

# Law and Lemons

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## **Abstract**

We study how statutory-law changes relate to disclosure, pricing, and liquidity in the used car market. Federal odometer laws mandated disclosure of mileage on car titles upon ownership transfer and thereby enhanced enforcement of odometer fraud. Following implementation of odometer regulations, we find increased dissemination of mileage in classified ads, increased sensitivity of asking price to mileage, a 10% mean increase in asking price, and a reduction in repeated ads. We also find that mileage disclosures substitute for puffery in classified ads. Our results indicate that statutes facilitating verification and enforcement of fraud can reduce information asymmetry.

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We thank seminar participants at Washington University in St Louis.

# Law and Lemons

## 1. *Introduction*

Evidence suggests that odometer fraud was once a significant problem. A 1985 study by the Illinois Attorney General's Consumer Protection Division found an odometer rollback rate of 49.8 percent (NHTSA Technical Report, 2002).<sup>1</sup> To reduce odometer fraud, Congress passed the Truth in Mileage Act (TIMA) of 1986, requiring seller disclosure of a vehicle's mileage on its title when ownership is transferred. This disclosure creates a trackable record of mileage readings on the vehicle's title.<sup>2</sup> A subsequent 1992 study found a significantly lower rollback rate of 3.91 percent, which suggests that odometer reliability improved following TIMA (USDOT, 2002).

We study whether a law that could reduce mileage rollback affects used-car markets. In particular, we ask two related questions: Is TIMA implementation related to a change in used-car-sellers' propensity to include mileage in classified car advertisements? Is TIMA associated with a change in used car pricing? The answer to these questions yields insight into how laws and institutions help market participants overcome information frictions and improve efficiency in a market that Akerlof (1970) made the archetype of an exchange operating under information asymmetry. The dishonesty on display in odometer rollback seems crass and comic on the surface. The welfare loss from crippled markets is substantial. As Akerlof (1970, p. 495) notes, "The cost of dishonesty, therefore, lies not only in the amount by which the purchaser is cheated; the cost also must include the loss incurred from driving legitimate business out of existence."

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<sup>1</sup> The study tracked 5000 randomly chosen vehicles sold in a one-year period by a large lease car company.

<sup>2</sup> The requirement for transferors to provide transferees with a written mileage disclosure in connection with the transfer of ownership of a motor vehicle dates back to Section 408 of the Motor Vehicle Information and Cost Savings Action of 1972. However, such disclosure requirements were not implemented by the States prior to TIMA, as discussed below.

We argue that if TIMA enforcement enhanced the credibility of odometer readings, (1) we expect more used-car sellers to disclose mileage information in classified ads, because mileage information, though costly to disclose, can reduce buyers' search cost<sup>3</sup> and improve trade liquidity (Ozga, 1960; Stigler 1961; Stiglitz, 1979), and (2) we expect used-car sales price to increase because enhanced credibility of odometer reading mitigates information asymmetry and reduces the adverse selection component of pricing (Glosten and Milgrom 1985; Amihud and Mendleson, 1986).

We exploit time variation of TIMA implementation across states and use a difference-in-difference research design to examine these questions. To limit the cost of collecting used-car-ad information, we focus on two states. All titles issued in Illinois after January 1990 must have an odometer statement, whereas California did not implement this requirement until April 18, 1994.<sup>4</sup> We examine changes in mileage disclosure in May classified car advertisements for Toyota Corollas in the *Chicago Tribune* and *Los Angeles Times* between 1984 and 1993 around TIMA implementation in Illinois.

Used-car ads published in the *Chicago Tribune* serve as the treated sample, while those in the *Los Angeles Times* serve as the control. The underlying assumption is that used-car sellers from Illinois advertise their cars in the *Chicago Tribune*, while those from California advertise in the *Los Angeles Times*. This is a reasonable assumption given that used-car buyers commonly request a test-drive before the title transfer.<sup>5</sup> Classified advertisements represent major marketplaces for

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<sup>3</sup> In this study, we adopt the standard definition of buyer search cost in the economic literature as the cost incurred by the buyer to locate an appropriate seller and purchase a product. Search costs are information costs and include the opportunity cost of time spent searching as well as associated expenditures such as contacting and conversing with the seller, arrangements to view and inspect the vehicle, newspaper and magazine subscriptions, etc.

<sup>4</sup> See Illinois Compiled Statutes 625 ILCS 5 Illinois Vehicle Code Section 3-112 and California Department of Motor Vehicles Chapter 5, Odometer Mileage Reporting. Appendix A provides a TIMA adoption dates by state.

