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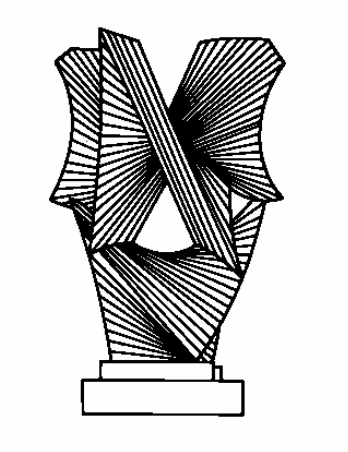

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"HOW'S MY DRIVING?" FOR EVERYONE (AND EVERYTHING?)

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Abstract:

This is a paper about using reputation tracking technologies to displace criminal law enforcement and improve the tort system. The paper contains an extended application of this idea to the regulation of motorist behavior in the United States and examines the broader case for using technologies that aggregate dispersed information in various settings where reputational concerns do not adequately deter antisocial behavior.

The paper begins by exploring the existing data on "How's My Driving?" programs for commercial fleets. Although more rigorous study is warranted, the initial data is quite promising, suggesting that the use of "How's My Driving?" placards in commercial trucks is associated with fleet accident reductions ranging from 20% to 53%. The paper then proposes that all vehicles on American roadways be fitted with "How's My Driving?" placards so as to collect some of the millions of daily stranger-on-stranger driving observations that presently go to waste. By delegating traffic regulation to the motorists themselves, the state might free up substantial law enforcement resources, police more effectively dangerous and annoying forms of driver misconduct that are rarely punished, reduce information asymmetries in the insurance market, improve the tort system, and alleviate road rage and driver frustration by providing drivers with opportunities to engage in measured expressions of displeasure.

The paper addresses obvious objections to the displacement of criminal traffic enforcement with a system of "How's My Driving?"-based civil fines. Namely, it suggests that by using the sorts of feedback algorithms that eBay and other reputation tracking systems have employed, the problems associated with false and malicious feedback can be ameliorated. Indeed, the false feedback problem presently appears more soluble in the driving context than it is on eBay. Driver distraction is another potential pitfall, but available technologies can address this problem, and the implementation of a "How's My Driving?" for Everyone system likely would reduce the substantial driver distraction that already results from driver frustration and rubbernecking. The paper also addresses the privacy and due process implications of the proposed regime. It concludes by examining various non-driving applications of feedback technologies to help regulate the conduct of soldiers, police officers, hotel guests, and participants in virtual worlds, among others.

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Harnessing the knowledge created by technologies that aggregate dispersed information has become a central concern of legal academics, economists, and policymakers in the new millennium. Some academic work has focused on information aggregators like Wikipedia, an online encyclopedia that anyone can contribute to, which is more extensive than Britannica and nearly as accurate.[1] Others have explored the virtues of information markets, which seem capable of predicting future events with greater accuracy than any assembled group of experts.[2] Still more academic work examines the growing importance of open source collaboration and peer production of intellectual property, where thousands of computer programmers scattered around the world team up to produce better code and then disperse immediately thereafter.[3] Simultaneously, many economists have explored eBay's extraordinarily successful system for aggregating and displaying reputation information for millions of unique users.[4] And organizational theorists have proselytized on behalf of various knowledge transfer strategies that improve performance in those companies and agencies that best facilitate the efficient flow of information up and down the chain of command.[5]

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[1] *See, e.g.*, CASS R. SUNSTEIN, INFOTOPIA: HOW MANY MINDS PRODUCE KNOWLEDGE ch. 5 (forthcoming Oxford Univ. Press 2006) (describing the benefits of Wikipedia and other resources for aggregating dispersed information); Jim Giles, *Internet Encyclopaedias Go Head to Head*: *Jimmy Wales' Wikipedia Comes Close to Britannica in Terms of the Accuracy of Its Science Entries, a Nature Investigation Finds*, 4381 NATURE 900, 900-01 (2005).

[2] *See, e.g.*, SUNSTEIN, *supra* note 1, at ch. 4; Michael Abramowicz, *Information Markets, Administrative Decisionmaking, and Predictive Cost-Benefit Analysis*, 71 U. CHI. L. REV. 933 (2004); Michael Abramowicz, *The Law-and-Markets Movement*, 49 AM. U. L. REV. 327 (1999); Saul Levmore, *Simply Efficient Markets and the Role of Regulation: Lessons from the Iowa Electronic Markets and the Hollywood Stock Exchange*, 28 J. CORP. L. 589 (2003); Charles R. Plott, *Markets as Information Gathering Tools*, 67 SOUTHERN ECON. J. 1 (2000); Charles R. Plott et al., *Parimutuel Betting Markets as Information Aggregation Devices*, 22 ECON. THEORY 311 (2003); Cass. R. Sunstein, *Group Judgments: Statistical Means, Deliberation, and Information Markets*, 80 N.Y.U. L. REV. 962 (2005).

[3] *See, e.g.*, SUNSTEIN, *supra* note 1, at ch. 4; Yochai Benkler, *Coase's Penguin, or, Linux, and the Nature of the Firm*, 112 YALE L.J. 369 (2002).

[4] *See, e.g.*, Mikhail I. Melnik & James Alm, *Does a Seller's E-Commerce Reputation Matter? Evidence from eBay Auctions*, 50 J. INDUSTRIAL ECON. 337 (2002); Paul Resnick & Richard Zeckhauser, *Trust Among Strangers in Internet Transactions: Empirical Analysis of eBay's Reputation System* 3 (NBER Workshop Paper 2001); Stephen S. Standifird, *Reputation and e-commerce: eBay Auctions and the Asymmetrical Impact of Positive and Negative Ratings*, 27 J. MGMT. 279 (2001).

[5] *See, e.g.*, Linda Argote & Paul Ingram, *Knowledge Transfer: A Basis for Competitive Advantage in Firms*, 82 ORGANIZATIONAL BEHAV. & HUMAN PROCESSES 150 (2000); Bradley C. Karkkainen, *Information as Environmental Regulation: TRI and Performance Benchmarking, Precursor to a New Paradigm?*, 89 GEO. L.J. 257 (2001); Margit Osterloh & Bruno S. Frey, *Motivation, Knowledge Transfer, and Organizational Forms*, 11 ORGANIZATION SCI. 538 (2000); Jeremy C. Stein, *Information Production and Capital Allocation: Decentralized Versus Hierarchical Firms*, 57 J. FINANCE 1891 (2002).

This paper takes the next step in the aggregation of dispersed information literature. Namely, it explores using information aggregation technologies to deter, detect, and punish citizen misconduct. This paper will propose that we do exactly that, focusing on the most promising and significant application of this approach to law enforcement: traffic regulation.

The stakes associated with the problem of traffic accidents and commuting-related stresses are enormous. Vehicular collisions are the leading killer of Americans aged 15 to 29,[6] and the nation's fourth most important cause of lost disability adjusted life years.[7] Worldwide, traffic accidents kill nearly 1.2 million people annually.[8] Recent economic research has placed commuting at the very bottom of the happiness index, easily ranking as the least pleasurable major life activity in which Americans engage.[9] Despite this, the average American worker spends more than 48 miserable minutes a day commuting to and from work,[10] completely frustrated by his inability to do anything about the relatively small number of obnoxious drivers who are imposing substantial costs on everybody else.

There is, in short, far more blood on the pavement in the realm of traffic law than there can ever be from intellectual property law, corporate law, or e-commerce. Yet while scholars in those fields have begun showing how aggregated information can be harnessed to improve laws and lives, scholars interested in transportation policy have virtually ignored these insights.[11] That blind spot is surprising, given that the dispersed

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[6] Michael Sivak, *How Common Sense Fails Us on the Road: Contribution of Bounded Rationality to the Annual Worldwide Toll of One Million Traffic Fatalities*, TRANSP. RESEARCH PART F 259, 260 (2002); Reginald G. Smart & Robert E. Mann, *Commentary: Is Road Rage a Serious Traffic Problem?*, 3 TRAFFIC INJURY PREVENTION 183, 187 (2002).

[7] Sivak, *supra* note 6, at 260. For an exploration of the social costs of traffic fatalities, see Gunnar Lindberg, *Traffic Insurance and Accident Externality Charges*, 35 J. TRANSPORT ECON. & POL'Y 399, 414 (2001) (estimating that the total social costs of traffic accidents in Sweden is equal to 2.7% of that nation's gross domestic product).

[8] For these statistic, see MARGIE PEDEN, THE WORLD REPORT ON ROAD TRAFFIC INJURY PREVENTION: GETTING PUBLIC HEALTH TO DO MORE 3 (Road Safety Congress 2005).

[9] Daniel Kahneman et al., *A Survey Method for Characterizing Daily Life Experience: The Day Reconstruction Method*, 306 SCIENCE 1776, 1777 tbl. 1 (2004).

[10] *See* http://www.census.gov/Press-Release/www/releases/archives/american_community_survey_acs/004489.html. This data includes all Americans who work outside their homes. The average two-way commutes exceeded one hour per day in New York City, Newark, Chicago, and Riverside, California.

[11] Although a few legal scholars have written in much detail about traffic law, and discussions about no-fault accident insurance once attracted some of the academy's leading scholars, traffic law scholarship is presently peripheral in legal academic discourse. It is not at all clear why that should be so. Besides the enormous number of lives and dollars at stake, traffic law remains the body of law with which ordinary

information relevant for transportation regulation purposes is so readily available and can be gathered quite inexpensively, yet virtually all of it presently goes to waste. Were that information harnessed, by contrast, it might be used to save thousands of lives and push criminal laws to the margins. In this case, the pertinent dispersed information consists of driver reputation scores.

Among the various technologies that have facilitated the aggregation of dispersed information, eBay's reputation system may have generated the most global wealth so far. We can underscore the importance of eBay's seller reputation scores by imagining what it would be like to buy items on eBay without them. Buyers would face the constant risk that a seller might abscond with the proceeds of a sale, necessitating substantial expenditures on escrow services for nearly every transaction. Even using escrow, there would be substantial problems in the absence of seller reputation rankings. Some buyers would discover after the fact that they had purchased counterfeit, defective, or stolen goods, and be left with little recourse tracking down and suing far-flung sellers. Law enforcement authorities might occasionally prosecute the worst offenders for mail fraud or trafficking in counterfeit goods, but the vast majority of wrongdoers would escape into the ether, taking the money of trusting buyers with them. As a result, buyers would be scared away from dealing with obscure sellers, and the prices paid for goods on eBay would drop substantially.[12]

A modern, urban freeway is a lot like eBay without reputation scores. Most drivers on the freeway are reasonably skilled and willing to cooperate conditionally with fellow drivers, but there is a sizable minority that imposes substantial costs on other drivers, in the form of accidents, delays, stress, incivility, and rising insurance premiums. Because enforcement of the traffic laws by police officers is sporadic and often targeted toward those offenses that are easiest to prove, as opposed to those that impose the greatest harm on motorists, insurance companies face substantial obstacles sorting among the good drivers and the bad. As a result, safe drivers pay higher premiums, and good

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Americans interact most frequently, and is the primary locus of citizens' interactions with the police. Moreover, traffic law is the only set of laws about which adult Americans are routinely tested, and is probably the body of law best understood by the lay public.

[12] This outcome reflects the "lemons" scenario developed in George A. Akerlof, *The Market for "Lemons": Quality Uncertainty and the Market Mechanism*, 84 Q.J. ECON. 488 (1970).

drivers who are part of demographic groups that are accident-prone pay far higher premiums than they would if insurance companies had perfect information.

Just as eBay developed a successful technological solution to the problem of online auctions among Internet users, there are sensible and attainable technological solutions to the problems created by motorist anonymity. These technological solutions could produce enormous social benefits in the form of lives saved, property damage avoided, everyday unhappiness alleviated, road rage mitigated, and law enforcement resources redeployed. An urban freeway contains thousands of motorists who are watching their fellow motorists driving well or poorly, and often talking (to themselves or passengers) about who is doing what. Harnessing this dispersed information by using available technologies could generate great welfare gains. Can this information be put to use? It appears so. The best available evidence suggests that using "How's My Driving?" placards on commercial vehicles substantially improves fleet safety. This paper proposes a massive expansion of these primitive placards with the implementation of a novel program called "How's My Driving?" for Everyone.

Part I discusses anonymity's central role in creating dysfunction on urban, suburban, and exurban roadways. It discusses the existing evidence regarding How's My Driving programs for commercial fleets, all of which suggests that the programs substantially reduce vehicular collisions. Part II makes the case for a universal How's My Driving program, whereby all drivers would be required to participate in a reputation monitoring regime. Such a program would enable society to put scarce law enforcement resources to better use, ensure that the forms of motorist misconduct that impose the greatest costs on others receive the harshest sanctions, and reduce information asymmetries in the insurance market. It could also make commuting a far less miserable experience while reducing road rage. Part III explores the potential drawbacks associated with a mandatory and universal How's My Driving program. This Part assesses the magnitude of the inaccurate or malicious feedback problem, examines the associated driver distraction costs, considers the privacy objections, and compares the effectiveness of How's My Driving feedback to purely automated safe driving technologies. This Part concludes by examining whether a mandatory, universal How's My Driving scheme is preferable to letting the market do as it will. Part IV discusses the many variations and

policy options that would arise if the government did implement a How's My Driving for Everyone regime. Part V considers the broader theoretical importance of the insights derived from this case study by exploring other policy domains in which the approach of replacing state policing with reputation tracking and decentralized enforcement could pay dividends. It suggests that How's My Driving-style regimes have the capacity to displace the state's roles in enacting and enforcing substantive laws. To that end, it ponders the question of when such displacement is appropriate. A brief conclusion follows in Part VI.

I. Anonymity and Aggressive Driving

"Motorist anonymity" arises when another driver observes my behavior but is unable to identify me as Lior Strahilevitz, as opposed to, say, some guy in a dark green Honda Civic. The problems associated with urban and suburban driving are, by and large, creatures of motorist anonymity. That statement may seem too bold to readers used to hearing about drunken driving, drowsy driving, and road rage. But a review of the literature on driving suggests that these problems stem from roadway anonymity. If society was able to watch all its roadways around the clock, and analyze this data to identify problematic motorists immediately and take corrective action, many of the traffic accident deaths that occur every year would be averted.

The evidence for this linkage between anonymity and aggressive driving is reflected in numerous studies, all of which reach essentially the same conclusion.[13] People are more likely to drive aggressively when they can avoid sanctions, but drive courteously when the believe they will be accountable for misconduct. The cleverest of these studies find that drivers of convertibles behave more aggressively with their tops up than their tops down,[14] even though hotter weather is associated with both one's top

[13] *See, e.g.*, Ann M. Brewer, *Road Rage: What, Who, When, Where, and How?*, 20 TRANSPORT REVS. 49, 55 (2000); Patricia A. Ellison et al., *Anonymity and Aggressive Driving Behavior: A Field Study*, 10 J. OF SOC. BEHAV. & PERSONALITY 265, 266-71 (1995); Richard Harding et al., *Road Rage and the Epidemiology of Violence: Something Old, Something New*, 7 STUDIES ON CRIME & CRIME PREVENTION 221, 235-36 (1998); Rebecca Lawton & Amanda Nutter, *A Comparison of Reported Levels and Expression of Anger in Everyday and Driving Situations*, 93 BRITISH J. OF PSYCH. 407, 408, 420 (2002); Leo Tasca, *A Review of the Literature on Aggressive Driving Research*, working paper available in <http://www.aggressive.drivers.com/papers/tasca/tasca.pdf>.

[14] Ellison et al., *supra* note 13, at 266-71.

being down and aggressive driving.[15] This observational evidence is consistent with data showing that road rage is rare in those areas where roadway anonymity is diminished, such as small rural communities,[16] and that people drive more aggressively when they are driving alone than when there are passengers in their cars.[17]

The linkage between aggressive driving and negative roadway outcomes, such as accidents, near misses, high-stress situations, and road rage, is similarly uncontroversial, though its magnitude is the subject of some debate.[18] In the most extensive literature review to date, Galovski, Malta, and Blanchard concluded that "more than 40 years of descriptive and experimental research studies have supported a reliable association between aggressive driving and increased risk of motor vehicle accidents."[19] According to the National Highway Traffic Safety Administration, aggressive driving causes approximately one-third of all motor vehicle accidents in the U.S. and two-thirds of all domestic vehicular fatalities.[20] Motorists agree that the problem is very serious, with

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[15] L.F. Lowenstein, *Research into Causes and Manifestations of Aggression in Car Driving*, 70 POLICE J. 263, 265-66 (1997). In commuting environments where strangers interact face to face, levels of cooperation and other-regarding behavior are higher than they are on urban freeways. *See, e.g.*, Matthew L. Fried & Victor J. DeFazio, *Territoriality and Boundary Conflicts in the Subway*, 37 PSYCH. 47, 55 (1974) (describing cooperative behavior among subway passengers).

[16] CHRIS S. DULA, VALIDITY AND RELIABILITY ASSESSMENT OF A DANGEROUS DRIVING SELF-REPORT MEASURE, PHD DISSERTATION IN PSYCHOLOGY, VA. POLYTECHNIC INST. 1 (Mar 26, 2003); Harding et al., *supra* note 13, at 225.

[17] T. Rueda-Domingo et al., *The Influence of Passengers on the Risk of the Driver Causing a Car Collision in Spain: Analysis of Collisions from 1990 to 1999***,** 36 ACCIDENT ANALYSIS & PREVENTION 481, 486 (2004); David Shinar & Richard Compton, *Aggressive Driving : An Observation Study of Driver, Vehicle, and Situational Variables*, 36 ACCIDENT ANALYSIS AND PREVENTION 429, 433 (2004).

[18] Jerry L. Deffenbacker et al., *Development of a Driving Anger Scale*, 74 PSYCH. REPORTS 83, 84 (1994); Frank A. Drews et al., *On the Fast Lane to Road Rage*, PROCEEDINGS OF THE SECOND INTERNATIONAL DRIVING SYMPOSIUM ON HUMAN FACTORS IN DRIVER ASSESSMENT, TRAINING AND VEHICLE DESIGN 1 (2003); Reginald G. Smart et al, *Can We Design Cars to Prevent Road Rage?*, 1 INT. J. VEHICLE INFORMATION & COMMUNICATION SYSTEMS 44, 46 (2005); Tasca, *supra* note 13, at 3; *see also* Elizabeth M. Grey et al., *Driver Aggression: The Role of Personality, Social Characteristics, Risk and Motivation* 49 (Federal Office of Road Safety Report No. CR 81 March 1989) (noting that the most accident-free drivers tend to be compulsively non-aggressive); Louis Tijerina, *Issues in the Evaluation of Driver Distraction Associated with In-Vehicle Information and Telecommunications Systems* 6, available in <http://www-nrd.nhtsa.dot.gov/departments/nrd-13/driver-distraction/PDF/3.PDF> (discussing the connection between tailgating and crashes).

