the harm the animals caused; and (vi) owners of buildings for the harm caused by their collapse or destruction. In their original formulation, however, these presumptions were a form of presumed liability that did not admit rebuttal evidence and did not allow for avoidance of liability (eg, fortuitous event or force majeure). These exceptions were only introduced by French courts later in the 19th century, following the spread of civil wrongs brought about by the industrial revolution.⁶ Rules of presumed negligence have

effect that changes in the burden of producing evidence have on the parties’ care and activity level incentives. Hereinafter, we’ll refer to the burden of production as ‘burden of proof.’ We compare the traditional rules that place the initial burden of proof on the plaintiff (we refer to these rules as ‘presumptions of non-negligence’), to the alternative rules introduced in Europe that have reallocated the burden of proof on the defendant (we refer to these rules as ‘presumptions of negligence’). These legal reforms have not modified the standards of proof applicable to the case, so we will set that dimension of the probatory problem aside for the purpose of our analysis.

³ See G. Alpa, *La responsabilità civile*, Trattato di diritto civile (Milano: Giuffrè, 1999), 313.

⁴ In these jurisdictions, only the legislature can introduce new cases governed by strict liability. This is because strict liability is still considered one of the exceptions to the general fault principle governing tort liability. Extensive interpretations or applications by analogy of the legal presumptions of negligence would thus be inadmissible, since they would *de facto* introduce new areas of semi-strict liability, infringing the general principle of fault liability.

⁵ See generally, M. Comporti, *Fatti illeciti: le responsabilità presunte*, *Il Codice Civile Commentario* (Milano: Giuffrè, 2012), 99.

⁶ See F. Laurent, *Principes de droit civil* (Paris: Librairie A. Marecq, Aine, 1878), 691; L. Jossierand, *Cours de droit civil positif français* (Paris: Recueil Sirey, 1932), 523–53; R. Demogue,

later appeared in several other European codifications.

Like the *code Napoléon*, the Spanish legal system included rules of presumed liability in special circumstances which depart from the otherwise applicable fault principle. Art 1903 of the Spanish Civil Code of 1889 encompasses these forms of civil liability in a single provision, specifying that the obligations are enforceable ‘not only as a result of one’s own acts or omissions, but also of those of such persons for whom one is liable.’ This includes parents being liable for the harm caused by their children; guardians being liable for damages caused by minors or incapacitated individuals under their supervision; owners or managers of a company being liable for damages caused by their employees in the exercise of employee functions; and teachers and schools being liable for damages caused by students under their control during school and extracurricular activities. This rule does not attach strict liability on the injurers or their supervisors,⁷ as liability only arises because the supervisors are presumed to have failed in their duties to properly supervise, educate, or control those under their authority or control. In other words, under Spanish law, defendants face a rebuttable presumption of negligence. As specified by the last para of Art 1903 of the Spanish Civil Code,⁸ to avoid liability, a defendant must establish that he or she acted with the same diligence as that of a reasonable person (‘a good family man’), although the undertaken precautions did not suffice to prevent the accident.

As discussed above, the drafters of Arts 1384, 1385, and 1386 of the *code Napoléon* initially took an intermediate position between a rule of strict liability and a rule of presumed liability. The *code* also had a clear influence on the rules introduced in Italy. Arts 1153–1156 of the Italian Civil Code of 1865 represent a mere transplant of the French rules into the Italian system. Presumptions of negligence are found in similar set of tort cases under Arts 2047, 2048, 2050, and 2054 of the Italian Civil Code of 1942. Unlike France, under both codifications, Italian courts interpreted these presumptions as rebuttable from their initial applications. Under Art 2047, para 1, of the Civil Code, in the event of damage caused by an individual lacking legal capacity, the supervisor or guardian of the individual becomes liable for the harm, unless they are able to prove that they could not have prevented the harmful act.⁹ According to Art 2048, the parents or

Traité des obligations en générale (Paris: Rousseau, 1925), 983; R. Savatier, *Traité de la responsabilité civile en droit français* (Paris: Librairie générale de droit et de jurisprudence, 1951), 421; H. Lalou, *Traité pratique de la responsabilité civile* (Paris: Dalloz, 1962), 665. On liability for risk, see n 7 below.

⁷ See Arts 1905, 1908 and 1910 of the Spanish Civil Code.

⁸ Art 1903 of the Spanish Civil Code: ‘The liability provided in the present Article shall cease if the persons mentioned therein provide evidence that they acted with all the diligence of an orderly [good family man] to prevent the damage.’

⁹ Art 2047 Civil Code. According to Corte di Cassazione 26 January 2016 no 1321, in order to be held not liable, it is necessary that the duty of care (of supervision), and its related liability, be transferred to another subject by contract, by law, or some other mechanism. For the presumption of liability provided by Art 2047 Civil Code, regarding who is liable for watching

guardians are liable for civil wrongs committed by non-emancipated minor children or persons subject to their guardianship and who live with them.¹⁰ Moreover, para 2 states that teachers and those who teach a trade, art, or profession are liable for any tort damages caused by their students or apprentices occurring while under their supervision.¹¹ Under para 3, such teachers are exempted from liability if they prove that they acted diligently or would have been unable to prevent the act.¹²

In analyzing these topics, the literature frequently focuses on whether these provisions operate as a rule of presumed negligence or, de facto, as one of strict liability. The effects of a presumption of negligence can be seen in the concept of imputed risk contained in these provisions and their wording. Liability can be avoided on two interrelated grounds. First, the presumption can be overcome by showing that due care was exercised in supervising the injurer and that the accident occurred, notwithstanding the adoption of diligent precautions. Second, the provisions explicitly allow for the parent or teacher who failed to take due care to show that, even if they had taken reasonable precautions, they would not have been able to prevent the accident. In this case liability can be avoided on causation grounds, even in the shadow of the unrebutted presumption of negligence. In other words, even if the supervisor had acted diligently, the accident could not have been avoided.¹³ A similar argument applies with respect to presumed *culpa in vigilando* and presumed *culpa in educando*. According to Italian case law, to rebut the presumption of negligence, the parent must prove that he has properly educated and adequately supervised the child based on their age, character, and nature (which in turn is a function of the environment, attitudes, and personality of the child).¹⁴ Short of that proof, the parent can still avoid liability on causation grounds, demonstrating that a proper education and supervision would not have been sufficient to prevent the accident.

over an unable person and for the admissibility of liability against the healthcare provider, see Corte di Cassazione 20 June 2008 no 16803. According to Corte di Cassazione 12 December 2003 no 19060, the recovery of a firearm used as a toy by incapable children does not constitute an exceptional and unforeseeable fact suitable to excuse a parent's liability under Art 2047 Civil Code, since the supervision of the incapable child must be constant and uninterrupted as well as not occasional nor from a distance.

¹⁰ Art 2048 Civil Code.

¹¹ *ibid* para 2. According to Corte di Cassazione 18 September 2015 no 18327, a parent's liability for the tort of the minor child exists pursuant to Art 2048 Civil Code and is not excused even when the harmful behavior of the child was carried out in a place subject to the supervision of others. For references regarding presumed liability, see generally Corte di Cassazione 22 April 2009 no 9542, *Massimario Giustizia civile*, 663 (2009); Corte di Cassazione, 20 October 2005 no 20322, *Massimario Giustizia civile*, 1919 (2005); Corte di Cassazione 28 March 2001 no 4481, *Massimario Giustizia civile*, 607 (2001).