<sup>5</sup> We use "*Chicago Tribune*" and "Illinois", and "*Los Angeles Times*" and "California" interchangeably in this study.

used-car trading during our sample period, because the sample period predates the widespread introduction of e-commerce sites such as *eBay* and *Craigslist*, both launched in 1995.

We choose Toyota Corollas because they are manufactured throughout the sample period, and are an economy vehicle, which ensures that mechanical reliability and therefore mileage information are important considerations for buyers. We also choose the Corolla because we believed it was likely to yield a decent sample size. Toyota began manufacturing Corollas in 1967. By 1990, Toyota had produced more than 15 million Corollas, surpassing the Model T (made for 19 years between 1908 and 1927) to become the second-most-produced car. By 1990, more Volkswagen Beetles had been produced (some 20 million), but that car was not sold in the US in 1990, and Beetle production started in 1938 (*New York Times*, 1990). Also, unlike the Beetle, the Corolla is a *not* considered a collectors' car. Instead, the Corolla is a workhorse, and buyers generally select it for low-cost, reliable transportation (apologies to the happy few who choose it for style). In addition, Corollas are available in limited versions, which makes it easier to control for cross-version differences in the empirical tests. While technological changes to Toyota Corollas might affect sellers' propensity to disclose mileage or sales price, they should apply to Corolla sellers in different States in the same way. Still, our tests control for the 'generation' of vehicle. In this way, our difference-in-difference identification estimator captures the TIMA-implementation effect.<sup>6</sup>

We have five main findings: First, we find a significant increase (17.5 percent, 6.9/39.3) in the frequency of car ads disclosing mileage information after TIMA implementation in Illinois relative to the change in California over the same period. This finding is based on multivariate analysis controlling for variables such as vehicle age, model generation, and whether the ad is a

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<sup>6</sup> We discuss how changes in the Corolla instrument cluster that contains the odometer might affect our inferences in Section 2.

dealer ad. The univariate analysis shows an increase in Illinois and a decrease in California in the propensity to disclose mileage. Neither univariate change is significant.

Second, we test whether mileage disclosure is associated with improved liquidity, and whether TIMA enhances this effect due to the increased credibility of mileage information. We measure liquidity by the number of times the same ad is repeated in the newspaper. If mileage information reduces buyers' search cost, we expect it to bear a negative relation with ad repetition. In addition, if TIMA improves the buyer's faith in the mileage reading, we expect buyers to be more likely to rely on mileage information in ads as they identify potential candidates for further information collection (contacting the seller and going to inspect the car) and purchase. Therefore, we predict that the association between mileage disclosure and repetition increases post TIMA. This is indeed what we find. Mileage disclosure reduces ad repetition by 8.7 percent, and post TIMA it further reduces the duration by roughly 4.0 percent.<sup>7</sup>

Third, we examine whether TIMA is associated with a pricing effect. If TIMA reduces mileage rollback and enhances the credibility of the odometer reading, it likely reduces information asymmetry between transacting parties and thus the adverse-selection component in price.<sup>8</sup> If so, we expect the asking price of used cars to increase, on average, post TIMA. We find evidence consistent with this prediction: The asking price increases by \$219 post TIMA among for Corollas advertised in Illinois (about 5.5% of the pre-TIMA average asking price of \$3,914).

Fourth, to provide additional evidence on whether TIMA increases the credibility of mileage information, we test the change in the sensitivity of asking price to miles disclosed in the

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<sup>7</sup> The average ad is repeated 4.45 times in the pre-TIMA period in Illinois.

<sup>8</sup> Ideally we would obtain the transaction prices for these tests. However, due to lack of transaction-price availability, we use the asking price provided in the classified ads. Asking price can be a noisy, biased proxy for the transaction price. If the bias does not vary surrounding the implementation of TIMA, or between Chicago and Los Angeles, our difference-in-differences research design limits the confounding effects of this bias as it relates to the interpretation of our results.

ads following the implementation of TIMA. One challenge for this test is selection bias. The seller chooses whether to include mileage information in the ad. We address this issue by using a Heckman selection model. We find that the sensitivity of asking price to miles disclosed increases significantly after the implementation of TIMA in Illinois. An additional 10,000 miles reduces the car's asking price by \$683. Post TIMA, selling price is reduced by an additional \$96 per 10,000 miles. The magnitude of this added reduction is economically large, \$470, given that the average car advertised in Illinois post-TIMA has 49,000 miles.