[19] TARA E. GALOVSKI ET AL., ROAD RAGE: ASSESSMENT AND TREATMENT OF THE ANGRY, AGGRESSIVE DRIVER 13 (2006). The source uses "MVA" as the abbreviation for "motor vehicle accidents," and the text above has been changed to use the unabbreviated term.

[20] Prepared Statement of the Honorable Ricardo Martinez, Administrator, National Highway Traffic Safety Administration before the House Transportation and Infrastructure Committee Surface Transportation Subcommittee (July 17, 1997).

survey results showing that aggressive driving is three-and-a-half times more likely than drunk driving to be identified as the most pressing traffic safety problem.[21]

So far, our story is straightforward. People are prone to aggressive driving when they feel that anonymity shields them from liability or social sanctions. This aggressive driving, in turn, causes substantial traffic accidents and fatalities. But that is not the only connection between roadway anonymity and adverse traffic outcomes. A study by Harding et al. presents the most comprehensive account of the psychology of aggressive driving. The authors make a convincing case that aggressive behavior by anonymous drivers triggers further aggression by those around them, who wish to sanction violations of driving norms but feel powerless to do so in light of the anonymity of the norm violators.[22] That is, many motorists who witness bad driving or aggressive driving become frustrated by their inability to sanction the offending motorists, and, as a result, they often engage in retaliatory aggressive driving or, worse yet, extreme acts of felonious road rage.[23] This research suggests that the absence of a measured social sanction for roadway norm violations can prompt extreme overreactions. Many aggressive drivers, on this account, are driving aggressively in an attempt "to communicate to other road users that there are angry."[24] Yet the nature of roadway interactions makes it difficult to express this anger in a proportional way and even more difficult for offending drivers to express remorse unambiguously. In light of this data, we should expect to see programs that reduce roadway anonymity substantially decreasing aggressive driving and vehicular collusions. The best available data from the most prominent such program strongly supports that hypothesis.

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[21] Shinar & Compton, *supra* note 17, at 429.

[22] Harding et al., *supra* note 13, at 222-31.

[23] *Id*.; *see also* Raymond W. Novaco, Automobile Driving and Aggressive Behavior 20 (University of California Transp. Ctr. Working Paper No. 42 July 1991) (noting that aggressive driving and pursuit are a common response, especially among males, when other motorists drive in an annoying manner); Sheila Sarkar et al., *Spatial and Temporal Analyses of the Variations in Aggressive Driving and Road Rage Behaviors Observed and Reported on San Diego Freeways* 6 (Calif. Instit. Transp. Safety Working Paper 2000) (arguing that road rage can result from retaliation against inattentive aggressive driving); Smart et al., *supra* note 18, at 47 (stating that obscene gestures or verbal abuse are precipitating factors in 64% of road rage cases).

[24] Lawton & Nutter, *supra* note 13, at 407.

A. "How's My Driving?" for Commercial Fleets

It is likely that readers of this paper have seen bumper stickers or placards emblazoned on the back of commercial trucks, vans, and busses asking the question: "How's My Driving? Call 1-800-XXX-XXXX with compliments or complaints." Motorists dial these phone numbers, typically using cellular phones, to report good or bad behavior by commercial drivers. The driver monitoring companies then make a report of each incident, including details about the reporter's identity, the road conditions, and the details of the incident. This data is immediately provided to the fleet operator, which usually investigates each incident, tracks reports about each driver, and conducts training sessions to correct recurring problems or sanctions repeat offenders where appropriate.[25]

In recent years, companies that operate How's My Driving ("HMD") programs have expanded their operations substantially.[26] This expansion has been fueled by various studies, mainly conducted by insurance companies, showing that the implementation of HMD placards, along with systems for monitoring the performance of individual drivers and investigating complaints, engender substantial reductions in accidents and losses. Reviewing these studies, Knipling et al. reported:

> Several studies, mostly by insurance providers, have researched the efficacy of using safety placards, such as "How's My Driving" stickers in improving safety in CMVs. These studies have shown significant reductions in vehicle crashes, insurance premiums, and DOT reportable crashes when fleets used safety placards with an effective feedback loop, that is, feedback combined with training and instruction. (Johnson 1998, The Fund 1999; STN 1999; Driver's Alert 2002). For example, the Hanover Insurance Co. conducted a study with 11 different trucking fleets (n = 445 trucks) using "How's My Driving" safety placards and reported a 22% reduction in crash rate and a 52% reduction in crash costs after 1 year."[27]

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[25] RONALD R. KNIPLING ET AL., COMMERCIAL TRUCK AND BUS SAFETY: EFFECTIVE COMMERCIAL TRUCK AND BUS SAFETY MANAGEMENT TECHNIQUE: A SYNTHESIS OF SAFETY PRACTICE § 4.7 (2003).

[26] Trebor Banstetter, *How's My Driving Calls Keep Truckers in Line, Studies Say*, PALM BEACH POST, April 20, 1999, at 1A.

[27] KNIPLING ET AL., *supra* note 25, at § 5.3.4; *see also* Jim Emerson, *Driving Test: Hanover Ins. Co. Uses Teleservices Monitoring to Cut Insurance Losses*, DIRECT, Feb. 1, 1999, at T3, available in 1999 WLNR 5531465 (reporting results from the same Hanover study).

Other insurance company analyses, reported in press accounts, have found similarly substantial benefits from HMD, with Reliance Insurance Company finding that the implementation of HMD placards was associated with a 35% reduction in crash costs in the first year,[28] and Fireman's Fund Insurance finding a 20% reduction in accidents.[29] Unpublished insurance company studies, supplied to the author by Driver's Alert, a major player in the HMD market, suggested similar results: A Great West Casualty Company study of 78 trucking companies found that in the two years after they implemented HMD programs, loss ratios improved by 51%, and accident frequency dropped by 53%.[30] John Deere Transportation Insurance's study of 63 companies found a 45% decline in loss ratio and a 33% decline in accidents.[31] Other fleets instituting HMD programs have seen similar improvements.[32] Insurance studies of the installation of electronic monitoring "black boxes" in commercial fleets and passenger vehicles have produced, by contrast, 20% reductions in accidents.[33]

These results are striking, suggesting that existing HMD programs may result in large cost savings and prevent many injuries and deaths. That said, to the best of my knowledge, no study of the effectiveness of HMD programs has ever appeared in a peer-reviewed journal. This dearth of peer reviewed studies should prompt caution, in part because it would be useful to know whether the insurance industry studies adequately accounted for selection effects.[34] The results of a survey suggesting that many commercial fleet safety managers were not enamored with the effectiveness HMD programs might prompt further skepticism, although there were real survey design

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[28] Banstetter, *supra* note 26, at 1A.

[29] Deb Riechmann, *Firms Get Good Mileage out of "How's My Driving?"*, PHILA. INQUIRER C1 (Mar. 26, 1999).

[30] DRIVER'S ALERT: A VEHICLE SAFETY & INFORMATION SERVICE (unpaginated manuscript, on file with author).

[31] *Id.*

[32] *See, e.g.*, Joey Ledford, *How's My Driving? Draws a Response*, ATLANTA J. & CONST. B5 (Dec. 24, 2001); *How's My Driving? Helps Firms Slash Accident Rates*, FLEET NEWS, July 3, 1998, at 32, available in 1998 WLNR 5732045.

[33] MATTHIAS ROETTING ET AL., TRUCK DRIVERS' ATTITUDES AND OPINIONS 4 (Liberty Mutual Research Instit. for Safety 2004); Peter I.J. Wouters & John M.J. Bos, *Traffic Accident Reduction by Monitoring Driver Behaviour with In-Car Data Recorders*, 32 ACCIDENT ANALYSIS & PREVENTION 643, 649 (2000).

[34] More specifically, it may be that companies sign up for HMD programs when they are also implementing other beneficial safety measures, or that they are likely to sign up form HMD programs after

problems with this portion of the survey, which may explain that result.[35] On the other hand, those intrigued by the data presented above can take comfort that all the available studies point in the same direction, that some sophisticated insurance companies are willing to put their money where their mouths are by providing discounts to commercial fleets that implement HMD programs,[36] and that the market for HMD services has grown dramatically in the last few years, both in the U.S. and abroad.[37] In short, an increasing number of businesses have been betting big on this technology in recent years, and seem pleased with their investment. At the end of the day, then, there is reasonably strong evidence that HMD programs produce substantial improvements in fleet safety, and the evidence is certainly strong enough to warrant rigorous investigation by transportation scholars.

Let us assume that the existing data reveals a causal effect, and that HMD programs do reduce collisions and collision-related losses. To what can we attribute these improvements in fleet safety? There appear to be two mechanisms at play. First, the presence of these placards reminds commercial fleet drivers that they are accountable

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incurring unusually large losses from accidents during a particular year and that the HMD improvements reflect regression to the mean.

[35] Whereas many safety coordinators at commercial trucking companies did not rank "How's My Driving placards and 800 numbers" highly as an effective safety strategy, they ranked "continuous tracking of driver's crashes/incidents/violations" as the third most important safety strategy (among 28 strategies). KNIPLING ET AL., *supra* note 25, at 2.2.1 tbl. 1 & tbl. 2. Tracking crashes and violations is relatively easy for commercial fleets, but if "incidents" refers to something other than "crashes" and "violations" then the only way to track such "incidents" would be through driver reports or motorist reports obtained from HMD. Indeed, all HMD service providers provide both a toll-free hotline and detailed incident reports and tracking reports for particular drivers. It therefore seems likely that the survey designers' decision to disaggregate HMD placards from "continuous tracking" of driver conduct resulted in the former being ranked as less effective. Knipling et al. themselves echo a similar concern, noting forthrightly the puzzling fact that "safety managers and other experts rated the practice of crash, incident, and violation tracking as highly effective . . . but they did not highly value the monitoring of source safety behaviors creating these outcomes." *Id*. at § 5.3.5. An alternative explanation for the poor performance of HMD placards in the Knipling survey is that fleet safety managers are almost always former truck drivers, *id*. at § 2.1, and survey research reveals that truck drivers are typically hostile to receiving motorist feedback via HMD numbers, though they generally welcome feedback from fellow truckers and their safety supervisors. ROETTING ET AL., *supra* note 33, at 9; Yueng-Hsiang Huang et al., *In Vehicle Safety Feedback*, PROFESSIONAL SAFETY 20, 24 tbl. 3, 27 (Jan. 2005).

[36] Riechmann, *supra* note 29, at C1; s*ee also State Encounters Problem with Plan for "How's My Driving?" Stickers*, CHARLESTON GAZETTE & DAILY MAIL, Sep. 29, 2004, at 5A (noting that a 2002 study by the South Carolina Governor's Office of Fiscal Risk Analysis and Management predicted that the state government would save $2.5 million annually by placing HMD stickers on all state vehicles).

[37] *See, e.g.*, How's My Driving?, Nov. 2, 2005, at http://irishtrucker.com/articles/2004/april/hmd.asp

for behavior that is likely to annoy fellow motorists.[38] Being watched acts as a deterrent to bad acts. Second, the information obtained from HMD calls allows commercial fleets to identify the worst drivers for extra training or dismissal.[39] Typically, 80% of fleet drivers rarely receive complaints, and 10-20% receive complaints frequently.[40] This data is consistent with other industry data showing that at most commercial trucking firms studied, the worst 10-20% of drivers are responsible for the majority of all collisions.[41] It is also worth noting that the nature of the complaints logged by HMD companies suggests that motorists generally call to complain about driving behaviors that are particularly likely to lead to accidents. Driver's Alert data classifies all its calls into one of the following categories, and reports the frequency of calls as follows: "Speeding (21%); tailgating (11%); unsafe lane change (23%); Illegal Passing (4%); Failure to Yield (5%); Failure to Stop (6%); Illegal Parking (2%); Compliment (8%); Weaving (15%); Miscellaneous (5%)."[42] If most of these reports are truthful, then it is no wonder that commercial fleet managers are able to use HMD data to identify the most accident-prone drivers.[43]

B. The Expansion of "How's My Driving?" Programs to Automobiles

HMD programs began in the 1980s as a system for reducing commercial fleet crashes.[44] During the 1990s and in this decade, several companies began targeting a second market niche: passenger vehicles driven by teenagers.[45] The idea here is basically the same as in the commercial context. Vehicular collisions are the leading cause of

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[38] KNIPLING ET AL., *supra* note 25, at § 4.7.

[39] *Id*.

[40] *Id*. at § 5.3.4.; Emerson, *supra* note 27, at T3; *see also* Riechmann, *supra* note 29, at C1. ("More than 90 percent of the drivers are never targets of a complaint, said FleetSafe president Richard Lea.").

[41] KNIPLING ET AL., *supra* note 25, at § 5.2.1.; *see also* Riechmann, *supra* note 29, at C1 (asserting that "ninety percent of the incidents are caused by only 10 percent of the drivers").

[42] DRIVER'S ALERT, *supra* note 30; *see also* Emerson, *supra* note 27, at T3 (stating that the most common complaints to HMD call centers "include tailgating, running red lights, speeding, improper lane changes, and cutting off other drivers").

[43] *Truckers Turn Toward Safety When Being Monitored*, J. COMMERCE 12A (Nov. 16, 1998) ("Most commercial drivers are good drivers, but about 10 percent to 15 percent drive aggressively -- tailgating, weaving in and out of traffic, and speeding . . . That kind of driving causes severe crashes. And it's also the kind of driving that gets people annoyed enough to call the 800 number on the sticker.").

[44] Ledford, *supra* note 32, at B5.

[45] Rex Bowman, *Roanoke, Va., Business Lets Drivers Call in to Monitor Teen Performance*, RICHMOND TIMES-DISPATCH, Sept. 2, 2000; Michael Squires, *New Program to Help Parents Monitor Their Teenage Drivers*, LAS VEGAS REV. J. 2B (Jan. 19, 2003); Lynn Waddell, *Teen Driving: I'm Gonna Go Tell Mom!*, NEWSWEEK, May 10, 2004, at 9.

death for American youths.[46] Little wonder, then, that parents worry about their children's safety and the safety of nearby motorists and pedestrians. Under HMD-for-teens programs, placards and bumper stickers are installed on the teenagers' cars, and all incident reports are conveyed directly to the parents. So far, it does not appear that the effectiveness of these programs has been studied, although there is little reason to expect that the results would be much different from those associated with commercial fleet HMD programs.[47] HMD programs for teens elicit information that supplements accident reports and tickets. Parents of teens with "clean" driving records report receiving valid critical feedback through HMD stickers, which they then use to take corrective action.[48]

C. Inadequacies of Existing HMD Programs

The apparent effectiveness of HMD programs is rather surprising in light of the following fact: Complaints flow into HMD call centers at an unimpressive rate. For example, HMD decals on 3,000 Sysco trucks prompted only 435 incident reports to the HMD call center during 1998.[49] Data provided to the author by Driver's Alert revealed higher call volumes: 283 calls in a six month period for Sonic Express's 1330 vehicles in 1999; 15 calls in the same period for Northern Beverage's 98 vehicles; and, at the high end, 23 calls during the six-month period for Mass Construction's 20 vehicles.[50] Yet despite these rather low call volumes, insurance studies conducted during this era still showed that HMD programs resulted in substantial reductions in accidents and losses.

This relative dearth of calls is not entirely surprising, given that reports to HMD call centers are something of a public good. Drivers have virtually no economic incentive to complain about commercial fleet drivers whose vehicles sport HMD

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[46] Smart & Mann, *supra* note 6, at 187.

[47] Where HMD programs have achieved little market penetration, commercial and non-commercial drivers evidently engage in aggressive driving at approximately the same rates. Shinar & Compton, *supra* note 17, at 434. Shinar and Compton reached this conclusion on the basis of a large-scale observational study near Tel Aviv prior to 2003. *Id*. at 429, 430. "How's My Driving?" stickers first appeared on Israeli trucks and busses during 2005. Barry Newman, *Steering Committee*, JERUSALEM POST 4 (Dec. 8, 2005). Parents may have fewer driver training resources at their disposal than commercial fleet companies, but they also have few drivers to monitor, and might limit or revoke the driving privileges of teenagers whose actions generate complaints, while rewarding those whose call logs suggest they are good drivers. Bowman, *supra* note 45.

[48] Jean Nash Johnson, *Moms Make a Web Site to Monitor Teen Drivers*, ATLANTIC CITY PRESS, July 31, 2005, at G1.

[49] Riechmann, *supra* note 29, at C1.

placards, and incur some costs when doing so, in the form of cell phone airtime charges and an increased risk of a collision while reaching for the phone or a pen to facilitate an HMD report. Using a simplistic model of *homo economicus*, the question is why *anyone* bothers to contribute to this public good when doing so is costly.[51]

The same question can be asked in the eBay context, as well as in the context of services like Wikipedia, CNET.com, Amazon's product ratings, the Zagat Guide, Download.com, and Tripadvisor.com. Yet in all those contexts, an extraordinarily valuable public good has arisen based on the voluntary contribution of feedback from mostly anonymous or pseudonymous users. A recent study of Wikipedia, published in *Nature*, found Wikipedia entries on science matters to be roughly as accurate as Encyclopaedia Britannica's.[52] EBay is the online forum that attracts the greatest level of participation, with feedback provided by users in half of all transactions.[53] These feedback levels are high even though transaction partners do not expect to, and probably will not, engage in future transactions,[54] and even though a buyer whose seller has already provided favorable feedback has no incentive to provide feedback about the seller.[55] Not coincidentally, eBay is also the service where users face the lowest costs of providing feedback. Indeed, eBay's software encourages users to leave feedback by reminding them of the opportunity to do so after a transaction has been completed. The incentive to provide feedback is cast in various ways: as a civic duty, an act of reciprocity, a common courtesy, or a chance to reward good conduct and avenge misconduct.[56] Though eBay's reputation system is admittedly imperfect, it has been extraordinarily successful at preventing fraud among auction participants.[57]

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[50] Driver's Alert, *supra* note 30, Fleet Profile, at 1.

[51] Asking and answering these questions is a theme in some of my other work. *See, e.g.*, Lior Jacob Strahilevitz, *Charismatic Code, Social Norms, and the Emergence of Cooperation on the File-Swapping Networks*, 89 VA. L. REV. 505 (2003) (examining users' willingness to upload content on P2P file-swapping networks).

[52] Giles, *supra* note 1, at 900-01.

[53] Paul Resnick & Richard Zeckhauser, *Trust Among Strangers in Internet Transactions: Empirical Analysis of eBay's Reputation System* 3 (NBER Workshop Paper 2001).

[54] *Id*. at 9.

[55] *Id*. at 20.

[56] *Id*. at 5.