¹² Art 2048 Civil Code. See M. Franzoni, 'Fatti illeciti', in A. Scialoja and G. Branca eds, *Commentario al codice civile, Libro quarto: Obbligazioni, Art. 2043-2059* (Bologna-Roma: Zanichelli, 1993), 326, 347, providing a detailed analysis of case law.

¹³ G. Alpa, *Responsabilità civile e danno. Lineamenti e questioni* (Bologna: il Mulino, 1991), 303.

¹⁴ See *ibid* 304-305, for references to cases.

Legal presumptions of negligence are also present in Germany. The German BGB of 1900 adopted the so-called binary system of legal presumptions:

‘this expression indicates all the various types of cases in which the person is faced with liability not based on negligence deriving from an action or omission, but rather grounded on a rebuttable presumption of negligence or, at times, liability without negligence...’¹⁵

This latter category includes cases of vicarious liability, where the principal is liable for the harm caused by his agents in the performance of an activity. The principal can avoid liability by proving that he used reasonable care in the choice and supervision of the agent, or if the damage would have resulted even if reasonable care had been exercised.¹⁶ Similarly, supervisors of minors and legally incapacitated individuals are liable for the harm caused by individuals subject to their supervision, unless they can prove that they diligently fulfilled their duty of care.¹⁷ This second category also includes the liability of an animal’s owner and keeper. An animal owner, under § 833 must compensate any individual who is killed or injured by their animal, regardless of whether they exercised reasonable care.¹⁸ Under § 834, this provision is also applicable to those who supervise the animal by contract for the owner.¹⁹ Similarly, under §§ 836– 837, whoever owns or possesses property is liable for any harm caused by the collapse or destruction of a building or any other structure on the land, unless the owner or possessor proves that they exercised due care in preventing the risk of damage.²⁰

2. Presumed Negligence Rules for Enterprise and Motor Vehicle Liability

At the end of the nineteenth century, in some European legal systems, we observed a gradual transition from negligence-based models of liability to models of liability based on the notion of ‘risk creation.’ Legal academics belonging to the so-called ‘legal socialism’ movement in Italy and France²¹ denounced the failure of negligence as a general foundation of liability and developed what became

¹⁵ G. Alpa, n 4 above, 304.

¹⁶ BGB § 831.

¹⁷ *ibid* § 832. Note that in 1999, the *Bürgerliches Gesetzbuch* (BGB) was reformed. Liability for obligations arising for minors was restricted. The new § 1629a provides that the financial liability for transactions concluded before the eighteenth year by the legal representatives of the minor (or personally by the minor with the consent of the legal representatives) is limited to assets that exist upon reaching the age of majority. The limitation does not apply to liability coming from wrongs committed by the minor. M. Löhnig and D. Schwab, ‘La legge sulla limitazione di responsabilità del minore’ *Responsabilità civile e previdenza*, 1215 (2000).

¹⁸ *ibid* § 833.

¹⁹ *ibid* § 834.

²⁰ *ibid* §§ 836-837.

²¹ See P. Ungari, ‘In memoria del socialismo giuridico’ *Politica del diritto*, 248 (1970); A. Loria, ‘Socialismo giuridico’ *La scienza del diritto privato*, 519 (1893).

known as the ‘risk theory of profit’.²² The idea centered on the premise that the risk generated by a firm through its economic activity is a risk that needed to be considered as a cost of production. Theories of liability that were developed based on the risk theory of profit reframed negligence liability by creating a presumption of liability on the person who generated the risk, unless proven otherwise.²³ This intellectual evolution led to the paradigms of strict liability or semi-strict liability and the broader use of legal presumptions of negligence.

From a functional perspective, rules of presumed negligence should not be confused with the Common law doctrine of *res ipsa loquitur*. Under the rule of *res ipsa loquitur*, courts depart from the traditional presumption of non-negligence because the facts are so obvious that requiring parties to argue any further would be redundant and contrary to procedural economy.²⁴ This principle of law, also known in Germany as *prima facie-Beweiss*, is particularly widespread in other civil law systems: the fact that a harm has occurred provides *prima facie* evidence of the wrongdoer’s negligence.²⁵

In several European jurisdictions, drivers of vehicles not guided by rails (ie, vehicles other than trains), are presumed negligent and thus face semi-strict

²² For a presentation of the legal socialism movement and the risk theory of profit developed by A. Loria, see G. Frezza and F. Parisi, *Achille Loria (1847-1943)* (Elgar Companion to Law and Economics, J.G. Backhaus ed, 1999), 392–402.

²³ M. Philonenko, ‘Faute et risque créé par les énergies accumulées’ *Revue trimestrielle de droit civil*, 305 (1950).

²⁴ See A. Guerra, B. Luppi and F. Parisi, ‘Do Presumptions of Negligence Incentivize Optimal Precautions?’ 53 *European Journal of Law and Economics*, 511–533 (2022). According to the exemplary quote of Chief Justice Erle, ‘there must be reasonable evidence of negligence. But where the thing is shown to be under the management and control of the defendant or his servants, and the accident is such as in the ordinary course of things does not happen if those who have management use proper care, it affords reasonable evidence, in the absence of explanation by the defendants, that the accident arose from want of care.’ *Scott v. London & St. Katherine Docks Co.* (1865) 159 Eng. Rep. 685; see also *Byrne v. Boadle* (1863) 159 Eng. Rep. 299, 300–01. In the US, a minority of states find that *res ipsa loquitur* creates a presumption of negligence, including California and Colorado. See, eg, *Blackwell v. Hurst*, 54 Cal. Rptr. 2d 209 (Cal. Ct. App. 1996); *Stone’s Farm Supply, Inc. v. Deacon*, 805 P.2d 1109 (Col. 1991).

²⁵ See P.G. Monateri, *La responsabilità civile. Le fonti delle obbligazioni* (Torino: UTET, 1998), 11; V. Fineschi, ‘*Res ipsa loquitur*: un principio in divenire nella definizione della responsabilità medica’ *Rivista italiana medicina legale*, 419 (1989). Along these lines, the Italian Supreme Court affirmed that ‘in matters of tort liability, it is up to the plaintiff, who sues for damages, to put forth evidence of the injurer’s negligence; this principle, however, does not necessarily imply that the judge requires negligence be proven exclusively from the evidence offered by the injured party, as the proof can be inferred from the facts and circumstances of the specific case. The evidence can also be presumptive, and, in this regard, a fact can be inferred circumstantially due to the *id quod plerumque accidit* rule, taking into consideration that it is not always easy to acquire direct evidence.’ That specific case dealt with products liability, and more specifically, involved a bottling company sued for damage caused by the bursting of a bottle containing a carbonated beverage. Corte di Cassazione 28 October 1980 no 5795; G. Monateri, above, 111. There is no general rule that indicates when it is possible to apply *res ipsa loquitur* or other presumptive inferences based on the *id quod plerumque accidit* because they are called upon to operate based on circumstantial evidence and findings of the specific case. *ibid* 114.

liability for any harm caused to people or things while operating the vehicle, unless the driver or operator is able to prove that he has undertaken reasonable precautions to avoid the harm.