Last, we investigate whether TIMA affects the relation between mileage disclosure and the use of less credible information in ads. Adding more words to the ad is costly to the seller, who must pay based on the number of lines in the ad.<sup>9</sup> We predict that sellers facing this cost-benefit tradeoff choose to include signals that yield the highest net benefit in ads. If TIMA improves the credibility of the odometer reading, sellers might substitute this more informative signal for less precise alternatives (e.g., “low mileage”), or unverifiable, general statements (e.g., “like new” or “grandma’s car”). We find a significant reduction, 43 percent, in the frequency of “low mileage” disclosure, and 19 percent in the number of unverifiable disclosures, among used cars advertised in Illinois post TIMA. The significance level of the latter drop is 10 percent in a two-tailed test.<sup>10</sup>

Taken together, the results suggest that TIMA increases sellers' use of mileage information in car ads and increases the car's asking price. Our findings suggest that laws and institutions that enhance the credibility of seller disclosures can mitigate the “lemon problem” (Akerlof, 1970) in the used car markets and improve trading efficiency.

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<sup>9</sup>Appendix B lists advertising rates and gives details.

<sup>10</sup> Approximately 11.5% of Illinois ads contain “low mileage” in the Pre-TIMA period. The coefficient on *Illinois\*Post* in Table 7 is -0.05. Approximately 77% of Illinois ads contain “unverifiable disclosures.” This coefficient on *Illinois\*Post* in Table 7 is -0.092.

Our study makes two significant contributions to the law, finance, and accounting literature. First, support for the “law and finance hypothesis,” i.e., that legal protections promote dispersed ownership and larger stock markets remains tenuous. For example, La Porta, Lopez-De-Silanes, Shleifer and Vishny (1997, 1998) suggest that law matters for financial-market development, while Acheson, Campbell, and Turner (2019), for example, suggest that private contracting can substitute for statutory protection. More relevant to our context, Lewis (2011) provides results suggesting that car sellers on eBay are able to contract (at least partially) on the quality of their cars using text and photographs. While including photographs in classified ads of sufficient resolution to provide credible information was technically infeasible in the time-period we study, sellers and buyers likely exercise creativity beyond that conceivable by researchers to secure available gains to trade via some means to contract on quality (Coase, 1974). Because many of these studies are cross-country (Acheson et al. (2019) is a notable exception), they face two major challenges: one difficulty is showing causality, and the other is pinning down the causal mechanism. Our paper addresses these two challenges by focusing on a specific (odometer) law that relates to a particular (used-car) market while employing staggered implementation. In this way, we can provide causal evidence that laws enhancing information credibility can reduce information asymmetry between traders and improve market liquidity.

Second, our study contributes to the trackless voluntary and mandatory disclosure literature. Our results suggest that increasing the reliability of a signal while holding its relevance constant aids market liquidity. The odometer reading is a noisy measure of automobile quality, yet it has information advantages over seller statements regarding a car’s past use and future reliability. It remains informative, even though buyers have access to other potentially more relevant

measures of future reliability (e.g., mechanic’s inspections).<sup>11</sup> We provide support for the benefits of providing a reliable measure of realized events (past miles driven). In addition, researchers debate the confirmatory role of mandatory financial reports. That is, the usefulness of audited financial statements in disciplining managers’ voluntary disclosures (Gigler and Hemmer 2002). Ball et al. (2007) provide evidence that independent verification of outcomes enhances disclosure credibility, leading to a complementary relation between audited financial reporting and managers’ disclosure level. Our study demonstrates that a shock enhancing the credibility of mileage information (“mandatory disclosure”) increases car sellers’ propensity to provide this information in the ads (“voluntary disclosure”).

We emphasize two caveats that restrain our enthusiasm before proceeding. First, though our study provides evidence that TIMA implementation yields positive market consequences, we cannot address the social-welfare effects of TIMA, because that requires specification of all the costs and benefits associated with TIMA implementation. Mileage reporting requirements are costly to implement and maintain and the resources devoted to these requirements are drawn from elsewhere in the economy. State governments are forced to direct more of their limited resources to odometer reporting; the opportunity costs of these resources is unclear. It varies with the efficiency of each State’s spending practices. Second, our findings do not imply that federal regulation such as TIMA and the consequent state regulations are the most efficient way to deter fraud. To do that, we must identify alternatives and compare their net benefits. One might argue that the States’ prior involvement in the vehicle-titling process provided a unique incremental-cost

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<sup>11</sup> The State could develop auto-health-measurement principals, mandate assessments, and audit them to protect small, unsophisticated car consumers. One could also argue that improperly maintained and mechanically troubled cars are a hazard to other drivers and pedestrians and are a negative externality. We do not find evidence that such audits are voluntarily performed by sellers—we assume, if they were performed, high-quality-car sellers would disclose this fact in ads.

advantage for the States to create a record of mileage information, but the incremental cost of obtaining and processing this information by other non-state parties at the time of TIMA is unclear. In 1992, CARFAX, a commercial web-based company that provides vehicle-history reports to individuals and businesses, began to offer reports that could be used to verify mileage, but at that time, CARFAX used odometer records created through TIMA protocols.<sup>12</sup> Later innovations in information technology allowed CARFAX to supplement this information with mileage readings taken when car owners brought their vehicles to dealers or auto-repair shops for maintenance or accident repairs. Nonetheless, our study sheds light on two important questions: how laws and institutions might aid private contracting, and how regulations affect disclosure and market liquidity when they improve the credibility of information.