[57] Nolan Miller, *Eliciting Honest Feedback in Electronic Markets* 3 (John F. Kennedy School of Government Faculty Research Working Paper RWP02-039 August 2002); Rong Ruey Duh et al., *Control*

Robert Frank has suggested that an emotional desire for vengeance often motivates people to sanction those whose misbehavior imposes costs on others.[58] If we examine the nature of calls to HMD services, it appears that this desire for vengeance and concern for personal and community safety are the primary factors motivating individuals to call in complaints.[59] We know from a study of San Diego's freeways that motorists do call the police in nontrivial numbers to complain about fellow motorists' aggressive driving, despite the absence of an organized program to encourage such calls and the nonexistence of an organized effort by law enforcement to respond to these calls in a timely manner.[60] And when Maryland instituted a 1997 campaign asking motorists who observed aggressive driving to inform the state police by dialing #77 on their cell phones, the line received as many as 200 calls a day.[61] Yet when police receive reports of aggressive driving, they do not usually issue a citation unless they can intercept the vehicle that sparked the complaint and observe unlawful conduct.[62] It is also worth noting that unlike eBay, which exhibits a "Pollyanna effect," whereby feedback is overly positive,[63] HMD services elicit responses that are overwhelmingly negative.[64] The lesson here is that when it comes to driving, some people do gain welfare from sanctioning a misbehaving driver by reporting the misconduct to a 1-800 number. We can expect that when the costs of tattling fall, the quantity of tattling will rise.

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and Assurance in E-Commerce: Privacy, Integrity, and Security at eBay, 3 TAIWAN ACCOUNTING REV. 1, 15 (2002).

[58] ROBERT H. FRANK, PASSIONS WITHIN REASON: THE STRATEGIC ROLE OF THE EMOTIONS 53 (1988).

[59] *See supra* text accompanying note 42. Because of this dynamic, whereby people obtain utility by sanctioning those who engage in antisocial behavior, the methodological challenges that arise when surveys and other instruments attempt to elicit accurate information from respondents are mitigated. For discussions of some of these challenges in the survey context, see Tomas Philipson, *Data Markets and the Production of Surveys*, 64 REV. ECON. STUDIES 47, 60-67, 70-71 (1997) 47-73; Tomas Philipson & Anup Malani, *Measurement Errors: A Principal Investigator-Agent Approach*, 91 J. ECONOMETRICS 273, 280-96 (1999).

[60] Sarkar et al., *supra* note 23, at 2. The Sarkar study found that during a 3-month period in which the California Highway Patrol tracked calls related to aggressive driving on San Diego freeways, it logged 2000 such calls. *Id*. Ten percent of survey respondents in the same study reported that they have called the police on their cell phones to report aggressive drivers in the past. *Id*. at 18.

[61] Kevin Johnson, *Frustration Drives Road Rage*, TRAFFIC SAFETY 8, 10 (July/August 1997).

[62] Michael Miller, *How's My Driving? Behavior Can Impact Business Image*, SOUTH FLA. BUS. J., Dec. 14, 2001, available at <http://www.bizjournals.com/southflorida/stories/2001/12/17/story4.html>.

[63] Resnick & Zeckhauser, *supra* note 53, at 11. For a description of the Pollyanna effect, see *infra* text accompanying note 203.

[64] *See supra* text accompanying note 42.

Of course, the costs of tattling are falling, substantially. In the past decade, the number of Americans who own cell phones has skyrocketed,[65] as has the prevalence of cell phone use by motorists.[66] One would predict that the increased availability of cell phones has resulted in increased call volumes to HMD call centers, although in the last couple of years some states have tried to curtail driver distraction by mandating the use of hands-free devices.[67] The hypothesis put forward to explain the HMD program's effectiveness – that it deters bad driving and allows firms to target the worst drivers for training and/or dismissal – suggests that as call volumes increase, the effectiveness of these programs also increases.

I shall conclude this portion of the argument with what I regard as a critical fact that supports the hypothesis that there is a great deal of additional information about individual drivers that currently goes to waste. It comes from an ingenious experiment run by Andrew McGarver and Michelle Steiner.[68] McGarver and Steiner set up a controlled experiment whereby subjects, driving their own motor vehicles, believed their speed and distance perception were being evaluated by a researcher sitting in the passenger seat.[69] In fact, the questions the researcher asked each subject were a ruse, designed to distract the subject from the actual experimental stimulus. After several blocks, the subject's vehicle approached a stop sign, at which point the researcher hesitated to provide directions about how to proceed. In the mean time, a confederate driver approached the back of the vehicle, and began honking his horn.[70] The experimenter then measured the subject's response to this aggressive act, which was followed by the confederate's vehicle rapidly passing the subject's vehicle soon after the subject had made a right turn at the stop sign. McGarver and Steiner found that three-

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[65] *See U.S. Cell Phone Use Up More than 300 Percent, Statistical Abstract Reports*, available in <http://www.census.gov/Press-Release/www/releases/archives/miscellaneous/003136.html> (reporting that the number of cell phones in the United States increased from 34 million in 1995 to 159 million in 2003).

[66] U.S. DEPARTMENT OF TRANSPORTATION, NATIONAL HIGHWAY TRAFFIC SAFETY ADMIN., CELL PHONE USE ON THE ROADS IN 2002, at 7 fig. 4 (National Ctr. for Statistics & Analysis Sep. 2005) (estimating that between 2000 and 2002, the number of drivers using cell phones at any given time between 8am and 6 pm, in the United States increased from 501,593 to 850,753).

[67] Melissa A. Savage et al., *Traffic Safety and Public Health: State Legislative Action 2004*, at 10 (National Conf. of State Legislatures Dec. 2004 report No. 20).

[68] Andrew R. McGarva & Michelle Steiner, *Provoked Driver Aggression and Status : A Field Study*, 3 TRANSPORTATION RESEARCH PART F 167 (2000).

[69] *Id*. at 172.

[70] *Id*.

quarters of all subjects verbalized a negative response to this provocation.[71] "In the majority of cases, angered participants made negative statements about the other driver, such as 'what a jerk!' or 'this guy behind me is really ticked off!' as well as some common expletives."[72] This data suggests that drivers' verbal responses to aggressive driving are often essentially automatic. It is buttressed by survey research finding that sizable majorities of drivers admit that while driving alone they complain aloud about the conduct of their fellow drivers.[73] Sometimes, frustrated drivers feel the need to vent by saying something derogatory to the source of their frustration, and this venting can escalate existing roadway conflicts.[74]

To recap, people are already complaining to themselves about aggressive drivers.[75] People are complaining to their passengers as well.[76] And some people are complaining to the government even when not prompted to do so.[77] If only we could develop a system that harnessed these complaints without imposing a burden on drivers to reach for a cell phone, call an HMD number, and report the details to an operator, an enormous amount of additional evidence would be revealed about the identities of aggressive drivers. The public goods problem would essentially dissipate if McGarver and Steiner's result is generalizable.[78]

So let us survey this terrain. HMD placards generate rather modest per-vehicle call volumes, and these occasional calls are evidently sufficient to improve commercial fleets' safety performance through some combination of deterring aggressive driving and allowing firms to identify their worst drivers in an expeditious manner. These placards were apparently successful even in an era in which cellular phones were far less prevalent

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[71] *Id*. at 173.

[72] *Id*.

[73] Dula, *supra* note 16, at 6.

[74] Jacob L. Cayanus et al., *The Relationships between Driver Anger and Aggressive Communication Traits*, 22 COMMUNICATION RESEARCH REPORTS 189, 194-95 (2005).

[75] *See supra* text accompanying notes 71-72.

[76] *See supra* text accompanying note 73.

[77] *See supra* note 60 and accompanying text.

[78] It is possible that drivers are more likely to complain about an aggressive driver if there is a passenger in the car, and that some drivers are uncomfortable muttering to themselves. On the other hand, it is also possible that the presence of an authority figure actually inhibited subject's willingness to express negative comments about the aggressive driver. The best data on this question suggests that these conflicting effects roughly cancel each other out, and motorists are approximately as likely to complain

than they are today, and even though there are monetary and safety costs associated with reporting a driver's misconduct to an HMD call center. It stands to reason that by lowering the costs of reporting driver misconduct further, HMD systems could do a much better job of identifying the worst drivers. The next section sketches out such a system.

D. "How's My Driving?" for Everyone

HMD placards, which began with commercial fleets, are now migrating toward non-commercial vehicles driven by teens. Georgia required all state-owned vehicles, with the exception of police cars, to display HMD placards in June of 2005.[79] That same year, Israel became the first nation to mandate the display of HMD placards on all commercial vehicles.[80] This expansion of HMD raises the question: Why stop there? Why not, rather, expand HMD programs to include all motor vehicles driven in the United States and install in each vehicle a voice activated device that facilitates the reporting and tracking of motorist misconduct?[81]

Just as each new motor vehicle is required to have seat belts in order to be road legal on Interstate highways,[82] the federal government could mandate the installation of HMD placards or bumper stickers on the front and rear of each passenger vehicle in the United States. Each placard would provide a unique identifier for each vehicle.[83] By pressing a button on their dashboards and speaking into a steering-wheel-mounted speaker, motorists would be able to contact a national HMD call center, and provide the

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when driving alone as when driving with others. *See* Dula, *supra* note 16, at 6 (reporting a survey finding that **"**77% of men and 56% of women swear underneath their breath at other drivers").

[79] See <http://www.fleet-central.com/gf/t_inside.cfm?action=news_pick&storyID=19805> (visited Feb. 17, 2006).

[80] Newman, *supra* note 47, at 4.

[81] As best I can tell, this idea was first proposed publicly in a short post by a pseudonymous blogger in 2004. The blog post proposed a driver-to-driver feedback mechanism, discussed the possible use of the derived data by insurers, and suggested that eliminating anonymity among drivers would improve motorist performance. The blog post did not develop the idea in further detail or depth. *See* Red Herring, How am I Driving?, Blog Post, available at <http://blog.redherring.com/mt/archives/main/000220.html>.

[82] *See* Brian T. Bagley, Comment, *The Seat Belt Defense in Texas*, 35 ST. MARY'S L.J. 707, 718 (2004).

[83] Such a system would be superior to one that relied on existing license plates. Motorists sometimes have difficulty identifying out-of-state plates, which could generate false positives. (i.e., a motorist means to complain about Maryland FGE 344, but instead identifies the plate as Virginia FGE 344). HMD placards on the fronts of cars could be mounted ambulance-style, so as to facilitate reading them using rear-view mirrors.

vehicle's unique identifier to an operator in order to lodge compliments or complaints.[84] The law would require the illumination of the placard at night and mandate its visibility whenever the vehicle was moving. Law enforcement officials would be able to use the unique identifiers as well, to gauge instantly whether a particular vehicle's liability insurance was valid, after accessing a centralized registry.

For reasons that will be discussed in Part IV, it may well be the case that an optimal HMDFE would make use of additional new technologies, beyond placards and call centers. A more expensive system would use in-vehicle GPS technologies or cell phone triangulation to enable reporting without resort to a unique identifier, along the lines of "Red Toyota behind me, subtract 2 points," which would lower the driver distraction costs of reporting even further and possibly reduce the probability of erroneous reports if people misread unique identifiers. These higher-tech versions of HMD are described more fully in Part IV, but for the time being, we can discuss the low-tech versions currently being managed by Fleetsafe, Driver's Alert and other HMD companies for use in commercial fleets, supplemented by readily available vehicle-integrated cell phone technologies.[85]

Here is how this low-tech version would work. Suppose motorist *A* was driving along Interstate 5, and was suddenly cut off by motorist *B*, who did not signal a lane change, and who abruptly hit his brakes, forcing motorist *A* to brake suddenly. Under a How's My Driving for Everyone ("HMDFE") program, motorist *A* could contact a HMD call center, and say the following words: "896JXD402, subtract 1 point, driver cut me off without signaling." Each motorist would be allotted a particular number of positive and negative points that they could dispense to other motorists during a particular month. These points could be dispensed one-at-a-time or cumulatively, for extreme acts of aggression or kindness. The call center would then convert the call reports into incident data for each vehicle on the road, possibly using automated voice recognition software.[86]

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[84] The system could provide a 1-800 number to enable pedestrians, bicycle riders, and bus passengers to phone in reports as well.

[85] R. Lind et al., *The Network Vehicle – A Glimpse into the Future of Mobile Multimedia*, IEEE AES SYSTEMS MAG., at 27 (Sep. 1999).

[86] Such software already produces reasonably high accuracy levels, and dramatic improvements in accuracy are expected in the next few years. Scott S. Washburn, *Speech Recognition for On-Site Collection*

Motorists would receive a monthly or quarterly invoice from the HMDFE monitoring center, along with a bill (if negative points on their driving exceeded positive points) or a check (if positive points substantially exceeded negative points). These would be styled as civil fines and rewards.[87]

Call centers would record the phone number and name of the complainant, though this information would not be provided to the motorist whose driving sparked this complaint. HMDFE could be designed as a revenue neutral subsidy from bad drivers to good drivers, or, more likely, revenue collected could be used to offset the loss of government revenue from speeding tickets and other moving violations. Reports could also be made available to insurers, who would be free to use the data so obtained for premium setting purposes.

Given the apparent safety improvements associated with HMD programs, we can conceptualize HMDFE as a vehicular safety device designed to save lives and dollars. It is a new kind of device, however, one that harnesses the value of dispersed information that currently goes to waste. In the part that follows, I will develop in more detail the affirmative case for HMDFE. A few readers may be chomping at the bit to know how HMDFE could cope with false or malicious feedback, driver distraction costs, and other likely objections. These problems turn out to be manageable, though readers will have to wait until Part III to hear why that is so.

II. The Case for "How's My Driving?" for Everyone

There is an easy way of distilling my argument in Part I of this paper, which is that a world without HMDFE is like a world in which students evaluate their professors' teaching, but no one ever reads or analyzes these evaluations. The students are sitting in class each day. They form opinions about the quality of the teaching. They discuss with classmates the quality of the teaching without prompting. In such a world, someone

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of License Plate Data: Exploratory Application Development and Testing, 128 J. TRANSPORTATION ENGINEERING 481, 488 (2002).

[87] The civil nature of the system is also essential to avoid conflicting with the U.S. Constitution's Confrontation Clause. *See* Van Harken v. City of Chicago, 103 F.3d 1346, 1352 (7th Cir. 1997). As explained below, HMDFE permits motorists to penalize those who impose substantial costs on them, with the state acting as a clearinghouse that enforces those penalties (and distributes any rewards for courteous driving).

should design a standardized form to solicit feedback and designate a place where feedback forms can be deposited and tabulated. No one is saying student evaluations should be the only measure of teaching performance. But it would be crazy to deny the value of collecting and analyzing the data at a school where administrators care about the quality of the educational experience. It is similarly silly to leave professors without the accountability that student evaluations provide; many professors would still teach conscientiously, but more than a few would not. Yet in the driving context, the government's policy does nothing to facilitate the collection of this readily available feedback, and even when motorists call in to complain about their fellow drivers anyway, the government rarely bothers to investigate to see whether the complaints have merit.

In this part of the paper, I will suggest ways in which the driving context may be particularly well suited to harnessing the value of dispersed information. In the process, I will spend a fair amount of time discussing the criminal law and tort systems, which presently regulate traffic in the United States. In some ways, it is a shame that these two legal systems have already occupied this terrain, for HMDFE could prove to be a more attractive regulatory regime than either one. But the existence of these two systems hardly eliminates the need for HMDFE. Rather, we should consider HMDFE as a regime that will allow society to substantially improve the performance of its tort system and significantly scale back the resources presently devoted to criminal traffic enforcement.

A. Putting Scarce Law Enforcement Resources to Better Use

It is largely because of the absence of an effective HMDFE program or other effective reputation tracking regime that society must assign a substantial number of its law enforcement resources to policing the roadways. In state courts, traffic violations account for 55 percent of all incoming cases.[88] Moreover, when traffic citations are issued, and motorists decide to contest their citations, police officers must travel to traffic

[88] *See* National Center for State Courts, 2004 Court Statistics Project: Traffic, available in <http://www.ncsconline.org/D_Research/csp/2004_Files/EWTraffic_final_2.pdf> (visited Feb. 17, 2006).

court to testify and present evidence,[89] which is plainly not the best use of their time, but which follows from the criminal nature of traffic penalties.[90]

Needless to say, an HMDFE program would enable the government to redirect traffic police to other endeavors where dispersed information aggregation systems would be relatively ineffective at policing deviancy and crime. Alternatively, HMDFE would enable state and local governments to shift resources to government programs that further other objectives, like health care, education, or military defense. That is not to say that an HMDFE program would allow state and local governments to do away with traffic police altogether. Some police would still be necessary to help direct traffic around collision sites; to ensure that drivers did not disable their vehicles' HMD placards so as to evade the HMDFE system; to identify and impound cars driven by uninsured drivers; and perhaps to intervene in real time when an extremely reckless motorist's behavior triggers substantial numbers of reports from motorists.

Other tasks currently delegated exclusively to traffic police, like writing tickets for motorists who drive at excessive speeds or run red lights, could be delegated entirely to the HMDFE program. Indeed, when crashes occur, detailed police reports usually would be unnecessary. HMDFE communications centers could expect to receive several contemporaneous reports from other drivers who witnessed the collision, which would help resolve blameworthiness in many cases where it might otherwise be contested, and which would solve the chronic problem of collision underreporting, which is one of the more severe information asymmetries currently faced by automobile insurers.

B. Optimizing Monitoring of Roadway Violations

Police officers are little better than individual motorists in recognizing violations of traffic rules – they have tools like radar detectors at their disposal, and perhaps

[89] Roger C. Cramton, *Driver Behavior and Legal Sanctions: A Study of Deterrence*, 67 MICH. L. REV. 421, 433-34 (1969).

[90] Police time, of course, is not the only scarce resource. Respect for the police is scarce as well, too scarce in many urban environments. It is common to see motorists cooperating in an effort to thwart police enforcement of traffic laws. For example, motorists often flash their high beam headlights to warn oncoming traffic that a radar-gun toting traffic patrol officer is hiding behind the next bend. In this context, motorist cooperation to evade the law may reflect frustration with police enforcement, and that frustration may have spillover effects in other contexts where the presence of citizen respect for the police's law enforcement function becomes a life or death matter.

somewhat better expertise regarding those rules, but little comparative advantage beyond that. Whatever advantage individual police officers have over individual motorists is swamped, however, by two factors. First, the presence of a marked police car induces motorists to change their driving behavior radically, so as to comply with the law.[91] Second, police cruisers are dramatically outnumbered by other vehicles on the roadway.[92] An effective HMDFE program would essentially turn every vehicle into an unmarked police car, resulting in substantial reductions in unlawful or inconsiderate driving behavior.

Beyond their numerical advantage, there are reasons to expect that the quality of self-policing by motorists would exceed the quality of governmental policing. As an initial matter it is worth examining the problems associated with the present regime.