In the field of traffic accidents, Germany adopted a mix of strict liability and presumed negligence rules, as early as 1909. Specifically, the Liability Provisions of § 7 of the German Road Traffic Act (*Strassenverkehrsgesetz*, hereinafter StVG) provides the central rule establishing a form of semi-strict liability for the owner or keeper (eg, lessor) of a motor vehicle, for the damage caused by the operation of the vehicle killing, injuring, or creating material damage to third parties. In such cases, liability can only be avoided showing that the accident was the result of force majeure, or the vehicle was used without the knowledge and permission of the owner.²⁶ When the driver is not the owner, the Traffic Act introduces a second ground for avoiding liability under § 18 StVG, allowing the operator to prove that the loss was not due to his or her fault.²⁷ Under this rule, liability can be avoided also by the owner and the keeper by showing that due care was exercised or that the accident was not caused by the failed adoption of diligent precautions.²⁸ Under the German Traffic Act § 17, when an accident occurs between two motor vehicles, a rule of presumed liability applies. In such cases, liability is apportioned according to the circumstances and the principles of comparative negligence and can only be entirely avoided by the parties by proving they have acted with due care.²⁹

3. Presumed Joint Negligence Rules

The Italian rules presuming negligence in traffic accidents are a bit more elaborate, leaving less room for discretionary evaluations based on the circumstances of the case if parties cannot prove to have acted with due care. Art 1156 of the Italian Civil Code of 1865 introduced, for the first time, joint liability for torts ascribable to more than one person. Based on this rule, the current civil code uniquely applies joint liability for vehicles coupled with a presumption of negligence. Italy's regime resulted in a novel legal rule, creating a legal 'presumption of joint negligence' for accidents between motor vehicles.³⁰ This interesting spin on legal

²⁶ See § 7 StVG: 'If a person is killed or injured or material damage incurred from the operation of a motor vehicle, the owner of the vehicle is obligated to compensate the injured party for the resulting loss, unless the accident was the result of force majeure, or the vehicle was used without the knowledge and permission of the owner'.

²⁷ § 18 StVG: 'In the cases of § 7(1), the operator is also liable to pay compensation pursuant to §§ 8–15, unless the loss is not the fault of the operator.' This amounts to a reversal of the burden of proof (*Beweislastumkehr*) on the issue of negligence.

²⁸ Van Dam (2013, 412) point out that German case law has found drivers not negligent when they prove to have taken the level of due care of 'the ideal driver who takes into account the considerable chance that other people make mistakes.' BGH 17 March 1992, BGHZ 117, 337; BGH 28 May 1985, NJW 1986, 183.

²⁹ Although not explicitly stating so, § 17 StVG de facto introduces a rebuttable presumption of joint negligence, like the Italian rule of presumed joint liability discussed in the text.

³⁰ G. Frezza and F. Parisi, *Responsabilità civile e analisi economica* (Milano: Giuffrè, 2006), 93.

presumptions specifies that in the event of a collision, unless proven otherwise, parties are presumed jointly negligent. According to this rule, it is presumed that each party equally contributed to producing the harm and is proportionally liable to compensate for the harm suffered by each vehicle (ie each driver is presumed equally negligent and liable for fifty percent of the damages caused).³¹ As originally written, this rule only applied when the collision resulted in harm to both vehicles. The Italian Constitutional Court found this to be unconstitutional.³² The Constitutional Court stated that the presumption of bilateral negligence and the resulting joint liability should also apply when only one of the vehicles has suffered harm in the accident, indicating that the presumption of joint liability was based on evidentiary principles, and was not created for the purpose of spreading the accident loss between the parties.³³

The evidence needed to rebut the presumption of joint liability consists of proving that the drivers undertook reasonable precautions to avoid the accident. To avoid their share of liability, drivers must show that they obeyed all relevant traffic rules and undertook reasonable precautions, under the circumstances of the case.³⁴ Furthermore, Italian law includes a specific rule for the collision between vehicles, both those moving and those temporarily parked.³⁵ In these cases, concurrent liability of drivers is presumed until proven otherwise. In tort situations involving two or more parties, each party is assumed to have contributed equally to the accident, even when the vehicle was not moving. Each party bears the burden of producing evidence. Paradoxically, the owner of the parked car may be in a worse position to produce evidence, notwithstanding the fact that in most cases a parked car is less involved in the causation of an accident.

If only one party can produce satisfactory evidence about their diligent behavior, the other party is held unilaterally negligent and bears the entire loss, as injurer (facing full liability) or as victim (facing the full loss, with no compensation). When neither party can prove his or her diligent behavior, the Italian rule leads to a sharing of the loss, like a rule of comparative negligence. Liability increases

³¹ Art 2054 civil code. For an articulated analysis of applicable case law, see generally M. Franzoni, n 12 above, 326-347. According to Corte di Cassazione 23 October 2014 no 22514, the principle stated by Art 1227 civil code (also applicable to tort law due to the express reference contained in Art 2056 of civil code) of the proportional reduction of damage based on the percentage entity of the causal efficiency of the injured party applies not only to the injured party, which claims compensation for the harm directly suffered, but also against the relatives who, in relation to the reflected effects on them, start legal action in order to be redressed for the damage suffered *iure proprio*.

³² Corte costituzionale 14 December 1972 no 205.

³³ *ibid*

³⁴ Corte di Cassazione 19 September 1980 no 5321; Corte di Cassazione 21 June 1979 no 3443. Additional discussion can be found in G. Spina, 'L'accertamento della responsabilità da sinistro stradale nella recente giurisprudenza. Profili sostanziali e giurisprudenziali' *Responsabilità civile e previdenza*, 1806 (2014).

³⁵ G. Alpa, n 3 above, 711.

and decreases in relation to the extent of the proven negligence of the driver.³⁶ When both parties can prove their diligent behavior, each party bears the loss suffered in the accident and no liability or compensation is owed to one another.

Other European legal systems, including the Netherlands introduced rules of presumed liability, creating rebuttable presumptions of negligence against injurers. In the Netherlands, however, a stronger presumption applies in favor of victims of motor vehicle accidents. Art 185 (1), *Wegenverkeerswet* (Road Law), 1994:

‘If a vehicle driven on the road is involved in a road accident, causing damage to persons or things (not to another motor vehicle), the owner or keeper of the vehicle is liable to compensate the harm, unless he can be proved that the accident was due to force majeure or by a person, for whom the owner or the keeper are not responsible.’

According to these European rules of presumed liability, evidence of harm and causation are sufficient elements to establish liability, effectively shifting the burden onto the defendant to show that he behaved diligently. Thus, in the event of an accident, injurers are by default liable and must pay full compensation unless they can rebut the presumption by proving their own diligence or showing that the victims’ behavior was itself negligent or not foreseeable, or that the accident was somehow not avoidable.