## **2. *Institutional background***

### **2.1. Legislative history**

The Illinois post-TIMA, statutory-disclosure requirements culminate a series of statutory stipulations. The requirement for transferors to provide transferees with a written mileage disclosure in connection with motor-vehicle-ownership transfer originates in Section 408 of the federal Motor Vehicle Information and Cost Savings Act of 1972. This law called for civil penalties. It forced any person who violated the disclosure requirement with intent to defraud to pay three times actual damages or \$1,500 whichever was greater and attorney's fees. The Cost Savings Act of 1972 was amended in 1976, adding civil penalties of \$1,000 per occurrence and criminal penalties for "knowing and willful" violation of up to \$50,000 and up to one year in prison. This amendment also created a budget for "carrying out this title" of \$650,000 for fiscal

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<sup>12</sup> At the time, Carfax reports were obtained by fax. The company started in Columbia, Missouri, which suggests that initial data were obtained from the Missouri Department of Revenue, which administers car registration and titling in the State.

1977. TIMA further increased penalties, raising the fine to \$2,000 per occurrence and the upper limit on prison to ‘not more than three years.’<sup>13</sup>

State laws govern motor vehicle titles and transfers, and the disclosure provisions initially adopted by states in response to The Cost Savings Act were deemed ineffective by federal legislators. For example, States allowed odometer disclosure to be made on a document that was not attached to the title and was not printed on tamper-proof paper. A December 30, 1976 survey of 49 states indicated that Illinois had no odometer disclosure program, and California had title disclosure requirements but no enforcement uniformity or procedures to verify recording.<sup>14</sup> The study concluded, “It appears that Federal Law 15 USC 1981 [the Cost Savings Act] may not have accomplished its purpose. There is a possibility that a large proportion of purchasers buying from private owners either do not ask, or do not receive any evidence that the odometer mileage has not be altered” (p. vii.). It recommended that States take action to make odometer tampering by dealers and private owners a prohibitively costly act. A 1985 study of 5,000 cars sold by a leasing company found that 49.8 percent of the vehicles had their mileage rolled back below the mileage recorded by the lease company at sale.<sup>15</sup>

The stated purpose of the Truth in Mileage Act of 1986 (TIMA) is to strengthen the reporting requirements of the 1972 Cost Savings Act.<sup>16</sup> By restricting the licensing of vehicles transferred in states that do not meet federal-mileage reporting requirements, the Act forces states to adopt procedures to force sellers to securely certify miles at the time of transfer on vehicle titles. Initially, TIMA required states to meet requirements by April 1989, but only one state was able to

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<sup>13</sup> Section 3 ‘Violations of Odometer Requirement’; Public Law 99-579, October 29, 1986.

<sup>14</sup> U.S. Department of Transportation, National Highway Traffic Safety Administration (1976)

<sup>15</sup> The study was conducted by the Illinois Attorney General’s Consumer Products Division and is cited in USDOT (2002).

<sup>16</sup> According to National Highway Traffic Safety Administrator Diane Steed, “The intent of the law has always been to protect consumers by providing an official paper trail of odometer readings that may be checked by car owners and law enforcement officials to determine whether the odometer has been turned back” (Chicago Tribune, 1988).

meet this deadline, and the National Highway Traffic Safety Administration granted extensions.<sup>17</sup> Illinois met reporting requirements in January 1990.<sup>18</sup> California followed in April 1994. A 1992 study by the Pennsylvania Office of Attorney General also checked cars sold by a leasing company for mileage rollback. Of 3,630 cars examined, 5.07 percent of the resold lease vehicles had their mileage rolled back. This suggests that such requirements can limit mileage rollback.<sup>19</sup>

We argue that the implementation of TIMA increased the expected cost of rolling back an odometer, thereby reducing the probability that rollback will occur. First, TIMA increased the penalty for tampering with odometers. Second, TIMA increased the probability of being caught. It requires sellers to record mileage on the vehicle title upon the transfer of car ownership and requires States to develop the means to implement this recording. Before the implementation, sellers were also required to disclose cumulative mileage to the buyer but not necessarily in the title. As a result, titles lacked mileage information. The advantage of having mileage on titles is that it creates a mileage record at each transaction date and enables both government officials and subsequent buyers to verify that the current vehicle mileage is reasonable given base records.<sup>20</sup>

## **2.2. The Corolla's instrument cluster**

We do not find significant differences in the Corolla's instrument cluster between 1987 and 1993 that would significantly affect a used-car buyer's confidence in the mileage reading or increase the

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<sup>17</sup> According to Steed, "Because the titling and disclosure provision will result in changes in many state motor vehicle titling laws and forms, we are adopting a flexible position on implementing this rule" (Chicago Tribune, 1988).