1. Suboptimal Police Monitoring

The bread and butter of many state and local police departments is writing speeding tickets. Published data on traffic citations issued in the U.S., broken down by violation type, is frustratingly rare. That said, Wisconsin is charmingly meticulous about tracking both traffic citations and crashes, and its data suggests that citations issued for speeding dramatically outnumber the citations issued for other dangerous driving activities. For example, in 2003, Dane County, Wisconsin issued more than 60 times as many speeding citations as tailgating citations.[93] Indeed, speeding citations there outnumbered the *combined* citations issued for tailgating, running stop signs, running red lights, illegal turns, illegal passing, unsafe backing, unsafe lane deviations, and

[91] A.S. Hakkert et al., *The Evaluation of Effects on Driver Behavior and Accidents of Concentrated General Enforcement on Interurban Roads in Israel*, 33 ACCIDENT ANALYSIS & PREVENTION 43, 59-61 (2001).

[92] *See* Cramton, *supra* note 89, at 435 ("There is so much driving behavior, and it is so dispersed in time and space, that traffic police, using present methods of surveillance and enforcement, face a virtually insurmountable task.").

[93] Calculated based on data provided at <http://www.danesheriff.com/03annual/citations.htm>. In Ontario, Canada, speeding accounts for more than half of all traffic convictions. Donald A. Redelmeier et al., *Traffic-Law Enforcement and Risk of Death from Motor-Vehicle Crashes: A Case-Crossover Study*, 361 LANCET 2177, 2179 (2003). A survey study of newly licensed teenaged drivers in northeast states found that of their first traffic citations, 66% were for speeding, 10% were for running a red light or stop sign, and failing to buckle up and making an illegal turn accounted for 4% of citations each. Anne T. McCartt et al., *Driving Experience, Crashes, and Traffic Citations of Teenage Beginning Drivers*, 35 ACCIDENT ANALYSIS & PREVENTION 311, 316 (2003).

inattentive driving by a factor of 6.6.[94] Targeting those who drive at excessive speeds may well be the optimal police strategy for raising revenue and minimizing traffic contests, because radar guns provide relatively objective evidence of a violations. Yet unless we make a series of unrealistic assumptions about the differential costs of speeding and speed-limit-enforcement versus other traffic infractions, it is unlikely that this substantial commitment of law enforcement resources to policing speed limits is the optimal strategy for improving road safety.[95] Wisconsin data, along with recent data from other states, suggests that a failure to yield contributes to more vehicle crashes than speeding, and tailgating contributes to slightly more accidents as well, although speeding does contribute to more fatal crashes.[96]

As a result of this emphasis on speeding, other traffic laws go under enforced. Survey data reveals that only 6.4% of motorists who admitted to running a red light recently have ever been ticketed for the practice, and that motorists are far more likely to have been involved in an accident where one motorist ran a red light than they are to have received a ticket for running a red light.[97] Police officers, in short, seem to be overpolicing the motorist misconduct that is easiest to detect and underpolicing the misconduct that leads to the most collisions. Perhaps these distortions explain the public's profound resentment of traffic police, especially among U.S. drivers, who are more aggravated by the presence of said police than they are by much of the misconduct

[94] Calculated based on data provided at <http://www.danesheriff.com/03annual/citations.htm>.

[95] John J. Bowen, *A Driver Looks at Traffic Enforcement*, 57 J. CRIM. L., CRIMINOLOGY & POL. SCI. 218, 218 (1966).

[96] *See* <http://www.dot.wisconsin.gov/safety/motorist/behaviors/aggressive/factors.htm>. New York's Department of Motor Vehicles reviewed 2003 crash data and concluded that a failure to yield contributed to 16% of crashes, tailgating contributed to 14% of crashes, and speeding contributed to 11% of crashes. *See* <http://www.nysgtsc.state.ny.us/hssp-06.htm>. Oklahoma data from the early 1990s presents similar findings, though speeding contributed to slightly more crashes than tailgating and inattention: Failure to yield contributed to 19% of crashes, tailgating contributed to 11% of crashes, speeding contributed to 12% of crashes, and inattention contributed to 9% of crashes. Michael J. Goodman et al., *Using Cellular Telephones in Vehicles: Safe or Unsafe?*, 1 TRANSPORTATION HUMAN FACTORS 3 (2000).

[97] Bryan E. Porter & Thomas D. Berry, *A Nationwide Survey of Self-Reported Red Light Running: Measuring Prevalence, Predictors, and Perceived Consequences*, 33 ACCIDENT ANALYSIS & PREVENTION 735, 738-39 (2001); *see also* Dula, *supra* note 16, at 3 (noting that 61% of survey respondents believe that anti-tailgating laws are inadequately enforced); Smart & Mann, *supra* note 6, at 184 (noting that many manifestations of road rage aren't illegal); *How's Your Driving? – Smart Motorist*, <http://www.smartmotorist.com/dri/dri.htm> (discussing various types of unsafe driving behaviors that are not proscribed by law or for which the relevant traffic laws are under enforced).

that these police are supposed to deter.[98] In the minds of many drivers, the cure for most unlawful driving is worse than the disease.

An additional shortcoming associated with primary police enforcement of traffic rules involves the entirely punitive nature of police regulation. That is to say, police officers focus almost exclusively on punishing poor driving, and do nothing to reward good driving. HMDFE can supplement intrinsic rewards for cooperative roadway behavior.[99]

2. Inadequacies of the Tort System

The criminal law system does not drive solo. The tort system deters and punishes motorists involved in collisions as well.[100] In a world with no automobile insurance and no judgment-proof drivers, we might anticipate that the tort system would deter collisions rather well. Of course, there would still be costs of relying on the tort system: litigation is expensive and slow; the costs associated with the tort system will diminish its ability to deter frequent but low-magnitude collisions; and trial outcomes are often unpredictable because of problems of proof and other factors,[101] engendering uncertainty that affects settlements that occur in the shadow of trial outcomes.[102]

For related reasons, legal scholars like Bob Ellickson have hypothesized that within close-knit groups reputation-based systems for enforcing social norms may outperform the tort system at preventing misconduct and resolving disputes about entitlements.[103] Ellickson studied the interactions of cattle ranchers in rural California, a

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[98] Timo Lajunen et al., *Dimensions of Driver Anger, Aggressive and Highway Close Violations and their Mediation by Safety Orientation in UK Drivers*, TRANSP. RESEARCH PART F 107, 118 (1998) (comparing British and American attitudes).

[99] Monetary rewards for cooperative driving should never be so high as to encourage people to engage in courteous driving as a fulltime job. *Cf.* Saul Levmore, *Carrots and Torts* 203, 208, *in* CHICAGO LECTURES IN LAW AND ECONOMICS (Eric Posner ed. 2000) (making this point about the inadvisability of rewards for those who wear seatbelts, as opposed to penalties for those who do not). There are too many cars on most urban and suburban expressways as is.

[100] Gary T. Schwartz, *Auto No-Fault and First-Party Insurance: Advantages and Problems*, 73 S. CAL. L. REV. 611, 614 (2000).

[101] RICHARD A. POSNER, ECONOMIC ANALYSIS OF LAW 602-04 (5th ed. 1998)

[102] Samuel R. Gross & Kent D. Syverud, *Don't Try: Civil Jury Verdicts in a System Geared to Settlement*, 44 UCLA L. REV. 1, 50-56 (1996)

[103] ROBERT C. ELLICKSON, ORDER WITHOUT LAW: HOW NEIGHBORS SETTLE DISPUTES 167 (1991); *see generally* Richard H. McAdams, *The Origin, Development, and Regulation of Norms*, 96 MICH. L. REV. 338, 409 (1997) (discussing subsequent scholarship that sheds light on the validity of Ellickson's hypothesis).

classic close-knit group, and found that in their dealings with each other they ignored the law of trespass, replacing it with neighborliness norms that were more efficient. One can conceptualize HMDFE as a technological fix that transforms a loose-knit group into a close-knit group, thereby enhancing the probability that welfare-maximizing social norms will emerge.[104] We might expect that just as norms evidently outperform trespass law in regulating cattle encroachments in rural California,[105] norms might outperform tort suits in regulating motorist behavior.

There is a critical difference between HMDFE and the type of norm enforcement regime that Ellickson described: the heightened importance of the automobile insurance market. Very quickly, an assessment of the tort system for regulating collisions requires an assessment of that market. In the automobile insurance market there are three fundamental and well-understood problems: moral hazard, adverse selection, and judgment-proof motorists.[106] HMDFE has the potential to ameliorate each of them.

The moral hazard problem is addressed because one would not expect to see the development of an insurance market to insure against fines that arose as a result of HMDFE reports. Just as one cannot insure against parking tickets or moving violations, we would not expect to see insurers viewing the HMDFE fines system as a regime that warranted their time. The fines would be too small for most motorists and the adverse selection problem too great to warrant entry by insurers. So whereas automobile insurance will reduce drivers' safety incentives somewhat, HMDFE should not be susceptible to the same problem.

The adverse selection problem is an information asymmetries issue. Motorists know more about their driving skills and propensities than insurance companies do, so

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[104] "Loose-knit groups are clusters of individuals among whom information pertinent to social control does not circulate easily. These loose-knit groups are typically composed of members who do not expect to be repeat players or who are unable to gather accurate information about another member's reputation even if repeat-player interactions do occur." Lior Jacob Strahilevitz, *Social Norms from Close-Knit Groups to Loose-Knit Groups*, 70 U. CHI. L. REV. 360-61 (2003).

[105] Ellickson, *supra* note 103, at 185-89.

[106] *See* Alma Cohen & Rajeev Dehejia, *The Effect of Automobile Insurance and Accident Liability Laws on Traffic Fatalities*, 47 J.L. & ECON. 357 (2004) (finding statistical evidence for the existence of moral hazard in the automobile insurance market); Steven W. Pottier & Robert C. Witt, *On the Demand for Liability Insurance: An Insurance Economics Perspective*, 72 TEX. L. REV. 1681, 1686 (1994) (discussing the adverse selection problem); S. Shavell, *The Judgment Proof Problem*, 6 INT'L REV. L. & ECON. 45 (1986) (discussing the problems created by judgment proof defendants in insurance markets).

unsafe drivers may try to take advantage of this asymmetry by obtaining generous insurance policies. Insurers will have a hard time distinguishing between unsafe drivers and risk averse drivers among the ranks of those seeking generous policies, and will expend substantial resources trying to exclude the former while insuring the latter. By providing insurers with far more information about individual drivers' behavior than they currently have, HMDFE can reduce this information asymmetry, thereby causing the insurance market to function much more efficiently.[107] The section that follows will examine the problems created by these information asymmetries in more detail.

Finally, HMDFE can address the judgment-proof defendant problem. Vehicular accidents are expensive occurrences, easily destroying thousands of dollars in property even if no injuries occur. Uninsured motorists may well be judgment proof with respect to these amounts. Where injuries do occur, the costs can escalate into the hundreds of thousands of dollars, an amount that vastly exceeds the payout limits on most drivers' insurance policies. Many Americans will be judgment proof when such figures are involved. Accidents, in short, are low-probability, high-cost events. HMDFE fines, by contrast, are high-probability, low-cost events. Many motorists who would be judgment proof with respect to tort damages, or who have insufficient income to obtain automobile insurance, will have sufficient assets to pay HMDFE fines, and the state will be in a strong position to collect these fines. Thus, HMDFE stands ready to deter those individuals, especially the uninsured, whose unsafe driving is insufficiently deterred by the present regime.

3. Reducing Information Asymmetries

As I suggested in the previous section, obtaining more complete information about driver conduct could permit insurers to make more fine-grained decisions about individual drivers' risk profiles and eliminate pernicious actuarial practices. Insurance

[107] Indeed, this information could have second-order benefits as well. The lack of information about driving propensities becomes a problem in tort trials, heightening the risk of an erroneous judgment. If HMDFE scores did correlate strongly with accident risks, then making HMDFE reputation scores admissible at trial could enhance the efficiency of the tort system. Presently, however, evidence of past accidents or traffic citations is inadmissible in most jurisdictions, except in cases where no eye-witnesses to an accident survived. *See* 61 C.J.S. MOTOR VEHICLES § 1079. Perhaps the inadmissibility of this information is itself connected to the sporadic nature of such data for most drivers. In that case, the less sporadic nature of HMDFE might address these concerns.

companies, of course, do get information about drivers from citation reports, reported collisions, and other losses. But the data available as a result of these sources still leaves large gaps in the system. These gaps are filled, in large measure, by resort to group-based premium setting,[108] imposing a collective sanction on all motorists who fit a particular profile. Information asymmetries thus raise substantial distributive justice concerns in the automobile insurance market.

Part of the problem is that, for most motorists, crashes are freakish events that occur very infrequently.[109] As a result, *A*'s past experience with crashes will not predict his future likelihood of a crash particularly well.[110] The problem is exacerbated by the substantial underreporting of vehicular collisions and systematic inaccuracies in collision reports,[111] as well as the prevalence of hit and run crashes, which account for approximately twelve percent of all collisions.[112] If insurers had more data about near misses, then future accidents could be predicted with improved accuracy[113] but near misses are rarely reported. In short, crashes occur rarely enough to render collision history an insufficient data source for safety evaluations. If only crash data could be supplemented with observational data, insurers could assess risks with much greater accuracy.[114]

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[108] For example, California insurers relied heavily on insured drivers' zip codes to set automobile insurance premiums after finding that drivers residing in certain neighborhoods were more likely to be involved in accidents. *See* Michael Liedtke, *Study Hits Insurance Rate Disparities*, CONTRA COSTA TIMES, Dec. 20, 2005, at F4. While insurers are prohibited by law from charging differentially on the basis of race, a good driver who moved from a predominantly white neighborhood to a predominantly African American neighborhood could expect to pay between $537 and $974 more for annual automobile insurance premiums. *Id*.

[109] Grey at al., *supra* note 18, at 19.

[110] Tijerna, *supra* note 18, at 6 (noting that involvement in property damage crashes are a poor predictor of fatal crashes); *see also* Baojin Wang, *Safety in the Road Environment: A Driver Behavioural Response Perspective*, 29 TRANSPORTATION 253, 255 (2002) (discussing other problems associated with using past accidents to predict future accidents).

[111] A.E. af Wahlberg, *Some Methodological Deficiencies in Studies on Traffic Accident Predictors*, 35 ACCIDENT ANALYSIS & PREVENTION 472, 474 (2003); M.J. Williams, *Validity of the Traffic Conflicts Technique*, 13 ACCID. ANAL. & PREV. 133, 142 (1981). Even countries that mandate the reporting of all accidents experience substantial underreporting. Jonathan Alsop & John Langley, *Under-Reporting of Motor Vehicle Traffic Crash Victims in New Zealand*, 33 ACCIDENT ANALYSIS & PREVENTION 353, 354 (2001).

[112] In 2003 in Wisconsin, there were 17,176 hit and run crashes and 140,265 total crashes. *See* WISCONSIN DEPT OF TRANSP., 2004 WISCONSIN TRAFFIC CRASH FACTS, Ch. 2, at 21 (July 2005).

[113] Tijerna, *supra* note 18, at 9.

[114] *Id*. at 5.

Information asymmetries present particularly daunting challenges for two high-risk groups: the youngest drivers and the oldest drivers.[115] Begin with the former group. Teenagers who have just received their driver's licenses are particularly accident prone[116] and are unusually likely to tailgate other drivers.[117] Yet information about teens' driving abilities is in short supply because they have driven so few miles, and even poor drivers have received few citations and been involved in few crashes.[118]

The situation with the elderly is in many ways similar. Seniors have lengthy driving records, but may see their driving abilities deteriorate rapidly because of slowed reflexes, worsening eyesight, dementia, and other health problems.[119] Seniors cause approximately ¼ of all fatal collisions, and they suffer disproportionately from collisions because of their lessened resiliency to trauma.[120] Indeed, per mile driven, older drivers are just as likely to be involved in accidents as novice drivers.[121] At the same time, seniors who retain their car keys do not drive very much,[122] so information about their driving abilities may be in short supply. Seniors typically compensate for their diminished driving abilities by driving more slowly. As a result, their fading driving skills may not be reflected in increased traffic citations.[123] State governments,[124] health care providers, and relatives often fail to recognize cognitive impairments in time or feel reluctant to take the keys away from a loved one.[125] Reference to HMD data on

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[115] On the heightened risks faced by very young and very old drivers, see David Schlundt et al., *Reducing Unintentional Injuries on the Nation's Highways: A Literature Review*, 15 J. OF HEALTH CARE FOR THE POOR AND UNDERSERVED 76, 84-85 (2004).

[116] McCartt et al., *supra* note 93, at 320.

[117] M. McDonald et al., *Close Following on the Motorway: Initial Findings of an Instrumented Vehicle Study* 4, Paper Presented at the 7th Vision in Vehicles Conference, Marseille, France, Sept. 1997

[118] *Id*. at 313, 320.

[119] Schlundt et al., *supra* note 115, at 85; Jane C. Stutts & Jean W. Wilkins, *On-road Driving Evaluations: A Potential Tool for Helping Older Adults Drive Safely Longer*, 34 J. SAFETY RES. 431 (2003).

[120] Margaret F. Brinig et al., Standards for Licensing and Driving 4 (Univ. of Iowa Law Sch. Working Paper 2005); Schlundt et al., *supra* note 115, at 85; Stutts & Wilkins, *supra* note 119, at 431.

[121] Marilyn Di Stefano & Wendy Macdonald, *Assessment of Older Drivers: Relationships Among On-Road Errors, Medical Conditions, and Test Outcome*, 34 J. SAFETY RESEARCH 415 (2003).

[122] ROBIN OLSON, SENIOR DRIVING ISSUES: UPCOMING CHALLENGES AND SOLUTIONS 9-10 (2004).

[123] *Id*. at 10; Sivak, *supra* note 6, at 266; *see also* Di Stefano & Macdonald, *supra* note 121, at 416 (noting that senior drivers rarely drive in excess of the speed limit).

[124] Stutts & Wilkins, *supra* note 119, at 431.

[125] Margaret A. Perkinson et al., *Driving and Dementia of the Alzheimer Type: Beliefs and Cessation Strategies Among Stakeholders*, 45 GERONTOLOGIST 676, 677 (2005); Victor G. Valcour, *Self-Reported Driving, Cognitive Status, and Physician Awareness of Cognitive Impairment*, 50 J. AM. GERIATRICS SOC'Y

individual teens and seniors would allow insurers to sort the good drivers from the bad more accurately.[126]

C. Controlling Secondary Effects from Aggressive Driving

The foregoing discussion focused on the tangible effects of reducing aggressive driving, as they relate to driver safety, lives saved, property damage averted, and traffic obstructed. Quite apart from these considerations, there are a number of external benefits that might be associated with the implementation of a HMDFE program to curtail aggressive driving. These benefits help underscore the value of HMDFE because they are benefits that the criminal law and tort systems do an exceedingly poor job of promoting.