Other countries are debating a change from the conventional presumption

³⁶ According to Tribunale di Catania 7 May 2020 no 1497, ‘the concrete ascertainment of the fault of one of the drivers does not involve the overcoming of the joint liability presumption of the other if the latter has not concretely provided satisfactory evidence relating to the lack of any possible charge against him’. Tribunale di Grosseto 7 May 2020 no 324 believes that in car accidents, para 2 of Art 2054 of the Italian Civil Code provides a presumption of liability for both drivers of vehicles involved in an accident. In this regard, the aforementioned rule does not constitute a strict liability hypothesis for the driver, but rather one of presumed liability. The driver can overcome this presumption by proving that he has done everything possible to avoid the damage, or by demonstrating sufficient diligence, ie, behavior free of negligence and in compliance with the traffic laws, as evaluated by the judge accounting for the circumstances of the specific case. In this sense, the presumption of negligence has a merely subsidiary function and operates only when it is impossible to determine the concrete extent of the respective liabilities. In other words, if the negligence of one driver is ascertainable, the other driver is exempt from the presumption of liability and is not required to prove that he has done everything possible to avoid the damage. According to the Tribunale di Pisa 25 March 2020 no 354, the first para of Art 2054 of the Italian Civil Code contemplates a form of presumed liability that can be overcome by the driver proving that he has done everything possible to avoid the damage. For example, if a driver strikes a pedestrian outside of a crosswalk, then the driver may avoid joint liability by demonstrating that the pedestrian failed to give the driver the right of way, resulting in an unforeseeable and inevitable obstacle, and that the driver had otherwise behaved correctly. According to Corte di Cassazione 20 marzo 2020 no 7479, on the subject of a collision between vehicles, the presumption of joint liability established by Art 2054, para 2, of the Civil Code has a subsidiary function, operating only in the event that the evidentiary findings do not allow to ascertain in a concrete manner to what extent the conduct of the two drivers caused the damage and to allocate the actual liability for the accident (in the specific case, two different technical experts were not allowed to reconstruct the exact dynamics of the accident).

of non-negligence to presumed liability in various tort situations.³⁷ The push to shift the burden of proof from victims to injurers is advanced on several grounds. One argument is that a shift in the burden of proof would provide protection to more vulnerable road users, such as cyclists (in accidents with motorcycles, cars, trucks, etc) and pedestrians (in accidents with cyclists, motorcycles, cars, trucks, etc), as well as victims below the age of sixteen and over seventy and disabled individuals. Advocates say these rules are needed for both fairness and efficiency reasons. Another argument is that the shift in the burden of proof onto the injurer is fairer than the standard fault-based evidence rule, as it shields more vulnerable victims from the burdensome task of proving the negligence of their injurer.³⁸ Yet other arguments in support of the presumption of negligence point to the widespread availability and rapid development of new evidence technologies, such as helmet cameras, black-box technology, and GPS location technologies, which make it easier for injurers to record accident events and provide evidence to rebut a presumption of negligence.

As will be discussed below, a jurisdiction's choice of which party should bear the burden of proof can have a significant impact on the parties' tort incentives, as well as on their incentives to invest in private evidence. Given the new range of evidentiary technologies, the choice of legal presumptions would benefit from a broader reassessment. In Section 3, we will offer a broad-brush outline of some of the relevant considerations, which we frame under the general umbrella of the 'cheapest-evidence-producer criterion.'

III. The Effect of Legal Presumptions on Tort Incentives

As pointed out by Castronovo, presumptions of liability in contemporary legal systems are

‘a dogmatically heterogeneous category because they combine the presumption, that is a qualification of the fact, with the resulting liability, that is a judicial effect.’³⁹

While the policy rationales and theoretical foundations of the presumptions of negligence vary greatly across jurisdictions—from simple inversions of the burden of proof for procedural economy or fairness, to goals of risk-spreading between the parties, to other policy objectives—the legal and economic consequences of

³⁷ In the UK see the Parliamentary debate 24 March 2011, Parl Deb HC (2011) col. 1222 W 81 (UK).

³⁸ R.H. Grzebieta, J. Olivier and S. Boufous, ‘Reducing the Rate of Serious Injuries to Cyclists’ *Medical Journal of Australia*, 242 (2017); S. Boufous, ‘It Is Time to Consider a Presumed Liability Law that Protects Cyclists and Other Vulnerable Road Users’ 28 *Journal of the Australasian College of Road Safety*, 65 (2017).

³⁹ C. Castronovo, ‘Sentieri di responsabilità civile europea’ *Europa e diritto privato*, 797 (2008).

these presumptions are straightforwardly uniform: when there is a lack of evidence pertaining to the relevant facts that led to an accident, a shift in legal presumptions turns a case that would have favored the defendant into a case favoring the plaintiff (or a splitting of the loss, under the Italian rule of presumed joint negligence for motor vehicle accidents).⁴⁰

1. Effects of Presumptions of Negligence Under Alternative Liability Regimes

Shifts in burdens of production of evidence are not neutral to truth-finding. Shifting the burden from one party to the other unavoidably affects the parties' respective probabilities of success in litigation. To the extent to which the case has one objective truth, the fact that the burden of proof affects the parties' likelihood of success in litigation must also imply that shifts in the burden will affect the probability that one or another type of judicial errors (Type-I or Type-II) takes place. Think of automobile accidents. A presumption in favor of defendant reduces the probability of imposing liability on a negligent driver, while a presumption in favor of plaintiffs increases the probability of imposing liability on a non-negligent driver.

The effects of these errors are not only distributive.⁴¹ Besides the obvious desire to reduce the frequency of judicial errors, it is also important to consider the effect that different types of errors may have on tort incentives.⁴² The associated social cost may differ, given the effects of these errors on the incentives of prospective injurers and prospective victims. When parties expect probatory difficulties, legal presumptions shift care incentives from one party to another.

When shielded by a presumption of non-negligence in their favor, injurers may strategically rely on their victims' difficulty in satisfying their burden of proof. This may dilute their precautionary care incentives. As probatory difficulties increase, a negligence ruler with a non-negligence presumption gradually degenerates into a no liability rule, entirely diluting potential injurers' care incentives. The adoption

⁴⁰ See G.A. Micheli et al, *L'onere della prova* (Padova: CEDAM, 1942), 313.

⁴¹ There is nothing deterministic about the optimal allocation of the burden of proof in the face of the possible judicial errors. By shifting the burden from one party to the other, the probability of error also shifts from one party to the other party. For example, a presumption in favor of the defendant (like the traditional negligence rule) may give him an advantage and lead to a margin of error in his favor (a fraction of cases may be erroneously decided in favor of the defendant when the plaintiff is unable to prove the negligence of his injurer). The adoption of a presumption in favor of the plaintiff, however, creates a mirror-image problem, giving the plaintiff an evidentiary advantage that may lead to a margin of error in his favor (a smaller or larger fraction of cases may be erroneously decided in favor of the plaintiff when the defendant is unable to prove his diligence).

⁴² As pointed out by R. Cooter, D. Robert and A. Porat, 'Does Risk to Oneself Increase the Care Owed to Others? Law and Economics in Conflict' 29 *Journal Legal Studies*, 19-34 (2000), prospective victims will not necessarily act differently depending on the legal liability rule-prospective victims who are already facing substantial risks of serious personal injury that vary with the degree of care that they take, are not affected by changes in liability rules, except in very rare cases.

of legal presumptions of negligence could correct this problem. When faced with a presumption of negligence, probatory difficulties shift the expected accident loss on injurers. As probatory difficulties increase, a negligence rule with a presumption of negligence gradually degenerates into a rule of strict liability, inducing injurers to undertake efficient care. The choice of presumptions of negligence can thus be desirable to mitigate the diluting effects of judicial errors on injurers' tort incentives.

However, the same reasoning applies with respect to the legal presumptions applicable to victims. When shielded by a presumption of non-negligence in their favor, prospective victims may strategically rely on their injurers' difficulty in proving their contributory or comparative negligence, and this may dilute the victims' care incentives. As probatory difficulties increase, the incentives created by a defense of contributory or comparative negligence may gradually disappear entirely. The adoption of legal presumptions of joint negligence, like those adopted in some European jurisdictions for traffic accidents, corrects this problem. When faced with a presumption of joint negligence, probatory difficulties shift the burden of proof back on victims. As probatory difficulties increase, prospective victims will fear being barred from receiving full compensation, inducing them to undertake efficient care.⁴³ The adoption of presumptions of joint negligence can thus be desirable to mitigate the effect that judicial errors may have on both victims' and injurers' tort incentives.