<sup>18</sup> (625 ILCS 5/3-112.1) (from Ch. 95 1/2, par. 3-112.1) Sec. 3-112.1. Odometer.)

<sup>19</sup> The study is cited in USDOT (2002). In the 1976 American Association of Motor Vehicle Administrators Survey, Pennsylvania indicated that it requires seller certification of odometer mileage on the vehicle title when transferred. It also indicated that it had computerized the system (USDOT, 1977).

<sup>20</sup> Prior to TIMA, evidence for odometer rollback could be discovered by happenstance and collection of physical evidence by local enforcement officials following tips. For example, a Du Page County jury awarded Michael James \$166,500 to be paid by two car dealerships because of rollback fraud. James found a two-year-old muffler-shop bill stuck between the glove box and dashboard. The bill indicated the mileage on his recently purchased Mercury Cougar's was 30 percent higher at the time of the muffler repair compared to the Cougar's current odometer reading. In this case, the jury also heard testimony from a mechanic who explained that the odometer showed signs of tampering (Sjostrom, 1989).

buyer's ability to detect mileage rollback.<sup>21</sup> Between 1987 and 1993, Toyota introduced four 'generations' of Corollas. None had sealed instrument clusters or other means that would allow the buyer to detect odometer tampering. Access to the speedometer odometer instrument cluster was not easy (during disassembly, bolts can be dropped into the dashboard and lost), but could be accomplished with minimal mechanical skill and common tools. It required the removal of approximately seven bolts and Phillips-head screws, the disengagement of multiple plastic tabs, and the unplugging of volt connectors. Once the speedometer/odometer is removed from the instrument cluster, mileage can be changed by turning accessible gears with one's fingers so that scratches would not be visible on the reassembled instrument cluster itself, though wear might be observed on the bolts and screws attaching the cluster assembly to the dashboard. A digital odometer requires specialized instrumentation to alter the mileage reading, but digital odometers did not appear in the Corolla until the 1998 model.

### **3. Hypothesis development**

Since Akerlof (1970), used-car markets have served as a metaphor for markets with significant information asymmetry and adverse selection. Subsequent work by Grossman and Hart (1980), Grossman (1981), and Milgrom (1981) argues that verifiable disclosure mitigates information asymmetry and thus the adverse selection problems. If truthful disclosure is possible and disclosure is costly, partial disclosure occurs (e.g., Jovanovic, 1982) and price is a function of the disclosed quality.<sup>22</sup> These papers suggest that sellers have an incentive to disclose quality-related information (if buyers know sellers possess it, Dye, 1985) because buyers infer lower quality from non-disclosure.

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<sup>21</sup> The instrument cluster is the group of gauges visible to the driver through the steering wheel that contains the tachometer, speedometer/odometer, temperature gauge, and fuel gauge.

<sup>22</sup> Akerlof (1970) and Grossman (1981) also note that warranties can facilitate trade when indicators of ex-ante quality can be verified ex post (e.g., subsequent brake failure or transmission trouble) and ex-post settling up can be assured.

In addition, search costs exist in markets where a “flow of ignorance is maintained by the entry of new firms or new individuals” (Stiglitz, 1979, p. 340). In such markets, where communication is costly, buyers and sellers lack perfect knowledge, and advertising has an informative role (Ozga, 1960). It can allow a buyer to find a better price given that she expects a distribution of prices (Stigler, 1961) or find product qualities that match their needs. Thus information provided by the seller through advertising facilitates trade.

If TIMA implementation increases the verifiability of the odometer’s mileage reading by discouraging rollback, and if odometer information is relevant for assessing car quality, we expect more used car sellers to disclose this information in classified ads to reduce information asymmetry, adverse selection, and search costs. The reduced noise in odometer information suggests that the benefits of disclosure will increase as the number is a more reliable indicator of quality. The seller takes this variation in benefits into account in determining whether or not to disclose mileage information in the ad, because disclosure of information in classified ads is costly to sellers (ad cost increases in the number of lines in the ad). The extensive use of abbreviations in ads indicates that sellers feel the weight of this cost. Given this cost, sellers will choose information that maximizes the likelihood of quickly finding a buyer and selling at the highest price. Ad costs also increase as the ad is run for more days. Presumably, these considerations would lead the seller to disclose information about the type and quality of the car. Inspection of the ads indicates that this presumption is accurate. We test whether the reliability of information influences its disclosure. Our first hypothesis is stated as follows:

*Hypothesis 1 (H1): Mileage disclosure in classified ads increases following the implementation of TIMA.*

Our second hypothesis relates to the first in that it also follows from the implications of enhanced credibility of mileage disclosure. Given asymmetry between buyers and sellers and skepticism on the part of buyers regarding claims made by sellers, we expect buyers to discount these claims absent credible disclosure. As information asymmetry declines with the disclosure of credible information, we expect the adverse-selection component of the price to decline, prices to increase, and markets to become more liquid (Glosten and Milgrom, 1985; Amihud and Mendelson, 1986). This logic is the basis for Hypotheses 2, 3, and 4.

*Hypothesis 2 (H2): Prices will increase for used cars in ads disclosing mileage following TIMA implementation.*

If increased credibility of mileage disclosures leads to increased price, the price should be more sensitive to the level of disclosed miles:

*Hypothesis 3 (H3): Prices of used cars will be more sensitive to mileage disclosed in ads following TIMA implementation.*

If enhanced communication of mileage information reduces search costs and improves matching between buyers and sellers and/or improves liquidity, we expect cars to be sold more quickly, and quicker sales should lead to less ad repetition:

*Hypothesis 4 (H4): The time to sell a car decreases for sellers who disclose mileage information following the implementation of TIMA.*

Our final hypothesis stems from another implication of the enhanced credibility of odometer miles as an indicator of used-car quality that results from TIMA implementation. Recall from the discussion leading to Hypothesis 1 that a seller chooses from a set of various items to include in the ad, based on the net benefit of including an item. These net benefits vary according to an item's perceived ability to quickly attract a buyer willing to pay a higher price. Our discussion

in the prior hypotheses assumed that the seller weighed benefits from reduction of information asymmetry, adverse selection, and search costs in light of buyer skepticism. Still, we observe the inclusion of nonverifiable items in classified ads. These items are nonverifiable either because the item asserts an opinion (“beautiful” “can’t miss”), because the assertion is nebulous (“low miles” “runs well”), or because the item would be difficult to verify (“garage kept” “grandma’s car”). The neoclassical economic model has difficulty explaining the inclusion of such items in ads. However, to the extent that the seller perceives non-zero benefit in their inclusion, we expect them to be squeezed out of ads as the benefit from inclusion of miles increases or as buyers rely less on such puffery and place more weight on odometer miles when assessing used-car quality.

*Hypothesis 5a (H5a): Fewer ads will contain the phrase “low miles” following TIMA implementation.*

*Hypothesis 5b (H5b): Fewer ads will contain unverifiable claims following TIMA*

## **4. Results**

### **4.1. Data**

We hand-code data from classified advertisements for auto sales posted in the *Chicago Tribune* and *Los Angeles Times* from 1985 to 1993. These ads appear in PDF files of pictures of newspaper pages and are provided via ProQuest Historical Newspapers. During this time period before early 2000, classified advertising at major local newspapers was a dominant venue for matching buyers and sellers in automotive, employment, and real estate markets.<sup>23</sup>

To list a car in a *Chicago Tribune* classified ad, a seller pays a fixed fee for each ad line. The pricing per line at the *Chicago Tribune* has steadily increased over time. Appendix B provides

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<sup>23</sup> Data available from the Pew Research Center shows that newspaper advertising revenue stops growing in 2000 and begins to decline thereafter (<http://www.journalism.org/chart/sotnm-newspapers-newspaper-industry-estimated-advertising-and-circulation-revenue/>).

information on these costs. It also gives a sense of the process of classified ad composition and submission. Figure 1 displays examples of classified advertisements from the *Chicago Tribune* and *Los Angeles Times*, respectively. The description in classified ads is far shorter and contains far less detail than ads currently posted on Craigslist where ad cost is free except for dealers, who pay \$5. Moreover, most ads are less than two lines, and few contain more than three lines. These observations suggest that the direct cost of advertising is non-trivial, and these costs force sellers to weigh the net benefit of including mileage in an ad.

Due to the cost of data coding, we limit our sample to advertisements for Toyota Corollas posted in May of each year, which yields a total sample of 9,759 classified advertisements.<sup>24</sup> We then eliminate repeated advertisements based on the seller contact and serial numbers and obtain a sample of 2,046 non-repeated, unique advertisements. Next, we exclude advertisements containing multiple cars or missing price information. Finally, we exclude advertisements for cars over 10 years old because these cars are exempt from TIMA. Our final sample consists of 1,692 advertisements of unique cars. Panel A of Table 1 depicts the sample selection procedure.