1. Everyday Unhappiness

While the costs associated with driver deaths and injuries are quite substantial, they may well be dwarfed by the sheer unhappiness associated with commutes to and from work. There is reason to believe that HMDFE would alleviate much of this unhappiness. By making drivers accountable, HMDFE could make driving more pleasurable, and this effect, in and of itself, could result in enormous improvements in human happiness.

1265, 1266-67 (2002); *see also* Stutts & Wilkins, *supra* note 119, at 431 (noting that seniors often lose self esteem and personal freedom when they lose their driving privileges).

[126] The suboptimal policing point and the information asymmetries point, in conjunction, tell us something interesting about optimal law enforcement policy. Classic economic approaches to crime assume that society should set the penalty for a crime so as to make the crime's costs (to the criminal) exceed its benefits (to the criminal). *See* RICHARD A. POSNER, ECONOMIC ANALYSIS OF LAW 242 (5th ed. 1998); Gary S. Becker, *Crime and Punishment: An Economic Approach*, 76 J. POL. ECON. 169, 176-77 (1968). If existing penalties prove inadequate, resulting in too much crime, society can respond by raising the likelihood of apprehension or raising the penalty for those caught. In theory, the state will be indifferent as between these two strategies. In practice, given the costs associated with raising the likelihood of detection, classic law-and-economics analysis often points in the direction of ramping up penalties instead of increasing the risk of apprehension. *See* A. MITCHELL POLINSKY, AN INTRODUCTION TO LAW AND ECONOMICS 78 (2d ed. 1989); Bruce L. Hay, *Fee Awards and Optimal Deterrence*, 71 CHI.-KENT. L. REV. 505, 507 (1995). But where we have a vibrant insurance market in place whose premium-setting strategies piggyback on information generated by criminal enforcement actions, society should prefer law enforcement strategies that raise the likelihood of detection. Rare but severe state punishments will leave insurers in the dark about most of their customers' driving attributes and may wipe out those whose misdeeds are detected by law enforcement, rendering unlucky wrongdoers indifferent to the marginal effects of increased insurance premiums. Frequent but measured sanctions for misconduct, by contrast, will allow insurers to sort among safe and unsafe citizens more effectively. In those areas, like traffic enforcement, where a robust insurance market exists and where the state relies on sporadic

In recent years economists have begun exploring the value of happiness. Experimental work by Daniel Kahneman and coauthors has prompted research subjects to assess their state of well being when performing various daily life tasks.[127] The researchers used a large sample of working women and a day reconstruction method, whereby the subjects would record diaries at the end of each day detailing their activities and how they felt while doing them.[128] The study separated out sixteen major life activities and ranked them in order of how happy people felt doing them. Commuting to work ranked dead last, noticeably below the two next least popular activities of housework and working.[129] The average subject spent 1.6 unhappy hours per day commuting.[130] We know from other research that the vast majority of this time was spent alone, in their cars.[131]

Commuters, then, are a rather miserable lot. Why so glum? This is not a question that Kahneman and his co-authors asked, but there is data on this question from transportation scholars, all of which blames rudeness and aggressive driving. When Porter and Berry surveyed frustrated drivers in a 2001 paper and asked them what was the most important cause of their frustration, driver rudeness won in a landslide. Fully 43.5% of respondents stated that "discourteous drivers" was the greatest source of frustration, versus 20.8% who identified "congestion," 12.7% who identified "drivers not following the law," 4% who stated "too many stop lights," and 1% who complained most about the length of their commute.[132] This data echoed findings by other researchers,[133]

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enforcement and high penalties, the case for creating a supplemental source of information about citizen misconduct, such as HMDFE, becomes powerful.

[127] Kahneman et al., *supra* note 9, at 1776.

[128] For a discussion of some of the methodological challenges in well-being research, see Carol Graham, *The Economics of Happiness*, *in* THE NEW PALGRAVE DICTIONARY OF ECONOMICS (forthcoming 2d ed.).

[129] Kahneman et al., *supra* note 9, at 1777 tbl. 1. "Intimate relations" easily ranked first on the happiness score, followed by socializing, relaxing, praying, and eating. *Id*.

[130] *Id*.

[131] Lorna Aldrich, *Commuting and the Economic Functions of Small Towns and Places*, 12 Rural Dev. Persp. 26, 26 (1998); Craig N. Oren, *Getting Commuters out of Their Cars: What Went Wrong?*, 17 Stan. Envtl. L.J. 141, 163-64 (1998); Lior Jacob Strahilevitz, *How Changes in Property Regimes Influence Social Norms: Commodifying California's Carpool Lanes*, 75 IND. L.J. 1232, 1235 (2000).

[132] Porter & Berry, *supra* note 97, at 738 tbl. 2. 18.1% identified "other" primary concerns. The data suggests this unhappiness results from a "few bad apples" problem, as polls suggest that drivers view most of their fellow motorists as "courteous and gracious." Robert F. Blomquist, *American 'Road Rage': A Scary and Tangled Cultural-Legal Pastiche*, 80 NEB. L. REV. 17, 25 (2001).

and there is a psychological literature connecting road rage and vehicular collisions to clinical depression and post-traumatic stress disorder.[134] If we put together the Kahneman research with the transportation survey research, we very quickly arrive at the conclusion that aggressive driving is the source of substantial disutility that Americans encounter in they day-to-day lives. This disutility leads to collisions,[135] to be sure, but a useful result of the happiness research is to show that even if aggressive driving did not lead to any additional collisions, it would still be a substantial social ill worth addressing through public policy interventions.

2. Expressive Benefits

Standard approaches to criminal law assume that enforcing the law is an undesirable activity that the state's agents (police officers) must be paid to do. The limited data available from HMD programs, along with the data from governmental pilot programs designed to elicit information about aggressive driving, suggests that there is a substantial portion of the civilian population that is willing to tattle on unsafe and discourteous drivers, even if doing so entails some financial costs and no financial benefits.

The present approach to traffic regulation ignores the "consumer surplus" that would be associated with enabling lay people to express their opinions about fellow drivers to punish bad drivers and reward good drivers. But these expressive benefits ought to be an important part of the calculus, and not only because expressing these opinions might alleviate the frustration that sometimes engenders aggressive driving or road rage. Rather, they seem to produce genuine welfare gains for the drivers who feel

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[133] *See, e.g.*, Deffenbacker et al., *supra* note 18, at 85 (finding that illegal driving behavior annoys research subjects much less than various hostile gestures and discourtesy on the roadway); Lajunen et al., *supra* note 98, at 110 (finding that among 33 driving situations, nine out of the ten most frustrating situations to U.K. motorists were in the "discourtesy" or "hostile gestures" categories, including "someone cuts in and takes the parking spot you have been waiting for," "someone is driving very close to your rear bumper," "someone cuts in right in front of you on the motorway," "someone backs out right in front of you without looking," "at night someone is driving right behind you with bright lights on," "someone makes an obscene gesture toward you about your driving," and "someone speeds up when you try to pass them"); Shinar & Compton, *supra* note 17, at 429 (noting survey results in which road rage / aggressive driving was rated as the single greatest safety concern by 39% of poll respondents, versus 11% who said drunk driving).

[134] *See* Smart & Mann, *supra* note 6, at 187 (citing sources).

[135] *See, e.g.*, Deffenbacker et al., *supra* note 18, at 84.

impotent and stifled under the status quo but whose complaints would be taken seriously under a HMDFE regime.[136] The effects of law enforcement on the enforcers, in short, can be just as important as the effects on enforcees.

III. Objections to "How's My Driving?" for Everyone

Having made out what I believe to be a rather strong affirmative case for HMDFE, I shall now proceed to discuss some of the serious objections that no doubt have occurred to readers. Several of these objections have merit, although I shall suggest that, even in combination, they do not offset the advantages detailed above. Moreover, a few of the arguments that at first glance look like objections ultimately may strengthen the case for implementing HMDFE.

A. Inaccurate and Malicious Feedback

A HMDFE system is only as good as the feedback it receives, so it is worth examining the anticipated accuracy of said feedback. We can identify two quite different problems here: First, deliberately inaccurate (positive or negative) feedback, and second, feedback provided in good faith that turns out to be mistaken. The former issue presents greater challenges, and should be treated at length.

It is rather easy to imagine scenarios whereby HMDFE systems could be abused. Let us bring the most troublesome scenarios to the forefront. Suppose a racist driver cruises around town, assigning negative feedback to African American or Asian American motorists who are driving in an acceptable manner. Alternatively, imagine that HMDFE feedback is used as part of a harassment campaign against an unpopular individual for reasons having nothing to do with her driving performance. There is no doubt that if HMDFE is implemented, this type of distasteful conduct will occur, as will occasional inaccurately positive feedback. That said, there is reason to believe that such misconduct will be rare, that technology can ameliorate such problems when they do arise, and that the problems associated with biased drivers would be no worse than the problems created by biased cops in the current police-based traffic enforcement regime.

[136] Frustrated drivers often express their frustration and anger by honking their horns. This is an unsatisfying response, in that it imposes few costs on the source of the driver's frustration, and it also engenders substantial noise pollution externalities.

Commercial fleet drivers sometimes object to HMD programs based on a fear that callers will phone in false reports.[137] Yet it turns out that inaccurate reporting for commercial fleet drivers are uncommon in HMD programs, and anonymous reports generally are not permitted, although the identity of callers is not reported to the offending drivers.[138] Rather, the pattern of calls to HMD call centers suggests that the concern about false reports are overblown. A small minority of drivers prompt the majority of calls, and after these drivers are identified for retraining or discharge, fleet accident rates drop sharply.[139] This evidence cannot be reconciled easily with the hypothesis that many HMD calls are motivated by racial animus, harassment, or pranks. To be sure, drivers of passenger vehicles might be more susceptible to malicious reports thanks to the greater proximity of the driver to his or her rear bumper, and women and minorities may be underrepresented in the ranks of commercial drivers. Still, while one might expect to see more prejudiced feedback in HMDFE than HMD for commercial vehicles, there is little reason to expect a plethora of false reports in the HMDFE context.

The phenomenon of false feedback is a concern that arises in online reputation regimes, and software developers, as well as economists, have developed algorithms that can detect deliberately false feedback. Essentially, the idea is that the system discounts outlier scores – instances in which a buyer gives negative feedback on an overwhelmingly well-rated merchant or vise versa.[140] There is a cost to eliminating these outliers, in that a good merchant sometimes behaves badly, just as a good driver sometimes makes mistakes.[141] That said, in an environment like eBay, where most users are behaving honestly, algorithms designed to weed out likely false reports are welfare enhancing.[142] Moreover, it is worth emphasizing that online reputation tracking

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[137] Banstetter, *supra* note 26, at 1A.

[138] *See* DRIVER'S ALERT, *supra* note 30, at Frequently Asked Questions 1; *see also* Safety Alert, Frequently Asked Questions, <http://www.safetyalert.com/faq.asp#serviceswork> (claiming that 99% of all calls logged by a HMD monitoring company represent valid complaints).

[139] Emerson, *supra* note 27, at T3; KNIPLING ET AL., *supra* note 25, at § 3.12.

[140] Chrysanthos Dellarocas, *Immunizing Online Reputation Reporting Systems Against Unfair Ratings and Discriminatory Behavior* 153, *in* PROCEEDINGS OF THE 2ND ACM CONFERENCE ON ELECTRONIC COMMERCE (2000).

[141] *Id*. at 155; Bin Yu & Munindar P. Singh, *A Social Mechanism in Reputation Management in Electronic Communities*, CIA 2000, LNAI 1860, at 154, 164 (2000).

[142] Sonja Buchegger & Jean Yves Le Boudec, *The Effect of Rumor Spreading in Reputation Systems for Multiple Ad-hoc Networks* 9, Working Paper presented at WiOpt '03: Modeling and Optimization in Mobile, Ad Hoc and Wireless Networks, Sophia-Antipolis, France (March 2003).

technologies are still in their infancy, and dramatic improvements to the eBay system for identifying false feedback can be expected in the years ahead.[143]

These algorithms could be adapted to the HMDFE regime quite readily. Indeed, by gaining more information about drivers than eBay has about buyers and sellers, the system could police racist and other forms of problematic feedback quite effectively. For example, if a HMDFE system knows the race of various drivers, it can discount or ignore entirely the ratings of white drivers who routinely assign suspiciously high levels of negative feedback to African American drivers. Similarly, if the system knows where people work, study, and live, it can discount or ignore feedback among people who live in the same household, attend the same high school, or who work for the same company.[144] Moreover, the system can discount repeat evaluations among the same drivers. In an urban environment, if one driver or a group of drivers are repeatedly giving positive or negative feedback to another driver, there is probably something fishy going on, and the system can ignore these suspicious rankings.[145] In other words, so long as we are willing to seed a HMDFE system with information about characteristics that might form the basis for inaccurate feedback, the use of algorithms can more effectively ameliorate the problems associated with deliberate inaccuracy.

In some respects, HMDFE would be better equipped to deal with malicious feedback than the online reputation sites. Online reputation sites suffer somewhat because users with poor reputations can always "flush" their existing identities and start over with a blank slate.[146] A HMDFE would use each participant's unique identifier (vehicle VIN numbers and / or driver's license numbers) to prevent these sorts of evasions. A well-designed HMDFE system, in short, ought to be able to ameliorate the problems with malicious feedback. Like Wikipedia, eBay, and open source projects, it

[143] Miller, *supra* note 57, at 27.

[144] Collusive ratings are a problem for online feedback systems generally, though eBay has been able to keep this problem at tolerable levels to date. Chrysanthos Dellarocas, *The Digitization of Word-of-Mouth: Promise and Challenges of Online Reputation Mechanisms* 26 (MIT Sloan Working Paper No. 4296-03 2003).

[145] Scholars who study reputation networks have identified this problem and shown how it can be solved if participants use unique identifier numbers (e.g., VIN numbers or driver's license numbers). Jay Schneider et al., *Disseminating Trust Information in Wearable Communities*, 4 PERSONAL TECHNOLOGIES 245, 247 (2000).

will not be able to eliminate malicious information entirely. But algorithms, combined with driver information from motorist reports, pre-existing government records, and third-party databases, provide a promising substitute for Wikipedia's voting system, eBay's fraud patrols, and open source filtering mechanisms.[147]

One additional point is worth emphasizing on this score. It is not appropriate to compare a HMDFE regime with occasional inaccurate reporting to an ideal system of police enforcement of traffic laws. Police enforcement in the real world is distinctly not first-best. Police officers are prone to the same biases as other people,[148] and training to correct for those biases is imperfect. Delegating traffic enforcement to drivers themselves is a nice way of ensuring that traffic enforcers reflect the demographics of the surrounding communities.

What about feedback that the caller believes to be true, but that turns out not to be accurate? On the whole, the experience of companies using HMD programs and the experimental research on driving attitudes suggests that the signal-to-noise ratio from HMDFE would be comfortingly high. There is, admittedly, some evidence to suggest that individuals may rely on stereotypes to generate their opinions of what contributed to a particular collision. After presenting research subjects with written descriptions of accidents and asking them to assign blame, Lawrence and Richardson found that gender

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[146] Cynthia G. McDonald & V. Carlos Slawson, Jr., *Reputation in an Internet Auction Market*, 40 ECON. INQUIRY 633, 640 (2002).

[147] The solid performance of various "peer assessment" metrics, such as "360 degree" feedback, in business and education settings provides further support for the proposition that drivers' feedback about fellow motorists' behavior will be informative. *See, e.g.*, Peter A. Bamberger et al., *Peer Assessment, Individual Performance, and Contribution to Group Processes: The Impact of Rater Anonymity*, 30 GROUP & ORG. MGMT. 344, 367 (2005); Phil Davies, *Computerized Peer Assessment*, 37 INNOVATIONS IN EDUC. & TRAINING INT'L 346, 353-54 (2000).

[148] *See, e.g.*, Matthew Petrocelli et al., *Conflict Theory and Racial Profiling: An Empirical Analysis of Police Traffic Stop Data*, 31 J. CRIM. JUSTICE 1, 8 (2003) (finding that police officers are much more likely to conduct searches of African American motorists than other motorists, and that the success rates of searches of African Americans are disproportionately low as a consequence); Jeff Rojek et al., *The Influence of Driver's Race on Traffic Stops in Missouri*, 7 POLICE Q. 126, 143-44 (2004) (same). A widely cited paper by Knowles, Persico, and Todd argued against the existence of widespread racial bias in police searches of motorists in Maryland, see John Knowles et al., *Racial Bias in Motor Vehicle Searches: Theory and Evidence*, 109 J. POL. ECON. 203 (2001). More recent work by Knowles has backed away from that claim after analyzing Missouri data that suggests the existence of racial bias, especially against Hispanics, in traffic stop-based searches. *See* Ruben Hernandez-Murillo & John Knowles, *Racial Profiling or Racist Policing? Bounds Tests in Aggregate Data*, 45 INT'L ECON. REV. 959, 981-84 (2004).

and car type significantly affected these judgments.[149] More specifically, male drivers were judged to be more aggressive (a stereotype that is consistent with other data),[150] and female drivers were judged to be more careless (a stereotype that is not supported by other data).[151] Similarly, BMW drivers were judged more likely to have behaved aggressively than drivers of tiny Smartcars (a stereotype that is consistent with some, but not all, of the other data).[152] In laboratory settings, then, people are influenced by external factors in designating other drivers as blameworthy.

In real-world settings, where aggressive driving often provokes visceral responses, these biases tend to fade into the background. For example, the intensity of driver reactions and the length of their verbal response did not differ when they were confronted by honking low-status or high-status vehicles on the roadway, although research subjects did accelerate more quickly to get away from honking drivers of low-status vehicles.[153] This suggests that the data produced by a HMDFE data will not perfectly reflect what actually happens on the roadways, but it should reflect it well enough to cause the system to operate reasonably well. Indeed, other feedback systems, such as eBay's, should be susceptible to some of the same biases, based on seller names and existing reputation, and yet those feedback systems are generally hailed as major successes. Moreover, keeping in mind the relevant comparison is again useful here. Police officers will hold many of the same subconscious biases,[154] and these biases may

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[149] Claire Lawrence & Jane Richardson, *Gender-Based Judgments of Traffic Violations: The Moderating Influence of Car Type*, 35 J. APPLIED SOC. PSYCH. 1755, 1768-69 (2005).

[150] *Id*. at 1771; Shinar & Compton, *supra* note 17, at 432.

[151] Lawrence & Richardson, *supra* note 149, at 1771.

[152] *Id*. at 1770. On the accuracy of vehicle-based stereotypes, compare Barbara Krahe & Ilka Fenske, *Predicting Aggressive Driving Behavior: The Role of Macho Personality, Age, and Power of Car*: 28 AGGRESSIVE BEHAV. 21, 26-27 (2002) (finding that drivers of high-performance cars rated higher on an aggressive driving scale); and Reginald G. Smart, *Road Rage Experience and Behavior: Vehicle, Exposure, and Driver Factors*, 5 TRAFFIC INJURY PREVENTION 343, 345 (2004) (finding that drivers of high-performance vehicles were more likely to report having engaged in road rage than drivers of other vehicles, but finding no significant differences between SUVs, minivans, trucks, and cars), *with* Shinar & Compton, *supra* note 17, at 433 (finding no correlation between vehicle status and the propensity to drive aggressively).