A second effect of legal presumptions and discovery regimes is on the parties' activity levels. As discussed above, in a world of imperfect adjudication, a shift of the burden of proof also transfers the cost of legal errors. A change in legal presumptions would affect the cost and desirability of a given activity, due to the shift in expected liability associated with the ability to satisfy the burden of proof. More specifically, a presumption that shifts the burden towards the defendant increases the expected cost of the defendant's activity. This is because, in the event of an accident, the defendant will have to incur the cost of producing evidence, or bear the liability associated with his inability to produce evidence (even when his behavior was non-negligent).

The costs associated with the burden of proof can be analogized to a tax imposed on the risk-generating activity. This tax will reduce the optimal level of activity for the party facing the burden of proof. Those familiar with the economic analysis of tort law will soon realize that this effect could be a curse or a blessing, depending on which party bears the burden.⁴⁴ This is because the burden of

⁴³ For a formal analysis of the effects of legal presumptions on care incentives in the presence of judicial errors, see A. Guerra, B. Luppi and F. Parisi, n 24 above.

⁴⁴ As per Shavell's activity level theorem, no negligence-based regime can incentivize optimal activity levels for both parties. This is because the party who does not bear the residual liability is only concerned about avoiding liability by undertaking due care and does not internalize the additional cost of non-negligent accidents. Conversely, the bearer of residual liability wants to avoid harm altogether and will be incentivized to undertake both optimal care and optimal activity level. The cost imposed by the burden of proof can therefore do either of two things: sub-

proof imposes a tax on activity level which can alternatively *distort* the already optimal incentives of the residual bearer or *mitigate* the inefficiently high activity levels of the party who does not bear the residual loss. The optimal use of the burden of proof as an activity level tax requires the creation of a legal presumption in favor of the party burdened with the accident loss when both parties acted diligently. This would entail imposing the burden on the defendant when the dispute arises under negligence-based regimes (ie, simple negligence, negligence with contributory negligence, or negligence with comparative negligence) and instead shifting the burden on the plaintiff when the dispute arises under strict liability regimes (ie, strict liability with contributory negligence, or strict liability with comparative negligence). Accordingly, the European rules of presumed joint negligence create a desirable alignment of incentives, bringing the activity levels of both parties closer to the socially optimal levels.

2. The Negative-Proof Problem and the Role of Evidence Technology

One of the common explanations for the use of presumptions of non-negligence and the allocation of evidentiary burdens on plaintiffs (in establishing the fault of their injurers) is that if plaintiffs did not have the burden, there could be an increase in potentially litigation, including a substantial fraction with little merit, brought to extract settlements from defendants. In the absence of fee-shifting rules or other correctives against frivolous claims, defendants might settle a case for a positive amount to avoid having to spend a greater amount proving that they were not negligent. The availability of new evidence technologies has reduced the cost of evidence production and the reliability of the evidence produced by defendants who invested in due care, weakening the practical rationales for the adoption of presumptions of non-negligence in tort cases.

Further, the availability of new evidence technologies has mitigated a theoretical and practical objection that was frequently raised against the use of legal presumptions of negligence. The objection consisted in the fact that a burden placed on the defendant would often entail a negative proof and would de facto deteriorate into a semi-strict or strict liability rule. The procedural laws of evidence were traditionally viewed as embracing this basic principle by allocating the burden of proof on plaintiffs; shifting the burden of proof on the person denying an assertion or a claim would constitute a logical fallacy, creating a presumption of truthfulness of the claim unless otherwise disproven. According to this principle, the victim

optimally reduce the activity levels of the residual bearer or mitigate the excessive activity level incentives of the non-residual bearer. Shavell's proposition has become known in the law and economics literature as 'Shavell's activity level theorem.' See F. Parisi, *The Language of Law and Economics: A dictionary* (Cambridge: University Press, 2013) for the standard restatement of this theorem. An ideal remedy in tort law should instead incentivize optimal precautionary care levels and optimal activity levels for both parties. S. Shavell, 'Strict Liability Versus Negligence' 9 *The Journal of Legal Studies*, 1 (1980), showed that this ideal is not achievable under negligence-based regimes, because only the bearer of residual liability will have incentives to mitigate its activity level.

should bear the burden of proof of the elements of negligence necessary to establish the injurer's liability, because shifting the burden of proving the non-existence of those elements on the injurer would reproduce the same logical fallacy. By creating a presumption of negligence, the injurer would face the formidable burden of proving a negative—the lack of negligence on his part. This would create a presumption of truthfulness of the tort claim, unless successfully disproven by the defendant.

The implicit premise of this argument is that negations often involve universal negatives, while affirmations do not. The proof of a universal negative is what ancient Romans called *probatio diabolica* (literally, 'devil's proof'), to signify its heinous difficulty. Consider, as an example, the allegation of a fact: 'Defendant signed a contract promising X.' A signed document and a few additional pieces of corroborating evidence would suffice to establish such an assertion. On the contrary, the negative claim by defendant 'I have never signed a contract promising X' would entail the proof of a universal negative, necessitating omniscience and omnipresence on the part of the defendant, and ultimately requiring the examination of a potentially infinite amount of evidence by the factfinder.

Despite its logical soundness, in today's world, the negative-proof argument presents a more limited logical objection to the use of legal presumptions of negligence. Consider the case of a negligence tort. Contrary to the example used to illustrate the negative-proof fallacy, proving the non-negligence of the injurer at the time of the accident (or, for this matter, proving that any other element of the tort is not present) does not entail the proof of a universal negative requiring omniscience and omnipresence—proving non-negligence amounts to proving due diligence.

The logical foundations of the law of proof do not dictate that in this case the burden of proof should necessarily be placed on the plaintiff making an assertion or a claim.⁴⁵ While at times it may be easier for a plaintiff to prove the negligence of the defendant, in other situations it may be easier for a defendant to prove his own diligence. Neither type of proof requires supernatural abilities. The choice of an optimal allocation of the burden of proof in these cases hinges upon a test of comparative advantage in the access to relevant information. *Ceteris paribus*, when the factual premises of the negative-proof argument do not hold, the party who has a comparative advantage in providing truthful evidence (hereinafter, the 'cheapest evidence producer') should bear the burden of proof.

⁴⁵ The inapplicability of the philosophical constructs to the legal notions of burden of proof and choice of legal presumptions was pointed out in the early 1930s by Columbia law professor Jerome Michael and Chicago philosopher and law professor Mortimer Adler, who observed: 'The principles of logic do not place upon either party any burden of proving the propositions which they have respectively alleged. The principles of logic are concerned only with the validity and the structure of the processes by which proof and disproof are accomplished.' M. Adler and J. Michael, *The Nature of Judicial Proof: An Inquiry into the Logical, Legal, and Empirical Aspects of the Law of Evidence* (New York: Columbia Law Review, 1931), 60.