Panel B of Table 1 displays sample composition by State and year. Note that Carfax does not have a TIMA-independent effect on our results during this period, because the States were Carfax's source of mileage data during our sample period. Carfax collected other vehicle history information (e.g., flooded and wrecked cars) from other sources. Moreover, Carfax information should be available to car sellers equally in Illinois and California. Therefore, our difference-in-differences research design addresses the concern that Carfax availability might drive our results.

## 4.2. Descriptive Statistics

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<sup>24</sup> We collect the 1991 *Chicago Tribune* data from April because the raw newspaper images from May are illegible.

Panel A of Table 3 presents descriptive statistics for the sample. About 30 percent of car ads disclose mileage. 48 percent of our sample comes from the *Chicago Tribune*, and 36 percent of ads were posted after the implementation of TIMA in Illinois. An average car with disclosed miles in the ads in our sample has 45,000 miles, much smaller than the corresponding figure of 90,000 miles in Lewis (2011), whose sample period is 2006. The average car in our sample has an age of 4.9 years whereas in Lewis's (2011) sample, it is 15.8 years. The evidence reflects significant improvement in car quality and durability over the 1980s and 1990s. About 30 percent of our sample cars are advertised by dealers, a figure comparable to that in Lewis (2011). 22.6 percent of car ads were posted in the Sunday edition, much higher than the 13 percent that would result if the posting days were chosen randomly.

Panel B of Table 3 shows descriptive statistics for subsamples based on state. Approximately 40 and 22 percent of cars ads in Illinois and California, respectively, disclose mileage. Panels C and D of Table 2 display descriptive statistics for Illinois and California subsamples divided into pre-1990 (before Illinois implemented TIMA reporting) and post-1990 based on mileage disclosure. Mileage disclosure increases in Illinois, but this change is not significant. No increase is observed in California. Ad repetition declines in Illinois but increases in California. Unverifiable disclosures decline in both States. However, the univariate results suggest that the Post-1990 sample includes far more dealer ads. Dealer advertisements differ from individual advertisements in that dealers are less likely to disclose miles in their ads. Therefore, we require multivariate tests to draw reliable inferences regarding differential effects of TIMA adoption on the Post-1990 Illinois sample.

Table 4 presents correlation coefficients between variables used in the empirical tests. Car ads in Illinois are more likely to disclose mileage information, and cars are less likely to be sold

by dealers (more likely to be sold by original owners), and have lower asking prices, shorter duration, and tend to contain more unverifiable disclosures. Mileage disclosure is positively associated with asking price, original-owner status (as noted above), and damage occurrence, while negatively associated with duration, “low mileage” disclosure, and car age. These results highlight the importance of including various controls that are associated with mileage disclosure and the necessity of including the pre-TIMA-Illinois period as a control in the empirical analyses.

### 4.3 TIMA enforcement and Voluntary disclosure of mileage information

To examine the effect of TIMA enforcement on seller disclosure behavior, we run OLS regressions based on the model below:

$$y_i = \beta_1 \times Illinois_i + \beta_2 \times Illinois_i \times Post_i + \boldsymbol{\gamma}'\mathbf{X}_i + \alpha_j + \alpha_t + \epsilon_i, \quad (1)$$

where the dependent variable  $y$  is an indicator variable that equals one if an ad discloses mileage. *Illinois* is an indicator variable that equals one if an ad is posted in *Chicago Tribune* and zero otherwise (i.e., if posted in *LA Times*). *Post* is an indicator variable that equals one if an ad is posted in or after 1990, the year when TIMA began taking effect in Illinois.  $\mathbf{X}$  is the vector of control variables, which includes *Age* (the age of a car in years), *Generation* (the Toyota Corolla generation of a car), *Dealer* (an indicator variable that equals one if an ad is posted by a dealer), *OriginalOwner* (an indicator variable that equals one if an ad is posted by the car’s original owner), *MustSell* (an indicator variable that equals one if a seller must sell the car (e.g., if the advertisement states “must sell” or “moving overseas”)), *Damage* (an indicator variable that equals one if a car is damaged), and *UnverifiableDis* (the number of unverifiable statements about the car’s condition in an advertisement (e.g., “like new”, “excellent”, or “reliable”));  $\alpha_j$  are car body type fixed effects; and  $\alpha_t$  are year fixed effects. Table 2 contains more detailed variable definitions. *Post* is not included by itself because it is perfectly collinear with year fixed effects. To allow for

dependence of the error terms, we cluster standard errors at the state-year level. The coefficient of interests is  $\beta_2$ , which measures the effect of the implementation of TIMA.