[153] McGarva & Steiner, *supra* note 68, at 174. This response may well be rational, as the driver of a low-status vehicle is more likely to be uninsured, so drivers should expect that the out-of-pocket costs associated with a collision with a low-status vehicle would be higher. A much earlier study found that people do honk more quickly at the driver who has failed to proceed after a red light turns to green when he is behind the wheel of a low-status vehicle than a high-status vehicle. Anthony N. Doob & Alan E. Gross, *Status of Frustrator as an Inhibitor of Horn-Honking Responses*, 76 J. SOCIAL PSYCH. 213, 215 (1968).

[154] *See supra* note 148.

be more problematic in the officer context because resource constraints require high levels of selective enforcement on the roadways.

B. Distracted Driving

By enabling drivers to complain about others' misconduct, a HMDFE regime might distract them from their first priority, which is to operate a motor vehicle safely.[155] In the last few years, as cell phones have proliferated, policymakers and researchers have devoted increased attention to the risks associated with driver distraction. Some of these concerns have prompted state legislatures to require drivers to use hands-free cell phone devices, although no U.S. jurisdiction has banned calling while driving altogether.[156] The best available evidence suggests that conversing on a cell phone increases collision risk marginally, perhaps not by enough to warrant regulation in light of the productivity gains associated with the in-vehicle use of communications devices.[157]

An impressive study by Wilson, Fang, Wiggins & Cooper combined observation of cell phone use on public roadways with research into the driving records and collision histories of those seen using cell phones versus those seen not using cell phones. Their study found that drivers "observed using a cell phone had a risk of an at-fault crash 1.16 times greater than did drivers not using cell phones."[158] For males, the relationship between observed cell phone use and collisions was not statistically significant, though it was significant for females.[159] By contrast, having previously incurred a citation for aggressive driving multiplied the likelihood of collision involvement by 1.84 for all drivers and by 1.76 for males.[160] Being aged 16-24 enhanced the likelihood of collision involvement by factors of 1.74 for all drivers and 1.99 for males, and being 25-34 multiplied the likelihood of collision involvement by 1.53 for all drivers and 1.6 for

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[155] *Cf.* Smart et al., *supra* note 18, at 49 (arguing that increasing drivers' ability to use communications devices may distract drivers from safe driving).

[156] Savage et al., *supra* note 67, at 10.

[157] For a cost-benefit analysis, see Joshua T. Cohen & John D. Graham, *A Revised Economic Analysis of Restrictions on the Use of Cell Phones While Driving*, 23 RISK ANALYSIS 5, 14 (2003) (finding that "the central estimate for the net benefits of a ban on cell phone use while driving was close to zero and hence that the value of preventing crashes caused by cell phone use while driving is approximately equal to the value of the calls that would be eliminated by a ban").

[158] Jean Wilson et al., *Collision and Violation Involvement of Drivers Who Use Cellular Telephones*, 4 TRAFFIC INJURY PREVENTION 45, 49 (2003).

[159] *Id.*

[160] *Id.* at 49 tbls. 3 & 4.

males.[161] For all drivers, the increased risk associated with being a cell phone user was essentially equal to the increased risk associated with being aged 35-44 (as opposed to 45 or older).[162] Wilson and co-authors did note that cell phone use was associated with other-high risk behaviors that enhanced collision risk, but a multivariate regression analysis revealed that cell phone use's role in enhancing collision risk was "relatively minor."[163] Equally important, the very high collision risk associated with aggressive driving violations (despite the rarity with which these violations were detected) makes it plausible that the increased collision risk associated with encouraging HMD cell phone reports would be dwarfed by the decreased collision risk associated with detecting and deterring aggressive driving.[164]

Another comprehensive study of Virginia traffic accidents analyzed the various causes of crash-related driver distraction.[165] The researchers found that cell phone use did contribute to some traffic accidents, but that it ranked well below looking at scenery, rubbernecking, and eating and drinking as a contributor to collisions.[166] Cell phone use ranked slightly above adjusting vehicle controls as a contributor to traffic accidents.[167] On the whole, the research findings suggested that cell phone use did cause some accidents, but far fewer accidents than other manifestations of driver distraction that currently go unregulated. Moreover, if it is true that HMDFE would decrease collisions by deterring aggressive driving and helping to remove the worst drivers from the roads, then this would generate substantial benefits from a driver distraction perspective, since rubbernecking is such an important contributor to crashes. Fewer accidents leads to less distraction, which results in fewer accidents. And so on. Other research suggested that two aspects of cell phone use are dangerous while driving: manipulating a phone (e.g.,

[161] *Id*.
[162] *Id*. at 49 tbl. 3.
[163] *Id*. at 51.
[164] It is plausible that the correlation between crashes and aggressive driving violations is so high, at least in part, because aggressive driving violations are so rare. That is to say, we can expect that the drivers who have received citations will tend to be the most aggressive drivers, as opposed to the moderately aggressive drivers.
[165] Andrea L. Glaze & James M. Ellis, *Pilot Study of Distracted Drivers* (Survey and Evaluation Research Laboratory, Center for Public Policy, Virginia Commonwealth Univ. Jan. 2003).
[166] *Id*. at 13-14.
[167] *Id*.

dialing numbers while driving), and engaging in intense conversations that demand a great deal of attention, focus, and computational brainpower.[168]

There are studies that reach very different conclusions, lending a note of caution to these conclusions about cell phone usage and collisions, although some of these studies do not control for the observed correlation between cell phone use and other risky driving behaviors.[169] If these studies are to be believed, then cell phone usage may result in moderate, or even major, increases in collision risk. In that case, even short duration calls to HMD centers could result in measurable increases in collision nationwide.

In light of this research suggesting that cell phone use probably increases collision risk mildly to moderately, three points are worth making. The first point is that voice recognition and other technologies stand poised to decrease the impairments associated with cell phone use while driving.[170] The second point is that even if cell phone use as such does increase accident risk, the incremental increase in cell phone use resulting from the implementation of a HMDFE program would be rather small. After all, motorists will spend far more time talking to friends, relatives, clients, and services providers than they will spend talking to HMD operators, even in a 1-800-based HMDFE system. Moreover, reports called into an HMD system can be used to identify those callers whose use of in-vehicle communications adversely affects their driving performance.

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[168] David L. Strayer & William A. Johnston, *Driven to Distraction: Dual-Task Studies of Simulated Driving and Conversing on a Cellular Telephone*, 12 PSYCH. SCI. 462, 462-66 (2001).

[169] Violanti's study is widely invoked for its claim that cell phone use is associated with substantial increases in traffic fatalities, but his study did not control for the aforementioned correlation. *See* John M. Violanti, *Cellular Phones and Fatal Traffic Collisions*, 30 ACCID. ANAL. & PREV. 519 (1998); *see also* Goodman et al., *supra* note 96, at 24. A better and more recent study found that cell phone use impaired response times when drivers had to stop suddenly to avoid running a red light. P.A. Hancock et al., *The Distraction Effects of Phone Use During a Crucial Driving Maneuver*, 35 ACCID. ANAL. & PREV. 501 (2003). And an even more recent simulation study found similar impairments from conversing on cell phones. *See* David L. Strayer et al., *A Comparison of the Cell Phone Driver and the Drunk Driver* 6 (AEI Brookings Joint Ctr. for Regulatory Stud. Working Paper 04-13, July 2004). There is reason to be cautious about the results from simulation studies. In the real world, drivers often slow down when talking on the cell phone as a means of compensating for the division of their attention. Goodman et al., *supra* note 96, at 22. Furthermore, participants in a simulator exercise know that in the event of a "crash" or other negative outcome, they will not be injured, nor will there be serious financial repercussions. One way to reconcile the findings of the simulation studies with the observational studies is to suggest that people are able to multitask more effectively when the stakes are very high. *Id*. at 25. For further discussion of some of the conflicting evidence and methodological challenges, see *id*. at 25-38; D. Haigney & S.J. Westerman, *Mobile (Cellular) Phone Use and Driving: A Critical Review of Research Methodology*, 44 ERGONOMICS 132 (2001).

The third point is the key. As the studies referenced above make plain, cell phone use is hardly the most significant source of driver distraction. Indeed, other research suggests that the frustration associated with seeing other drivers behave rudely or aggressively is very substantial, and that this frustration is itself a source of distraction.[171] So while a HMDFE system would increase the distraction associated with reporting others' misconduct, it promises to alleviate the distraction that arises from fuming about another's driving and either feeling powerless to do anything about it, or contemplating some means of retaliating against the offending driver.[172] And, of course, when retaliation does occur, via light flashing, honking, gesturing, and the like, the result may be the distraction of two drivers – both the initial offender and the frustrated retaliator.

In short, in order to determine the net driver distraction effects of HMDFE, we would need to balance the incremental danger of distraction by callers against the incremental danger of driver frustration resulting from an inability to report bad driving. Seen in that light, it may be that the net effect of a HMDFE system would be a decrease in driver distraction, notwithstanding the enhanced use of telecommunications devices required in order to log complaints.

C. Privacy Interests

Privacy advocates occasionally sound the alarm about automated enforcement regimes in the driving context, whereby rental car companies or insurance companies monitor individual drivers' behavior through the use of GPS or other surveillance

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[170] Mike Schneider & Sara Kiesler, *Calling While Driving: Effects of Providing Remote Traffic Context*, CHI 2005 PAPERS 561, 567-68 (2005); Washburn, *supra* note 86, at 481.

[171] *See supra* text accompanying notes 22-24 and sources cited therein; *see also* Deffenbacker at al., *supra* note 18, at 84 (noting the connection between driver anger and collisions); Clifford Nass et al., *Improving Automotive Safety by Pairing Driver Emotion and Car Voice Emotion*, CHI 2005 SHORT PAPERS 1973 (presenting interesting experimental data that examines how drivers' emotional state influences their attention to the road); Paul C. Rosenblatt, *Grieving While Driving*, 28 DEATH STUDIES 679, 684-85 (2004) (expressing concern about the potential for grieving drivers to be distracted by their grief, thereby exposing them to an enhanced risk of accidents).

[172] *Cf.* Brewer, *supra* note 13, at 55 (noting that in some cases, distracting frustrated drivers can be advantageous, because it lowers their propensity to retaliate aggressively).

technologies.[173] When discussions involve sharing such information with the government, these same privacy advocates are quick to invoke George Orwell's *1984*.[174]

I teach and write about privacy law,[175] but I have difficulty understanding the appeal of these kinds of claims. I can comprehend the individual privacy interest in travel destinations and why 24-hour GPS monitoring of a vehicle might intrude on a legitimate privacy interest. After all, 24-hour monitoring of that sort would allow the monitor to infer a great deal about the driver's intimate associations, medical information, and political activities. But we can remedy these concerns by forbidding monitoring entities from piecing together information about drivers' travel patterns and by protecting vigilantly the HMDFE databases that would contain information that reveals these patterns. If we focus our attention on technologies that allow governments or insurers to discover a motorist's speed or braking distance, the privacy interests would seem to disappear. There is nothing private about road speed: It can be discerned with substantial accuracy by a police officer, a bystander holding a radar gun, or a motorist driving behind the car being monitored. There is no connection between road speed, or propensity to tailgate, and intimate conduct of any kind.[176] Nor do these bits of information implicate our interests in facilitating the development of personalities, affect sensitive medical information, or undermine valuable confidential relationships. Privacy is a means, not an end.[177] We should protect privacy if, and only if, doing so promotes social welfare. It is difficult to identify such a benefit to roadway anonymity with respect to behaviors like road speed, weaving through traffic, and cutting off other motorists.

Driving usually takes place in very public places. Almost everything that could be learned through the implementation of a HMDFE regime could be learned through multiplying the present number of traffic police by a factor of ten. Yet virtually no one

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[173] Bob Gritzinger, *Under the Hood, with Big Brother*, AUTOWEEK, Nov. 8, 2004, at 30; Sheryl Jean, *Checking Your Driving: Progressive Insurance Testing Chip that Tracks Speed, Distance*, ST. PAUL PIONEER-PRESS, Aug. 10, 2004, at C3.

[174] *See, e.g.*, Gritzinger, *supra* note 173, at 30.

[175] *See, e.g.*, Lior Jacob Strahilevitz, *A Social Networks Theory of Privacy*, 72 U. CHI. L. REV. 919 (2005) [hereinafter Strahilevitz, *Social Networks*]; Lior Jacob Strahilevitz, *Consent, Aesthetics, and the Boundaries of Sexual Privacy After* Lawrence v. Texas, 54 DEPAUL L. REV. 671 (2005).

[176] I have argued elsewhere that as a general rule, those bits of information that relate to intimate conduct present the strongest case for privacy protection. Strahilevitz, *Social Networks*, *supra* note 175, at 923-24, 930-31.

contends that increasing the number of police officers patrolling the streets would violate individual privacy rights.[178] HMDFE makes drivers accountable for conduct that is public and obscure solely because of resource constraints. The only time an individual has a reasonable expectation of privacy with respect to her driving is when hers is the only car on the roadways. In those settings, HMDFE would protect the privacy of her conduct, because there would be no one around to report any good or bad driving. The privacy objection to HMDFE, in short, is a non-starter.

D. Why Not Fully Automated Enforcement?

In recent years, traffic planners have become increasingly enamored with automated means for improving traffic flow and safety. Various technologies are being developed by research and development departments at car manufacturers and in engineering faculties. For example, cars are being developed that will use radar to detect instances in which a driver is tailgating another vehicle too closely;[179] intersections are being fitted with cameras to catch motorists who drive through red lights;[180] and insurance companies as well as rental car companies and commercial fleets are testing the use of GPS to monitor speeding by individual drivers.[181] Many of these approaches hold promise, and research into these programs can proceed alongside the roll-out of HMDFE.[182] Indeed, because automated systems might provide an objective means of corroborating some of the information reported to HMD centers, these systems could enable researchers to spot-check the accuracy of the information aggregated via HMDFE.

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[177] *See* Richard A. Posner, *The Right of Privacy*, 12 GA. L. REV. 393, 394 (1978).

[178] One paper that comes close to taking this position is Marc Jonathan Blitz, *Video Surveillance and the Constitution of Public Space: Fitting the Fourth Amendment to a World that Tracks Image and Identity*, 82 TEX. L. REV. 1349, 1374-77, 1443-47 (2004). Blitz suggests that while sporadic police surveillance of public streets would not violate the Fourth Amendment, complete surveillance of these same streets would. Blitz's argument is admirably ambitious but in the end I do not believe it persuades. The Fourth Amendment has not been read to impose a resource constraint on society's expenditures on law enforcement, nor should the Constitution dictate a maximum level of law enforcement resources that can be devoted to policing conduct in public spaces. The possibility of retreating onto private or communal property provides adequate protection for intimate conduct and association, as well as the possibility of chance encounters among strangers.

[179] Smart et al., *supra* note 18, at 48.

[180] Savage et al., *supra* note 67, at 22.

[181] *See* Jean, *supra* note 173, at G3.

[182] *See* Savage et al., *supra* note 67, at 22 (finding that the use of automated red light cameras at intersections resulted in reductions in injury crashes of between 7% and 29% at those intersections).

It is certainly possible that the implementation of HMDFE would curtail the development of technologies designed to promote safer driving. That said, the case for HMDFE over automated enforcement is the case for human judgment and context sensitivity. Driving in excess of the speed limit is efficient in some contexts, whereas in other contexts (such as on an icy road), driving at the speed limit exposes other drivers to substantial risks.[183] Indeed, on a clear and sunny day, when most drivers are doing 70 miles per hour in a 55 mile per hour zone, driving at the speed limit is more dangerous than driving 70 miles per hour.[184] Running a red light at three o'clock in the morning at a deserted intersection is sensible; ticketing a driver for engaging in such context serves little purpose other than to prompt exasperation with the traffic laws. Some forms of bad driving, such as excessive lane changing or a refusal to let another motorist merge, are difficult to detect via automated enforcement. Other harmful driving habits, like excessive braking or darting into a parking spot that another motorist is plainly waiting for, are not generally unlawful. Finally, as has been discussed above, automated enforcement offers none of the expressive benefits associated with HMDFE, whereby the regime encourages measured and anonymous retaliation for driver misconduct, thereby diverting frustrated motorists from more excessive and provocative retaliation.

One comparative advantage of HMDFE, as opposed to automated traffic enforcement is quite similar to the comparative advantage of HMDFE over traffic police's enforcement of rules. It is based on a preference for standards and norms over rules and laws. There is a standard-like exception to virtually every "rule" of the road. Americans drive on the right, except when the right lane is obstructed, in which case they try to move into the left lane when it is safe to do so. Americans must not run red lights, except when it is necessary to do so in order to avoid an accident or get out of the way of an emergency vehicle. Moreover, much of what makes a driving environment pleasant and safe manifests as manners that do not lend themselves to rule-based-enforcement via technology or police officers who must justify their decisions if challenged. HMDFE is, in short, like a jury system for traffic regulation, where existing laws and rules are

[183] Cramton, *supra* note 89, at 436.

[184] David Navon, *The Paradox of Driving Speed: Two Adverse Effects on Highway Accident Rate*, 35 ACCIDENT ANALYSIS & PREVENTION 361, 366 (2003).

modified by social expectations and aspirations to form a body of law that is used to reward the cooperators and punish the deviants.[185]

E. Shouldn't We Let the Market Implement HMD on Its Own?

In order to justify a mandatory regulatory intervention, it is usually appropriate to identify a market failure that needs fixing. At the outset, it is worth recalling that the absence of an effective market on the roadway is the source of the aggressive driving problem in the first place. We need not develop a comprehensive reputation tracking system in instances where vendors who behave poorly suffer the repercussions. If a Starbucks barista is rude, customers can complain to the shop manager, and since the manager has an incentive to keep his customers happy, he will train the employee to behave better or fire her if training seems futile. In the driving context, there is no market that binds one driver to another, and this absence of a market both creates the need for governmental involvement, via the traffic police and tort system, and opens up the possibility for a HMDFE system to displace government regulation with distributed enforcement.

That said, there are major players in the driving market who in some respects resemble our Starbucks managers. Automobile insurance firms, in theory, could discipline poor drivers whose policies they underwrite, but at present there is no institution that allows a frustrated motorist to identify which insurance company to call in order to complain about the pick-up truck driver who nearly rear-ended him. Insurance companies are certainly free to make it worth their customers' while to participate in a HMD scheme, and given the mandate in all 50-states that every motorist carry liability insurance, one might expect to see high levels of participation in a purely voluntary HMD scheme. This raises the question of why government mandates are appropriate here.