The test of comparative advantage is informed by some general assumptions and guiding rules of thumb. For example, when the standard of due care entails the undertakings of many actions, proof of diligence can be more burdensome than the proof of negligence. Proof of negligence could be satisfactorily obtained by showing that any one of the required actions had not been undertaken. Proof of diligence would instead require evidence that each and every required precautionary action was undertaken. In the limiting case in which an infinite number of actions need to be undertaken to satisfy due care, a negative proof of non-negligence would become virtually impossible. Thankfully, no such infinite list of burdensome duties of care is legally expected from ordinary humans.⁴⁶

If, as it seems, there is nothing fundamentally necessary behind the idea of placing the burden of proof on plaintiffs, the next logical question becomes identifying the factors that should drive the optimal allocation of the burden of proof. On this matter, it is important to consider that new technology is substantially increasing the amount of information that can be acquired and preserved, with far-reaching applications in the field of legal evidence and discovery. Scientific and technological innovations play a dual role in evidence and discovery. Some technologies can give factfinders insights, allowing them to look back and gather information about past events, while others record and preserve present information for future uses. We shall refer to the first group as ‘investigative technologies’ and to the second group as ‘fact-keeping technologies.’

1. *Investigative Technologies.* The characteristic feature of investigative technologies is that they can be employed *ex post* even though no such technology was used or available at the time of the event. Consider, for example, evidence obtained through genetic testing. Like a lie detector, genetic testing can shed light on past events. This technology need not be adopted by the parties at the time of the original event but instead can be deployed when a need for discovery arises later.

2. *Fact-Keeping Technologies.* Other technologies collect information about present events and preserve it for future investigations. This category encompasses two subgroups. The first is technology that can be adopted by parties who are neither prospective injurers nor victims, including local governmental authorities, such as traffic surveillance cameras and satellite imaging, capable of documenting facts and events that occur within their range. We shall refer to them as ‘*public fact-keeping technologies.*’ The second involves technologies that individuals and firms can privately adopt. These are instruments that are tailored to a specific set of applications, determined by their user. Examples that fall within this category include adoption of black-box technology on vessels, cameras on body vests or helmets, Snapshot® and dash-mounted cameras on cars, use of digital timestamp

⁴⁶ For a collection of cases describing the innumerable list of duties that a ‘reasonable man’ should fulfill to avoid being held negligent in torts, see the humorous book by A.P. Hebert, *Uncommon Law* (London: Methuen, 1937), 3–11.

certification methods, use of electronic tamper-proof data storage systems managed and certified by third parties, and various applications of GPS technology. We shall refer to them as ‘*private fact-keeping technologies*’. Private fact-keeping technologies consist of two distinct subgroups, each with different focuses and applications. Some technologies, such as black-box technology, Google Timeline®, Snapshot®, and cloud data storage, are better able to track the user’s own actions. We shall refer to them as ‘*first-party evidence technologies*.’ Other technologies, such as private surveillance cameras, fingerprints and face recognition devices, are better able to document the activity of others. We shall refer to them as ‘*third-party evidence technologies*.’

As will be discussed below, these evidence technologies have changed the relative cost and reliability of providing evidence in a court proceeding, and thus altered the resulting optimal allocation of burdens of production under the cheapest-evidence-producer criterion.

3. Accuracy of Tort Adjudication and the Effects of Adversarial Discovery

As Alice Guerra and Francesco Parisi pointed out, much of the conventional wisdom underlying the choice of legal presumptions rests on the now-outdated assumption that the amount of evidence available in any given situation (eg, the number of witnesses or the amount of physical evidence available after an accident) is not controlled by the parties. The advent of new evidence technology has radically changed this situation. Individuals involved in a prospective accident can endogenously control the amount of available evidence with the adoption of evidence technology.⁴⁷

In this respect, legal presumptions influence the type of evidence technology likely to be adopted. As summarized in *Table 1* below, under traditional presumptions of non-negligence, prospective injurers have limited incentives to invest in first-party evidence technology, since in the event of an accident, it would primarily be the victims’ burden to come forth with the necessary evidence. Prospective victims would instead have incentives to adopt third-party evidence technology to prove the negligence of their injurers. The opposite would hold under legal presumptions of negligence. In this case, prospective injurers would be more likely to adopt first-party evidence technology, and victims would have fewer incentives to invest in third-party evidence technology. Presumptions of joint negligence would, instead, incentivize both parties to invest in first-party evidence technology. Under this latter presumption, prospective injurers would prevalently adopt evidence technology focused on themselves to prove their non-negligence, and prospective victims would similarly adopt evidence technology focused on themselves to prove lack of

⁴⁷ A. Guerra and F. Parisi, ‘Investing in Private Evidence: The Effect of Adversarial Discovery’ 14 *Journal of Legal Analysis*, 657–671 (2021).

contributory or comparative negligence. Hence, both parties would have greater incentives to adopt first-party evidence technology.

Table 1: *Legal Presumptions and Adoption of Evidence Technology*

	Injurers' Evidence Technology	Victims' Evidence Technology
Presumption of Non-Negligence	—	Third-Party Focused
Presumption of Negligence	First-Party Focused	—
Presumption of Joint Negligence	First-Party Focused	First-Party Focused

The availability of new evidence technology increases the verifiability of diligent and/or negligent behavior, increasing the benefits of the owner's investment in precautions. Precautions decrease the probability of an accident, but also help individuals prove their diligent behavior to avoid liability. By increasing the *ex post* verifiability of the parties' behavior, evidence technology reinforces the parties' incentives to act diligently. An increase in evidence and accuracy of adjudication will change the relative price of negligent versus non-negligent behavior. A burden placed on the defendant increases the wedge between the payoffs in cases of diligent versus non-diligent behavior. That is to say, the relative payoff of diligent behavior over non-diligent behavior is increased, causing a substitution effect.⁴⁸ These investments may lead to desirable adjustments in the parties' care investments. Think, for example, of a motorcyclist fearing to harm pedestrians in a regime of presumed negligence. In the event of an accident, the motorcyclist would have to prove lack of negligence to avoid liability. Evidence technology could help him satisfy the required burden of proof. The motorcyclist may thus put a dashcam on his motorcycle to present footage of the accident in a courtroom. Evidence technology renders past behavior more verifiable and increases the value of his investments in precautions. This would strengthen the motorcyclist's incentives to act diligently

⁴⁸ As shown in the law and economics literature, for a sufficiently moderate cost of evidence, this substitution effect should not be observed given the discontinuity of payoffs created by a negligence standard.

and to undertake the due level of care, further reducing the probability that he will find himself in the role of injurer in the event of an accident. The overall care level incentives created by legal presumptions of negligence would be further amplified by the adoption of presumptions of joint negligence. Under presumptions of joint negligence, both parties would adopt technology that increase the value of their care investments, making them more verifiable.⁴⁹

It should be further observed that evidence rules concerning discoverability of evidence can play an important role in determining the parties' decisions to invest in evidence technology.⁵⁰ The differences between the rules governing adversarial discovery in the United States and Europe are significant. In 1938, the enactment of the Federal Rules of Civil Procedure in the United States gave origin to one of the most far-reaching discovery systems in the world, authorizing discovery into any matter that is not privileged which is relevant to the subject matter of the case.⁵¹ As Allen et al pointed out, in most litigation settings modern US discovery rules make a fetish out of free access to all information, rendering most of the available evidence discoverable.⁵² As Subrin put it, the federal discovery rules have opened the doors to 'fishing expeditions' through adversarial discovery, where litigants are allowed access to documents and data of the opposing party for exploratory reasons in the search for information that may strengthen their case or weaken the case of their opponent.⁵³ Rules of civil procedure at the state level have followed the federal example, introducing some limits on discovery only in the interest of procedural economy.

The reach of adversarial discovery as practiced in the United States, is not available in civil law jurisdictions. The non-adversarial procedural traditions of

⁴⁹ It should be noted that better verifiability of facts reduces the variability in the outcome of the results: court decisions will be correct more often. The increase in accuracy does not necessarily affect the parties' activity levels. The risk of being incorrectly found negligent, and required to pay damages despite having taken care, does not will deter activities. The increased variance in judicial outcomes also entails a counterbalancing hope of being incorrectly found diligent, and required to pay no damages, despite not having taken due care. Unless we assume that lack of accuracy in adjudication entails a systematic bias toward the incorrect finding of negligence (with no offsetting dismissals in favor of negligent defendants), on average, courts' unbiased inaccuracy would not affect expected liability and the resulting activity levels.

⁵⁰ For a formal economic model, assessing the effects of discovery rules on the incentives to invest in private evidence, see A. Guerra and F. Parisi, n above 47.

⁵¹ See US Federal Rules of Civil Procedure, Rule 26.

⁵² R.J. Allen et al, 'A Positive Theory of the Attorney-Client Privilege and the Work Product Doctrine' 19 *Journal Legal Studies*, 359 (1990). US evidence law generally makes most of the available evidence discoverable. See A.R. Miller and C.E. Tucker, 'Electronic Discovery and the Adoption of Information Technology' 30 *The Journal of Law, Economics, and Organization*, 217 (2014); R.S. Haydock and D.F. Herr, *Discovery Practice* (New York: Wolters Kluwer, 2016).

⁵³ S.N. Subrin, 'Fishing Expeditions Allowed: The Historical Background of the 1938 Federal Discovery Rules' 39 *Boston College Law Review*, 691 (1998). For example, in *United States v Microsoft*, 87 F. Supp. 2d 30 (D.D.C. 2000), prosecutors used e-mails sent between Microsoft executives to prove anti-competitive intent towards Netscape. For other examples of e-discovery, see A.R. Miller and C.E. Tucker, n 52 above.

Europe adopt a different approach in legal discovery, letting each party produce the evidence that is available to them, with very narrow use of court-ordered discovery of evidence.⁵⁴ These approaches are deeply entrenched in the civil law tradition and echoed in current case law, as best exemplified by the rules and cases governing adversarial discovery in Europe. A few representative examples are offered below.

The relevant laws governing the discovery of evidence in France are Arts 10, 138, and 139 of the Code of Civil Procedure (*Code de procédure civile*). Under the French Code of Civil Procedure Art 10, parties may petition the court to order the other party or third parties to produce evidentiary material, but the judge's decision to allow discovery is discretionary.⁵⁵ However, French judges do not allow adversarial access to evidence for exploratory reasons, and only force production of evidence in cases where the opposing party already has knowledge of the content of the sought-after evidence and has no other means to prove its claim (eg, to obtain a signed agreement that remained in possession of the opposing party).⁵⁶

The opportunity for adversarial use of evidence under the Italian Code of Civil Procedure (*Codice di Procedura Civile*) is even narrower. Art 670 allows parties to seek sequestration of physical documentary evidence (now interpreted to also include electronic, audio, and video evidence) that contains information already known to the other party and that — if later admitted by the court — could be critical for the resolution of the dispute.⁵⁷ The role of the sequestration, reflected in Art 671, is purely conservative: evidence is placed in the trust of a third party, and it is not given to the opposing party for the search of other information that could help to corroborate their case. The admissibility of the preserved evidence in court is governed by Art 210 of the Italian civil procedure code. Italian case law—ranging from trial courts to a recent decision of the Italian Supreme Court (*Corte di Cassazione*)—has narrowly interpreted Art 210, affirming that adversarial discovery is granted at the discretion of the judge, and should not be granted as an instrument to aid a party in meeting its burden of proof.⁵⁸ Case law restated that the content of the requested evidence should be known and specified by the requesting party, and discovery should not be asked

⁵⁴ European legal systems follow a more conservative approach with respect to adversarial discovery of private evidence. See M.H. Redish, 'Electronic Discovery and the Litigation Matrix' 51 *Duke Law Journal*, 561 (2001); G. Foggo et al, *Comparing E-Discovery in the United States, Canada, the United Kingdom, and Mexico*, (London: McMillan, 2020). For extensive references, see T.P. Harkness et al, 'Discovery in International Civil Litigation: A Guide for judges' *Procedure, Advocacy, Strategy and Tactics in Arbitration*, 14 (2017).

⁵⁵ G. Serge, F. Frederique and C. Cecile, *Procédure civile* (Paris: Dalloz, 2009), 341-42, 341-52.

⁵⁶ See J. El-Ahdab and A. Bouchenaki, *Discovery in International Arbitration: A Foreign Creature for Civil Lawyers?* (Arbitration Advocacy in Changing Times ICCA Congress Series no 15, 2011), 65-117. Requirements on the petitioning party further limit the application and viability of forced production petitions within the French legal system. P. Harkness et al, n 54 above.

⁵⁷ For discovery practices in selected jurisdictions, see P. Harkness et al, above n 54.

⁵⁸ Tribunale di Frosinone 18 April 2018 no 379; Tribunale di Grosseto 7 January 2020 no 8.

for exploratory reasons.⁵⁹ If the requesting party fails to specify the exact content of the document requested through adversarial discovery, the request should be denied.⁶⁰ In 2016, the Italian Supreme Court reaffirmed this principle, highlighting its rationale when it stated that

‘the purpose of discovery is not to help the party prove something that he would not have been able to prove in the absence of the new information acquired through discovery.’⁶¹

The relevant rules governing the adversarial discovery of evidence in Germany are found in the German Code of Civil Procedure (*Zivilprozessordnung*). Like its French and Italian counterparts, the German Code of Civil Procedure does not offer procedures for pretrial discovery similar to those found in US jurisdictions, and the German principle against the use of discovery for exploratory reasons is upheld in case law.⁶² Furthermore, under German law there is no general obligation to produce documents to assist the opposing party in transnational litigation. This procedural principle led Germany to introduce reservations in the ratification of the Hague Service of Process Convention, which entered into force on 26 June 1979. In ratifying the Hague Convention, Germany introduced declarations and reservations that excluded the application of Chapter II of the Convention. As a result, in transnational disputes, Germany will not execute requests of pretrial discovery of documents as known in the United States (according to Art 23 of the Declaration).

The differences in the adversarial discovery of private evidence have obvious consequences on the parties’ incentives to invest in evidence technology. Under a fully discoverable evidence regime, keeping track of one’s actions makes the saved information subject to being discovered and subpoenaed, and possibly used as evidence by opposing parties in the event of a dispute. Under US evidence law, private investments in evidence could thus have a backlash effect on the party that invested in the technology.⁶³ As an example, think of a dashboard webcam that can be installed in a car. If the information gathered by the dashcam could be

⁵⁹ Tribunale di Spoleto 1 July 2019 no 461.

⁶⁰ Corte d’Appello di Torino, 8 July 2019 no 1153.

⁶¹ Corte di Cassazione 15 March 2016 no 5091.

⁶² Federal Court of Appeals (BGH) 4 June 1992, NJW 1992, 3096, 3099.