[185] None of this says that a world of HMDFE is a world where all traffic laws get repealed. Many traffic laws, such as the convention that motorists in the U.S. drive on the right and pass on the left, establish efficient focal points in coordination and mixed-motive games. These laws should remain on the books to serve as a backstop for driving norms. Other traffic laws will be useful in determining liability ex post where a traffic collision has occurred, particularly if there were not many motorists nearby to witness the collision, or if there is strong reason to expect that the witnesses who happened to be nearby were biased in a systematic way.

The first answer is that a non-universal system would mitigate the expressive benefits associated with HMDFE. More precisely, a HMDFE taps into norms of reciprocity whereby motorist *A* tolerates the possibility that other drivers may punish his own poor driving by virtue of his own ability to punish others' poor driving in exchange.[186] Given the strong possibility that the least considerate drivers will be most likely to opt out of a voluntary HMD program, these expressive benefits will be lost, and these holes in system coverage might invite road rage and aggressive retaliation against those who have opted out, while simultaneously undermining support for the system as a whole.

The second answer is that there are millions of drivers who do not have automobile insurance,[187] and a voluntary HMD regime would not incorporate these drivers into the system. At present, it is rather difficult for police to discover that a particular motorist is uninsured. A HMDFE system could enable law enforcement to detect these vehicles more easily, by making it possible to determine quickly whether a vehicle is insured based on evidence that can be accessed from the exterior of the car.[188] As noted above, with HMDFE, a (reduced) number of traffic police would still be required to ensure that every motorist is participating faithfully in the system, and this could be accomplished through a combination of random checks in traffic and the targeting of vehicles that had been the subject of HMD reports but that did not show up as carrying liability insurance in a centralized HMD database. Creating an HMD database would substantially reduce the marginal costs of including insurance information in the database.

The third answer is that there are negative externalities associated with aggressive or inappropriate driving that are not borne by individual insurance companies. Automobile insurance companies do internalize many of the harms of increased collisions, but not the

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[186] On reciprocity in punishment, see Dan M. Kahan, *The Logic of Reciprocity: Trust, Collective Action, and Law*, 102 MICH. L. REV. 71 (2003).

[187] Dan Walters, *Legislators Spend A Lot of Time Deciding Who Can Legally Drive*, SACRAMENTO BEE, Oct. 31, 2005, at A3 (noting that in California alone, 15% of motorists lack automobile insurance, representing 3.5 million drivers).

[188] The United Kingdom has experimented successfully with real-time accessible databases of insured motorists that can be accessed by specially equipped patrol vehicles to identify and impound uninsured vehicles based on their license plate numbers. Steve Womack, *Flash! Now Cameras Snare the Uninsured: Police Step up the Fight to Force 1.2 Million Motorists off the Road for Driving Without Cover*, MAIL ON SUNDAY (UK), Aug. 28, 2005, at 18, available in 2005 WLNR 13647594. Texas is developing a similar system. *See* Ty Meighan, *System a Real Time Check of Insurance: Nearly a Quarter of Texas Drivers Don't Have It, DPS Reports*, CORPUS CHRISTI CALLER TIMES, Sep. 22, 2005, at B4.

health and psychological costs associated with frustrated and angry drivers, the rising vehicle and fossil fuel costs associated with increased expenditures on bigger and safer cars, and the law enforcement costs associated with policing traffic violations. These are costs born by the public at large and the state, and they may explain the failure of insurance companies to encourage the expansion of HMD beyond commercial fleets. Moreover, while individual insurance companies would benefit from having feedback about their own customers, they would not benefit (much) from enabling their customers to leave feedback about other insurance companies' customers. Hence, the provision of feedback-enabling technologies in vehicles would be plagued by a minor tragedy of the commons, which might well prevent insurers from encouraging the installation of these devices in vehicles driven by their customers.

Finally, it is worth invoking paternalist rationales in support of mandatory HMDFE. When it comes to driving, commercial and non-commercial drivers alike deviate rather substantially from what a rational actor model would predict, with cognitive errors and emotional responses adversely affecting driver performance.[189] The predominant government attitude toward seat belts in the 1970s was that individuals could decide for themselves whether they wished to use these safety devices. Most consumers did buckle up, but thousands refused to do so and died as a consequence. If studies of HMD in the commercial fleet context translate into the passenger vehicle context, then the argument for HMDFE would look a lot like the argument for click-it or ticket laws. Forcing the universal use of a safety device saves enough lives to warrant the associated restrictions on individual liberty. Indeed, the case for HMDFE is rather stronger, in that HMDFE is designed primarily to control the externalities associated with driving, whereas mandatory seat belt laws were designed primarily to protect against internalized harms.

[189] *See* ANNICH MAINCENT ET AL., TRUCK DRIVER'S BEHAVIOUR AND RATIONAL DRIVING ASSISTANCE 11-12 (University of Lyon Working Paper 2004) (finding that many commercial truck drivers engage in behaviors that adversely affect both time of arrival and fuel consumption); Ehud Guttel & Alon Harel, *Probability Matching and the Law: A New Behavioral Challenge to Law and Economics* 11-16 (2004 American L. & Econ. Ass'n Annual Meetings Paper No. 39) (reporting results from a parking experiment in which subjects chose whether to park illegally, not on the basis of welfare-maximization, but on the basis of probability matching); Otto Anker Nielsen, *Behavioral Responses to Road Pricing Schemes: Description of the Danish AKTA Experiment*, 8 INTELLIGENT TRANSPORT. SYS. 233, 250 (2004) (noting that motorists

On balance then, it seems that HMD would be most effective if implemented universally, and the government's ability to mandate participation make it the obvious vessel for implementing HMDFE. There is, of course, a doctrinal glitch associated with such an approach: the Due Process Clause. In the sense that the federal government would be deputizing its motorists and enabling any of them to sanction fellow motorists, the program would be unprecedented. The state often encourages private citizens to blow the whistle about others' misconduct, via *qui tam* statutes, whistleblower protections, and signs encouraging motorists to "Be an HOV Hero: Report Carpool Cheats." But these complaints typically trigger government investigations where the accused are entitled to a presumption of innocence.

At the same time, there are numerous examples of instances in which the government delegates high-stakes decisions about individuals to the community. Does an advertising campaign infringe a registered trademark? It depends on the extent of associated consumer confusion. Can sexually explicit speech be suppressed? Will vice laws be enforced? The answer usually depends on whether citizens of the affected neighborhoods demand enforcement. That depends in part on whether it is obscene under community standards. The interesting question raised by HMDFE is "What happens when the stakes of a sanction are much lower and the costs of permitting each motorist to challenge any sanction in court or administrative proceedings would be prohibitive?" To answer such a question the law would have to fall back on a general balancing approach, along the lines of *Mathews v. Eldridge*.[190] *Mathews* suggests that bare-bones procedures may be constitutionally sufficient if they result in reasonably reliable decisions about sufficiently low-stakes matters.[191] This analysis suggests that a great deal will turn on the magnitude of the inaccurate feedback problem identified above.[192] To the extent that the version of HMDFE proposed so far would be insufficiently accurate under *Mathews*, the

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have a poor sense of the average and marginal costs of driving); Sivak, *supra* note 6, at 263-68 (giving various examples of instances in which driving behavior reflects bounded rationality).

[190] 424 U.S. 319 (1976).

[191] *Id*. at 341-49; *see also* Van Harken v. City of Chicago, 103 F.3d 1346, 1351-52 (7th Cir. 1997) (upholding a civil parking fines system under the Due Process Clause, notwithstanding a city policy of not requiring police officers to appear at hearings, because "the benefits of requiring the police officer to appear at every hearing are unlikely to exceed the costs.").

[192] *See supra* text accompanying notes 137-154.

part that follows explores some costlier variations that would almost certainly satisfy the *Mathews* test.

F. Cost-Benefit Analysis

The ultimate test of HMDFE will be whether it withstands cost-benefit analysis. The preceding sections have identified the relative costs and benefits, and it will be helpful to recount them briefly here. Of course, with a new and admittedly radical proposal like this one, it will be impossible to generate any reliable estimates of the actual dollar figures on either the cost or benefit sides.

With respect to benefits, we would be aggregating the value of collisions avoided, including lives saved, injuries prevented, work interruptions avoided, litigation and insurance administration costs eliminated, and property damage averted. Data on HMD for commercial vehicles suggests that collision reductions could range from 20% to 50%.[193] A recent economic analysis found that the mean social cost of a fatal traffic accident in the developed world was approximately $1.5 million in 1999.[194] Other recent estimates suggest that fatal traffic accidents alone cost the United States 2.2% of its Gross Domestic Product (GDP).[195] Using the Bureau of Economic Analysis's 2005 estimate of $12.76 trillion for GDP,[196] the cost of such accidents in the United States equaled $280.73 billion. A 20% reduction in fatal crashes therefore would save society upwards of $56 billion per year, based on these conservative, back-of-the-envelope calculations. Other benefits identified in this paper would include cost savings on law enforcement, enhanced efficiencies from reduced information asymmetries in the insurance market, substantial improvements in everyday driver happiness, and substantial expressive benefits from enabling drivers to sanction those who endanger or frustrate fellow motorists.

On the costs side, we should include the costs associated with establishing a HMDFE system, the costs of malicious and inaccurate feedback, and the costs incurred

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[193] *See supra* text accompanying notes 27-33.

[194] Anna Trawen et al., *International Comparison of Costs of a Fatal Casualty of Road Accidents in 1990 and 1999*, 34 ACCIDENT ANALYSIS & PREVENTION 323, 330 (2002)

[195] Kevin M. McDonald, *Federal Preemption of Automotive Recalls: A Case of Too Many Backseat Drivers?*, 71 TENN. L. REV. 471, 477 (2004).

[196] See <http://www.bea.gov/bea/newsrel/gdpnewsrelease.htm>.

by those motorists who would suffer disutility from having their driver behavior adversely evaluated by peers. There would also be some driver distraction costs associated with HMDFE. However, these distraction costs would be offset (perhaps fully) by a reduction in two forms of driver distraction: distraction caused by an inability to sanction an aggressive driver in a measured way, and distraction caused by reduced rubbernecking.

In short, the costs and benefits of HMDFE are presently indeterminate and will remain so until a pilot program is implemented or further experimental studies are conducted. That said, it seems entirely plausible that the benefits associated with HMDFE will outweigh the associated costs, perhaps by a wide margin.

IV. Variations

My goal in this paper has been to construct a conceptual case for distributed enforcement of traffic norms. I have no intention of hashing out all the details of what the ideal HMDFE system would look like. After all, for the reasons identified above, implementing any HMDFE regime would induce a great many changes in the way we think about traffic regulation, and different portfolios of changes are likely to appeal to different readers. Along the same lines, any HMDFE regime necessarily confronts some basic tradeoffs, and the ways in which policymakers weigh those tradeoffs should affect the parameters of such a system. For example, there will be a tradeoff between the costs of a HMDFE system and its effectiveness in generating accurate data. So policymakers in jurisdictions facing major resource constraints might opt for a less accurate system, and policymakers in jurisdictions where collisions impose particularly serious costs on society may be willing to stomach a higher tech version of HMDFE. This part of the paper identifies the more important tradeoffs and evaluates possible variations on the HMDFE regime.

A. High Tech Reporting

The rudimentary version of HMDFE relies on technologies that already exist and have proven themselves in the context of voluntary HMD programs for commercial

fleets: stickers or placards on the backs of vehicles encouraging motorists to report misconduct via their cell phones. That said, placards and cell phones should strike us as stone age technologies in 2006. Requiring motorists to see a placard clearly, pay for cell phone calls, and report good or bad behavior to an operator will surely deter some reporting and thereby keep much useful data out of the system. So technologies that can reduce these reporting costs seem particularly valuable in the context of a HMDFE regime. A slightly higher technology version of the system would lower the cost of reporting good or bad driving by installing dedicated communications technologies within vehicles for the sole purpose of contacting HMD call centers. Motorists could contact these call centers by pressing a button on their steering wheels and by commenting on others' driving using a built-in speaker. We can dub this version the "On-Star" approach.[197]

But with a little bit of ambition, we can imagine a much more effective HMDFE system, using technologies that already exist, but that have not been adapted for the purposes of reporting bad or good driving. This could be accomplished by mandating the installation of GPS trackers in every vehicle or using cell phone tower triangulation to identify the locations of particular motorists. Such positional data would allow drivers to report on each other's driving even if they could not see a placard. For example, a driver might contact the call center to report, "Blue convertible behind me, add three points, kindly let me merge." Relying on voice recognition software to turn this report into binary code instantaneously,[198] the HMD call center would then use GPS to discover the location of the caller's vehicle as well as the unique identifier belonging to the vehicle immediately behind his, assigning that vehicle three driving points after verifying that it was a blue convertible. Indeed, if the vehicle behind the driver at that moment was no longer a blue convertible, the automated call center could locate any blue convertible within a few car lengths of the caller's vehicle and assign that car the points in question. In principle, such a system also could be designed to facilitate reporting by pedestrians, bicyclists, and bus passengers, particularly as GPS-enabled hand held devices become increasingly common in the coming years. Analyzing the various engineering challenges

[197] *See* <http://www.onstar.com>.
[198] Washburn, *supra* note 86, at 481.

inherent in developing such a system is well outside my zone of expertise. I will merely refer interested readers to some of the more illuminating papers in the burgeoning literatures on the use of GPS devices in driving,[199] wireless communications systems in vehicles,[200] and voice recognition devices in automobiles.[201]

A different type of high-tech reporting can address the aforementioned inaccurate feedback problem as well. It would be relatively easy to mount digital video cameras on the front and rear of all participating vehicles, and in-car computers could upload the video footage from the time period immediately preceding a call to a HMDFE call center. The images captured by these cameras could provide verification of negative or positive feedback reported to the HMDFE call centers.[202] It would not be efficient for the state to analyze each reported incident independently to see if it was supported by what the cameras picked up. But spot checks to ensure the accuracy of feedback reports could be accomplished quite easily, and in cases involving high stakes (i.e., where one driver assigns a large number of positive or negative points) evidence from these cameras would go along way toward ensuring system accuracy.

A high-tech version of HMDFE will be more costly than a low-tech version, but the savings associated with a higher-tech version could warrant the added expenditures, particularly since automobile industry analysts expect the proliferation of vehicle-based speech-recognition and GPS tracking technologies anyway in years to come.

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[199] *See, e.g.*, Youjing Cui & Shuzhi Sam Ge, *Autonomous Vehicles Positioning with GPS in Urban Canyon Environments*, 19 IEEE TRANSACTIONS ON ROBOTICS & AUTOMATION 15 (Feb. 2003); Tamer Nadeen, *The Security and Privacy of Smart Vehicles*, 2 IEEE SECURITY & PRIVACY 49 (May / June 2004); Nielsen, *supra* note 189, at 237; Yonglong Xu, *Development of Transport Telematics in Europe*, 4 GEOINFORMATICA 179, 186-190 (2000).

[200] *See, e.g.*, Michel Frenkiel, *Clip Card: Smart Card Based Traffic Tickets*, EGOV 2002, at 313 (R. Traunmuller & K. Lenk, eds. 2002); Sojen Pradhan, *Mobile Commerce in the Automobile Industry*, *in* PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON INFORMATION TECHNOLOGY: COMPUTERS AND COMMUNICATIONS (2003); Xu, *supra* note 199, at 190-195.

[201] *See, e.g.*, John H.L. Hansen et al., *Robust Speech Processing for In-Vehicle Voice Navigation Systems*, 4 ICA-2004: INT'L CONGRESS ON ACOUSTICS 2603 (2004); Marvin C. MaCallum et al., *Speech Recognition and In-Vehicle Telematics Devices: Potential Reductions in Driver Distraction*, 7 INT'L J. SPEECH TECH. 25, 32 (2004); Washburn, *supra* note 86, at 481. The MaCallum et al. study found that the use of voice recognition technologies to control a PDA did not affect driver performance in speed maintenance or lane tracking tasks, but did lower response times in emergency situations, although in these settings voice activated systems did outperform systems requiring manual manipulation. MaCallum et al., *supra*, at 31.

B. Decreased Anonymity for Reporters

At first glance it may seem strange that a paper that began by bemoaning the ills associated with anonymous driving has proposed a system of semi-anonymous feedback. On balance, a system where call centers know the identity of a caller but drivers who spark a complaint do not seems to strike the best balance among several objectives that are at times in tension with one another. Caller anonymity will incentivize people to report others' misconduct, discourage retaliation, and promote accurate feedback (to the extent that a fear of retaliation would discourage people from providing feedback). On the other hand, caller anonymity would decrease transparency for the subjects of complaints and would make it more difficult to correct maliciously false negative reports, which will diminish the accuracy of feedback somewhat.

What underlies the paper's tentative conclusion that complete anonymity vis a vis targets of driving feedback is optimal? In part, it is a judgment that non-anonymous feedback on eBay has manifested a Pollyanna effect, in that participants have an incentive to provide positive feedback about transaction partners in order to increase the likelihood that their transaction partners will in turn provide favorable feedback about them.[203] Because of this concern about retaliation, some participants who are not entirely satisfied with the performance of a transaction partner leave unduly positive feedback, and this marginally erodes the system's ability to distinguish good vendors from excellent ones.

In the driving context, we can expect to see a similar effect if anonymity is not protected. Namely, *A* may forego providing negative feedback about *B*'s driving based on a concern that *B* will retaliate against him by providing negative feedback about *A*. This concern could be mitigated, somewhat, by a time lag in revelation, such that *A* would be long gone by the time *B* learned of *A*'s feedback. But this feature would not ameliorate the concern entirely in a low tech version of HMDFE since *B* might have made note of the *A*'s unique identifier if he thought there was some risk that *B*'s driving

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[202] *Cf.* Gregory M. Lipper, *Racial Profiling*, 38 HARV. J. ON LEGIS. 551, 560 (2001) (noting that New Jersey "has instituted a campaign to install video cameras on all patrol cars so that traffic stops can be recorded and monitored").

[203] Resnick & Zeckhauser, *supra* note 53, at 4.

would provoke a negative response from *A*. Because of these concerns about retaliation, too few people would supply the public good that driving feedback represents.

This concern is even more pronounced in the aggressive driving context than in the eBay context for a couple of reasons. First, the likelihood of violent retaliation is higher in the driving context. Second, with aggressive drivers, we are talking about a population that is prone to aggressive and retaliatory acts in many other facets of their lives.[204] Many aggressive drivers, in short, will tend to behave vindictively in an environment where negative feedback hits them in the pocketbooks, and for that reason protecting anonymity to some degree seems essential. Of course, callers should not be entitled to remain anonymous with respect to HMD call centers, even though this lack of anonymity will no doubt deter some callers from providing feedback. If callers are permitted to leave completely anonymous reports, then HMD centers can do nothing to ensure that a few drivers are not providing too much feedback, that some drivers are not targeting other drivers with repeated negative or positive feedback, and that racial or other biases are not prompting particular callers to leave inaccurate feedback.[205] System integrity, in short, demands that callers be accountable to the government, although not directly to the targets of their complaints.

C. Points Only, or Comments as Well?

One appealing aspect of an HMD system is its potential to educate drivers who are oblivious about their shortcomings.[206] Experimental interventions in the driving context suggest that when drivers are provided with feedback regarding safety performance from passengers in the vehicle, they are responsive to this feedback and drive more safely in the future.[207] In the commercial fleet setting, fleet operators obtain the details of incident reports and use these details to train drivers in how to avoid repeating the same mistakes in the future. This raises the design question of whether

[204] Lowenstein, *supra* note 15, at 268.

[205] *Cf.* Bamberger et al., *supra* note 147, at 369-70 (concluding that non-anonymous peer assessment may outperform anonymous peer assessment in the workplace setting).

[206] Many drivers fall into this category. *Cf.* Ola Svenson, *Are We All Less Risky and More Skillful than our Fellow Drivers?*, 47 ACTA PSYCHOLOGICA 143, 146 (finding that 88% of Americans and 77% of Swedes surveyed believed to be safer than the median driver in their countries, and that 93% of Americans and 69% of Swedes believed they were more skillful than the median driver).

HMDFE feedback for everyone should include substantive comments about driving, or whether the system should just report final results like +2 points or -1 point for a particular incident. There is not an obviously right answer to this question. Comments can educate or inflame. Some comments will be perceived by the targets of these complaints to be so unfounded that they may erode support for the HMDFE scheme. On the other hand, some motorists may be frustrated by the absence of substantive feedback, especially if they routinely receive low marks from fellow drivers but cannot discern the basis for that pattern. Indeed, substantive feedback on eBay seems successful, and helps interested participants identify the reasoning behind negative or positive vendor reviews.

In the driving context, some feedback is particularly valued and valuable. Separate surveys of both commercial fleet drivers and senior citizen motorists revealed a similar dynamic: Drivers were quite receptive toward feedback about their driving received from people with perceived expertise. More precisely, commercial fleet drivers were quite welcoming of performance feedback from their company's safety managers and supervisors, as well as feedback from fellow drivers of commercial fleet vehicles.[208] They were not receptive, by contrast, to feedback from drivers of passenger vehicles.[209] Senior citizens were responsive to feedback from driving instructors, but grew somewhat defensive when receiving feedback from people with no apparent expertise in driving-related matters.[210] Let us assume this principal finding is broadly generalizable. Is there a way to raise the quality of substantive feedback in a HMDFE system by identifying the relevant experts?

The ideal HMDFE system would collect substantive feedback from all drivers, but only report that feedback from those drivers with the most favorable HMD scores. In other words, the drivers who received a relatively large number of positive points and a relatively small number of negative points from fellow motorists would be free to transmit substantive feedback (e.g., "changes lanes too frequently") to other drivers, whereas average and below-average drivers would only have the outcomes of their

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[207] Karl A. Hutton, *Modifying Driver Behaviour with Passenger Feedback*, 4 TRANSP. RESEARCH PART F 257, 266-68 (2002)

[208] ROETTING ET AL., *supra* note 33, at 9.

[209] *Id*.

[210] Stutts & Wilkins, *supra* note 119, at 432.

feedback (e.g., “add 1 point”; “subtract 2 points”) reported to others. Under such a system, those drivers ranking in the top quartile of positive reviews would be entitled to leave substantive feedback that other drivers could hear; all other drivers would be muzzled. As a result, when drivers did receive substantive feedback about their driving, it would be from drivers whom the system identified as possessing some expertise about how to drive in an effective manner.

There are additional benefits associated with such a regime. It is likely that the drivers ranked in the top quartile will be relatively courteous in their interactions with fellow motorists. Courteous drivers seem likely to provide relatively constructive feedback to other motorists, so limiting this substantive feedback to a select few drivers should also help ensure that motorists rarely hear inflammatory, expletive-laced feedback about their own driving.[211] Moreover, it is possible that motorists will value the expressive benefits associated with being a highly-ranked driver. If so, enabling the top ranked drivers to leave verbal feedback will create greater incentives for motorists to drive in a manner that wins points from their anonymous peers.

Finally, collecting substantive comments in addition to points could serve an important educational function for drivers. Once all the HMDFE feedback is collected, it would be relatively easy for the state to publish data on which driving behaviors sparked the most compliments and complaints. Motorists might be surprised to see, say, that tailgating annoyed many drivers and that rolling stops did not, or that stealing parking spots prompted very intense reactions, whereas moderate speeding prompted only mild annoyance. Motorists who perused this data could adjust their own driving behaviors accordingly in subsequent periods. The publication of such data would help satisfy some due-process oriented concerns about citizen notice of the rules of the road. Moreover, it would enable jurisdictions and insurers to monitor changes in driving norms over time. The primary benefit, though, of using information aggregation technologies in this context would be the creation of a parallel traffic code, one that approximated actual motorists’ preferences and behaviors as closely as possible. HMDFE thus emerges as a system that is capable of enforcing existing norms, but also becomes a system that can

allow the state to identify emerging social norms. These norms can then be publicized to members of the public, perhaps hastening the process by which they become efficient focal points for human behavior.[212]

Having described the trees, a few words about this forest are in order. The foregoing analysis suggests the potential for HMDFE to produce, as a by-product, a universal and comprehensive driving code that perfectly reflects the preferences of American drivers and is capable of changing on a dime in response to preference shifts. We might conceptualize such a code as the product of hyperdemocratic decisionmaking. It certainly makes other forms of direct democracy, like the initiative process, look republican and clunky in comparison. Unlike any other law on the books, such a law would provide citizens with precise notice of the rules of the road *as enforced*. That is something no other sort of law presently does.

D. One Car, One Vote?

This discussion of differential feedback abilities brings to mind a further programmatic variation. To date, the discussion has assumed that the feedback structure would permit something like cumulative voting. Under such a scheme, each driver might be allotted fifteen positive points and fifteen negative points each month, which could be assigned to thirty different vehicles or two different vehicles, depending on the intensity of the driver's reaction to another drivers' conduct. All along, the discussion has assumed something along the lines of one car, one vote.

It may be that an optimal system would involve deviations from this system. For example, the system probably should allot more points to motorists who spend more of their time on the roadways, and miles driven would be an adequate proxy for this. Similarly, motorists who receive very positive marks from their peers could be allotted extra points each month, or could have their points weighted more heavily than those

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[211] Grey et al., *supra* note 18, at 49 (describing the drivers with the fewest lifetime accidents as being unusually relaxed and cool headed when confronted by others' rude driving).

[212] On the effect of focal points and the law's expressive effects, see Richard H. McAdams, *A Focal Point Theory of Expressive Law*, 86 VA. L. REV. 1649 (2000); Richard H. McAdams & Janice Nadler, *Testing the Focal Point Theory of Legal Compliance: The Effect of Third-Party Expression in an Experimental Hawk / Dove Game*, 2 J. EMPIRICAL LEGAL STUD. 87 (2005).

who receive middling or poor feedback.[213] Indeed, the system might well ignore the feedback provided by the worst drivers, since those drivers could be penalizing driving behavior that the vast majority of motorists regard as safe and cooperative.[214]

Even if the HMDFE system adhered to a one car, one vote principle, insurance companies might still be able to obtain some of the gains associated with deviations from that principle. If the raw data from HMDFE is shared with insurers, then insurance companies could test various voting models and try to better predict risks. Actuaries thus could function as lab technicians, constantly tinkering with new models for weighing feedback, and the government eventually could piggy back on this work, adopting the weighting algorithms that proved most successful in the private insurance market.

This discussion of some of the variations and design issues that would arise in implementation of a HMDFE regime reveals how much the regime can accomplish and how much rides on the details. Other details of the program, such as the optimal voting scheme, seem open to reasoned debate.[215]

V. "How's My Driving?" for Everything?

In a standard thought paper, a concluding section discusses the various ways in which the model proposed might be extended to other settings. There is some awkwardness in writing that section of this paper. After all, my proposal itself extends two related ideas – commercial fleet HMD programs and eBay-style electronic reputation tracking – to a much larger arena. Nevertheless, we can conceptualize this paper's

[213] *Cf.* Yu & Singh, *supra* note 141, at 158 (advocating the implementation of such a system for online reputation tracking systems).

[214] There is, of course, some circularity built into a system that allots extra votes to the top-ranked drivers and fewer votes to the bottom-ranked drivers. This circularity is easily avoided, however, if rankings at a fixed point (say, the beginning of each month or year) are used to weight votes. Alternatively, the system can rely on raw scores (i.e., the results of a one car, one vote system) to rank for the purposes of determining how many votes each driver is allotted, and adjusted scores thereafter.

[215] Because of space considerations, I will spare the reader extended discussions of other variations, such as the decision as to whether cumulative feedback scores should be visible on the exterior of vehicles (a point about which I am agnostic), or whether HMDFE should replace voluntary feedback with a market regime, whereby motorists would obtain financial bonuses for providing negative feedback about a motorist who was subsequently involved in an accident or for providing positive feedback about a motorist who maintained a clean driving record during the next year (a variation that I would regard as undesirable), or whether citizens ought to be able to go "double or nothing" when negative feedback about them is logged, permitting them to avoid penalties for negative feedback if they receive no similar negative

proposal as a new paradigm for the enforcement of societal rules. In public spaces where social norms are reasonably well developed and universal, and where policing by government agents is inherently problematic, we can rely heavily on citizens themselves to police misconduct.

As this paper suggested earlier,[216] work by social norms scholars has suggested that efficient citizen enforcement can happen naturally in close knit groups, where repeat player interactions are common, information pertinent to social control flows easily, and relations among actors are somewhat multiplex and not too hierarchical.[217] But in environments where those conditions do not hold, i.e., among loose-knit groups, social order sometimes breaks down, necessitating a substantial police presence. The idea behind this paper is to use technology to transform loose-knit environments into close-knit environments, so that the police presence can be curtailed substantially without compromising safety. These schemes therefore replace state policing with citizen policing, laws with norms, and, to some extent, rules with standards. In thinking about extensions of the approach, then, it makes sense to think about other loose-knit environments where social order sometimes breaks down.

At the same time, there will be social settings in which technologically aided norm enforcement is undesirable. I am thinking, in particular, of those settings in which conformity is bad and majoritarian norms are invasive. For example, we would recoil at the thought of "How's My Speech?" being used to sanction political dissidents. When political dissent is at issue, society has long recognized the value in letting unpopular or unfashionable arguments be voiced. Similarly, using "How's My Art?" to award National Endowment for the Arts grants could well reward those artists whose work was not artistically excellent but coincided with the aesthetic preferences of the median voter. And, in a different vein, we must recognize the problems that would arise if we tried to use a "How's My Driving?" for Everything approach to deal with matters about which preferences are very idiosyncratic. For example, such technologies could take some of

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feedback during the next year or two, but applying a multiplier to the fine if they receive similar feedback in the near future (a variation that seems appealing).

[216] *See supra* text accompanying notes 103-105.

[217] ELLICKSON, *supra* note 103, at 180-81 (1991).

the risk out of blind dates,[218] but romantic tastes are certainly variable enough to warrant skepticism about the approach, and hurt feelings may prompt people to leave inaccurate feedback following instances of unreciprocated attraction. Indeed, for these reasons, online dating web sites that have incorporated reviews and references do not seem to have been particularly successful.[219] In short, when the very high emotional stakes associated with dating are combined with highly individuated preferences, the false feedback problem becomes almost insurmountable.

There will be other settings in which conformity is relatively uncontroversial and median voter instincts are sensible but the costs of using HMD technologies to police misconduct exceed the benefits. Take pedestrian activity in public spaces. Interactions among pedestrians on a sidewalk, at a block party, or outside a concert venue are usually reasonably orderly for a variety of reasons: people interact with others face to face, people may be accompanied by a few acquaintances amidst the crowd, people may fear police intervention or mob justice if they act boorishly, and many people have internalized norms that cause them to behave in a considerate fashion. In a science-fiction world, we can imagine a "How's My Walking?" for Everyone system that eliminates anonymity in public spaces.[220] Were we to hand people remote controls and let them play a reputational version of laser tag, where their point totals would be posted on the Internet for employers, parents, blind dates, and parole officers to see, public misconduct would be deterred substantially. This regime would be one in which obscurity in public spaces disappeared entirely, but at what cost?. Such a regime only would be appropriate in those environments where public misconduct has reached crisis levels.

In looking for successful applications of "How's My Driving?" for everything, then, we should seek out contexts in which conformity is unproblematic, median voter

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[218] How's My Kissing?

[219] *See* Anna Jane Grossman, *Honestly Online: Internet Dating Becomes Less of a Crapshoot When You can Pre-Screen Your Potential Date*, CHI. SUN-TIMES, July 4, 2005, at 32.

[220] This is no longer science fiction. Science non-fiction is more like it. As you read these words, engineers are developing wearable computers that will facilitate face-to-face interactions when proximate strangers' devices reveal mutual interests, acquaintances, or social aspirations. Scholars have already begun thinking about how wearable communities can incorporate reputation and feedback. See Gerd Kortuem & Zary Segall, *Wearable Communities: Augmenting Social Networks with Wearable Computers*, 2 IEEE PERVASIVE COMPUTING 71, 77 (2003); Schneider et al., *supra* note 145, at 245-47.

judgments are informative, a broad social consensus exists regarding appropriate behavior, and the benefits of reputation tracking exceed the costs. For illustrative purposes, we can begin with a context where the disorder resulting from anonymity is not severe, but for which the costs of implementing a reputation tracking system would be so low as to render an intervention plausibly worthwhile. The vast majority of hotel guests are perfectly cooperative, desiring little more than a clean room and a good night's sleep. But most readers have probably had the misfortune to be assigned a room next door to inconsiderate outliers on multiple occasions. Many people, being essentially nonconfrontational, simply endure the noise. Others bang on walls or ask the front-desk employees to intervene, sometimes with minimal success. The problem, of course, is that hotels cannot identify the noisy patrons in advance, and customers are given no opportunities to choose their neighbors. It is not difficult to imagine a straightforward "How's My Neighboring?" program for hotel guests, which would enable hotels to exclude the noisy (or confine them to a particularly well insulated portion of the hotel) and allow everyone else to enjoy a decent night's sleep. The idea, then, is to make reputations for noisiness transportable across hotels. More controversially, we can imagine the application of HMDFE variations to public policy issues large (facilitating the accurate reporting of parental abuse and neglect of their children) and small (permitting the sanctioning of neighbors who leave their trash cans at the curbside for too long after pickup day). Without exploring all these variations, we should turn our attention to three settings in which these reputation systems seem particularly promising.

The first is military operations. I am not talking about trench warfare here or hand-to-hand combat. Increasingly, members of the military are called upon to engage in peace-keeping operations where aggravating the local population is detrimental to mission objectives. Law-abiding Iraqis are constantly witnessing some American soldiers behaving well and a few behaving quite badly. Yet there is no systematic effort to harness this information in a way that might improve military training and conduct. Now, there is an obvious challenge here. We do not want insurgents rating G.I.s, because they will probably phone in complaints about the most competent soldiers. But if the law-abiding population outnumbers the insurgent population by a sufficient margin, and if reporting on the quality of individual solders is made easy enough, then this problem

can be solved. And of course it may well be that creating this highly visible form of accountability creates extraordinary good will among the occupied.

The same arguments hold true in the context of police officers, and "How's My Policing?" programs in high-crime areas might be a promising strategy.[221] Again, we do not particularly want criminals complaining about cops, but if there is a way to encourage ordinary citizens to lodge compliments and complaints about particular officers in a low-cost way, then the benefits would be substantial. Opportunities to do this exist in the present system. A citizen can jot down a badge number and call a precinct or write a letter to a police commissioner. But the costs of doing so are rather high, and the lack of a visible and regular process for leaving feedback surely deters people from providing police departments with valuable information that could be used to improve policing.

There is a third type of environment in which reputation tracking and feedback systems may be particularly advantageous. It is an environment that is hard to describe, however, because it does not yet exist. As discussed in the paragraphs above, "How's My Driving?" for Everything may prove successful when a well-developed set of norms already exists. But recall the preceding discussion of how HMD programs might also permit us to create a "traffic code" that can be updated to reflect real-time changes in drivers' preferences and behaviors.[222] On this model, we can use "How's My Driving?" for Everything to create hyper-democratic rules in new environments characterized by loose-knit interactions. Surveying the past decade or so, scores of new environments like this have sprouted up, mostly in cyberspace: Internet chat rooms, online poker tournaments, peer-to-peer file swapping networks, massively multi-user online games, Craig's List, comments sections on blogs, and many more. The designers of these new environments often have to guess about what types of rules to impose on their users, and mistakes will be inevitable. Harnessing technologies that let anonymous users to rate each other's behavior and explain the basis for their high or low ratings will often be a highly beneficial means of giving users the types of rules they want and galvanizing user opinion around desirable innovations. Nobody knows what new loose-knit environments

[221] *See* Terence C. Gill, Note, *Regulating the Police in Investigatory Stops: A Practical Alternative to Bright Line Rules*, 50 S. CAL. L. REV. 183, 200 (1985) (mentioning such a regime).

[222] *See supra* text accompanying note 212.

will emerge in the coming decades. But we have enough information to suspect that in the new environments that do emerge, "How's My Driving?" for Everything technologies stand poised to help create and enforce the norms that will regulate behavior therein.

VI. Conclusion

The regime advanced in this paper represents a re-thinking of the way that we currently regulate traffic. It examines the costs of anonymous driving and finds them to be quite substantial, resulting in aggressive and unsafe behavior that kills thousands of Americans each year and makes tens of millions of commuters miserable. Although anonymous driving has become a fundamental fact of urban, suburban, and exurban driving environments, this anonymity can be curtailed. Indeed, urban driver anonymity seems like a relic from a bygone era, out of place in the information age. Just as eBay's reputation tracking system tamed e-commerce fraud rather effectively, "How's My Driving?" for Everyone might rein in aggressive, inconsiderate, and unsafe driving.

"How's My Driving?" programs appear to improve commercial fleet accident rates substantially, although more research on this front is certainly warranted. Assuming that further study confirms the very promising initial industry data, the state should strongly consider extending these programs to passenger vehicles, and there are strong reasons to favor universality within a given jurisdiction. At any given moment, there are millions of American drivers who are watching their fellow motorists behave badly. Many of these drivers mutter to themselves about their peers' misconduct, growing increasingly frustrated with their driving experience. At times, this frustration boils over into extreme acts of road rage. These opinions are formed, the information exists, and it is being vocalized to passengers or to no one in particular. All the government needs to do is harness this information. In so doing, the government would be delegating substantial traffic regulation duties to its drivers, in one fell swoop eliminating the need for vast numbers of traffic police, enabling insurers to price automobile premiums in a more individuated, less discriminatory manner, and quite possibly, making urban driving fun again.

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