⁶³ F. Parisi et al, ‘Access to Evidence in Private International Law’ 23 *Theoretical Inquiries in Law*, 77 (2022), use a simple analytical model to illustrate the effect of these procedural differences on individuals’ incentives to invest in private evidence technology, suggesting that the tension between the retrospective and the prospective effects of discovery of private evidence should be considered in the allocation of probatory burdens and the design of evidence rules. The impact of discovery practice on private information technology in the US has been widely documented in the empirical legal literature. A.R. Miller and C.E. Tucker, n 52 above studied the effects of state e-discovery rules on the adoption of electronic medical records by hospitals. The study suggests that in states that adopt e-discovery rules, hospitals reduced the use of electronic records to limit risks that they could be adversely discovered and used against them in future litigation.

used in court against the driver to prove his negligence when his non-negligence is presumed, the driver may be disincentivized from installing the dashcam.⁶⁴ Imagine the case of two individuals facing the risk of an accident in a regime of negligence liability with a defense of comparative or contributory negligence. The parties need to decide whether to invest in evidence technology, which can gather and save information that can be used as evidence in the event of an accident. The two individuals make their investment decision without knowing whether they will find themselves in the role of victims or injurers. In the absence of evidence technology, facts related to the accident are only partially verifiable by the factfinder.

Evidence technology can increase the verifiability of the information presented by the parties by recording the events of the accident. By investing in evidence technology, the party facing the burden of producing evidence has an increased probability to satisfy his or her burden of proof.

However, if the evidence in possession of one party is discoverable by the opposing party the evidence collected by the technology could be discovered by the opposing party and would also increase the opposing party's ability to satisfy its burden in the event of an accident. In cases characterized by role-uncertainty, such as ordinary traffic accidents by average drivers, the advantages and disadvantages of the evidence technology would be offset in most tort situations, eliminating the parties' incentives to invest in new evidence technology. Individuals would invest in private evidence when undertaking activities that put them in a position of prospective victims more often than in a position of prospective injurers, and/or in situations where defenses of contributory or comparative negligence have a high likelihood of application.⁶⁵ Making private evidence discoverable discourages investments in technology in tort scenarios characterized by symmetric role-uncertainty.⁶⁶

⁶⁴ In turn, insurance companies would not want to encourage the adoption of dashcams by offering premium discounts, knowing that the evidence collected by this technology would increase the exposure of their insureds, with an increase in the expected liability of the insurance company. Not surprisingly, although in the US several insurance companies offer discounts if 'telematic' devices without video recording are installed to monitor drivers' driving patterns (eg, Progressive Insurance's Snapshot®), no US insurance company offers premium discounts to their insureds for installing dashcams with video recording. Conversely, many insurance companies in Europe—and every insurance company in Italy—offer premium discounts to drivers who voluntarily install webcams on their vehicles. See A. Guerra and F. Parisi, n 47 above.

⁶⁵ Asymmetries in the parties' role-probabilities can arise for a variety of reasons: activities differ in nature; riskier activities are statistically more likely to cause harm to others; parties may differ in their abilities to undertake effective precautions; etc. When role probabilities are asymmetric (eg, individuals who fear becoming victims of a tort of trespass or assault) the adoption of evidence technology, such as a webcams or bodycams, could be beneficial to record information that could enable victims to produce the necessary evidence against their injurers, with limited risk of backlash from the adversarial discovery of the evidence.

⁶⁶ As a plausible development in the future regulatory landscape of jurisdictions with discoverable evidence, it is conceivable that policies may be introduced to mandate the adoption and use of recording devices: if such recording devices exist and are not expensive, why should lawmakers encourage those who are more likely to be in violations of duties of care to shield their

Things work differently when parties operate in jurisdictions that grant limited discovery of private evidence technology. In the face of a tort scenario with role-uncertainty, evidence technology will increase a party's ability to satisfy his burden of production with no backlash effect. When private evidence technology is not discoverable, the optimal strategy for the parties in both prospective roles as injurers and victims is to adopt evidence technology when the benefit of the evidentiary advantage is higher than the cost of acquiring and using the technology. The adoption of affordable technology becomes a rational decision for both parties.⁶⁷

IV. Conclusions

Activities that provide grounds for liability vary in complexity and access to information. Consider the case in which the injurer's negligence took the form of a given action or omission, like speeding above the posted limit. The proof by the plaintiff that speeding occurred is the equivalent of the proof by the defendant that speeding did not occur. There is nothing that logic can say about which of the two parties can more easily prove that fact and should bear the burden of proof in this case. If one party has better access to that information and can reliably supply new evidence to the factfinder, the optimal allocation of the burden of proof should then be on that party. So, if the plaintiff can more easily prove the speed at which the defendant was driving, thanks to the adoption of third-party evidence technology (eg, bodycams or other technology that might be available for those types of accidents), the burden should optimally be imposed on him. Conversely, if the injurer has a comparative advantage in proving lack of speeding, thanks to first-party evidence technology available on his car (eg, GPS or Blackbox technology capable of keeping track of his speed), the burden should optimally fall on him.⁶⁸ In many situations, drivers may be better able to keep a complete record of their own driving speed than prospective victims. Hence, the use of legal presumptions of negligence for traffic accidents and the resulting adoption of evidence technology observed in European jurisdictions may well be justified under the cheapest-evidence-producer criterion.

In this paper, we presented the diverse origin of rules of presumed negligence and presumed joint negligence in modern and contemporary European systems and compared their workings to the US system with special attention to negligent torts. Our discussion emphasized the fact that technology increasingly makes it possible for parties to keep records of their behavior. For example, car drivers can have a dashcam or a black box installed on their vehicles, capable of recording speed,

behavior, avoiding the adoption of socially desirable evidence technology?

⁶⁷ For a formal proof of these results, see the analysis carried out in A. Guerra and F. Parisi, n 47 above.

⁶⁸ On this point, see the reliability conditions identified by C.W. Sanchirico, 'Evidence Tampering' 53 *Duke Law Journal*, 1215 (2004).

braking, and other information. A driver facing a presumption of negligence and a burden of proving his diligent conduct might have an incentive to invest in a camera and black box (at least if the driver planned to exercise due care. Investing in such technology, however, could be to the driver's disadvantage if he failed to take due care: if a driver exceeded the speed limits or violated other traffic laws and his devices recorded his behavior, under US discovery rules, his counterpart in litigation could use the driver's recorded information against him. The more protective discovery rules followed in European jurisdictions would avoid this problem and encourage also drivers who are less likely to exercise due care to invest in evidence technology. The discussion further showed that the use of alternative legal presumptions leads to the adoption of different types of evidence technology by different groups of individuals. Presumptions of non-negligence incentivize prospective victims to adopt third-party focused technology. Presumptions of negligence incentivize prospective injurers to adopt first-party focused technology. Presumptions of joint negligence incentivize both prospective victims and prospective injurers to invest in first party focused technology.

In sum, jurisdictions such as Italy, that limit discovery of private evidence and adopt presumptions of joint negligence, provide superior tort incentives. By requiring both parties to provide evidence of their diligent behavior, these presumptions increase the access to evidence by courts, increasing the accuracy of adjudication and preserving tort incentives in the face of adjudication errors. Unfortunately, these conclusions do not provide an easy pathway for legal reform in different jurisdictions. Procedural rules on adversarial discovery affect the conditions for the effectiveness of presumptions of negligence and, in a way, explain the observed differences between the laws of different countries.