Table 5 shows the results. The coefficient on *Illinois* is positive and significant, suggesting that sellers from Illinois are more likely to disclose mileage information in ads. More importantly, the coefficient on *Illinois\*Post* is positive and statistically significant. Sellers' propensity to disclose mileage increases from 40 percent before TIMA implementation to 46.5 percent after TIMA implementation. The 6.5 percent increase is economically significant, representing 16 percent of the sample mean. As for the control variables, the coefficients on *Dealer*, *MustSell*, and *UnverifiableDis* are all significantly negative. Thus, ads posted by dealers, ads that use the term "Must Sell," and ads with unverifiable disclosures are less likely to disclose mileage. The latter result suggests that more solid information substitutes for puffery.

The dependent variable, whether a seller discloses mileage in ads, is an indicator variable. Thus, we check the assessment of the economic magnitude of the TIMA-implementation effect by using a Probit model to estimate Model (1); and the average marginal effects are reported in column (2). We obtain similar inferences as the OLS estimates. In sum, we find that TIMA enforcement increases sellers' tendency to disclose mileage information.

#### 4.4 TIMA enforcement and credibility of mileage disclosure

While we find that TIMA enforcement increases sellers' voluntary disclosure of mileage, it is unclear whether it increases the credibility of mileage disclosure. To shed light on this issue, we conduct a test based on model (2) below:

$$y_i = \beta_1 \times Mile_i + \beta_2 \times Mile_i \times Illinois_i + \beta_3 \times Mile_i \times Illinois_i \times Post_i \\ + \beta_4 \times Illinois_i + \beta_5 \times Illinois_i \times Post_i + \boldsymbol{\gamma}_1' \mathbf{X}_i + \boldsymbol{\gamma}_2' \mathbf{X}_i \times Mile_i$$

$$+ \alpha_j + \alpha_j \times Mile_i + \alpha_t + \alpha_t \times Mile_i + \epsilon_i, \quad (2)$$

where the dependent variable  $y$  is the asking price of a car (in 1985 dollars);  $Mile$  is the disclosed mileage of a car (in 10,000 miles);  $Illinois$  and  $Post$  are defined as in model (1);  $X$  is the vector of control variables, which are the same as in model (1); Control variables include:  $CertifiedMile$  (an indicator variable that equals one if the disclosed mileage of a car is said to be ‘certified’, whatever that puffery means), and  $OriginalMile$  (an indicator variable that equals one if the disclosed mileage of a car is original);  $\alpha_j$  are car-body-type fixed effects (see Table 2 for a full description); and  $\alpha_t$  are year fixed effects.  $Post$  and  $Mile \times Post$  are not included because they are perfectly collinear with year fixed effects and  $Mile \times$  year fixed effects, respectively. The coefficient of interest is  $\beta_3$ , which measures the effect of the implementation of TIMA on the sensitivity of price to mileage.

Table 5, Panel C, column (2) presents the results based on OLS estimation for the subsample that discloses asking price. We find that an additional mile reduces asking price by six cents. Thus, sellers factor in mileage when pricing their cars, despite the dubious reliability of mileage. More importantly, the interaction term  $Mile \times Illinois \times Post$  is negative and statistically significant. Therefore, following TIMA implementation, sellers’ asking price becomes more sensitive to mileage disclosed. This evidence is consistent with the idea that by requiring mileage information to be recorded on vehicle titles and increasing the penalty for lying, TIMA enforcement improves the credibility of mileage disclosed in ads. From an economic-magnitude perspective, one additional mile reduces asking price from six cents in the pre-period to seven cents in the post period. Furthermore, the coefficient on  $Illinois \times Post$  is positive (column (1)), suggesting that TIMA enforcement improves asking price even for cars without mileage disclosed

in ads. The economic magnitude is large. On average, the asking price increases by \$704, which is 17 percent of the sample mean.

With respect to control variables, the asking price for cars advertised in Illinois is, on average, \$363 lower relative to those advertised in the Los Angeles times for the subset of car ads disclosing miles. As expected, older cars and cars disclosing damage are associated with a lower asking price while cars with unverifiable disclosure or with disclosed mileage designated as “certified” are associated with a higher asking price. In addition, asking price is less sensitive to mileage for older cars, for cars advertised by a dealer, or for cars disclosing a damage but more sensitive for cars with unverifiable disclosure or for ads indicating certified mileage. The dealer-mileage effect suggests that price reflects the increased dexterity of dealer mechanics. Buyers seem to place less weight on dealer mileage disclosures. It also suggests why dealers are less likely to disclose miles. The information content of the mileage disclosure is lower for dealers than for private sellers.

Model (3) presents the result generated using Heckman maximum likelihood estimation. *Sunday* is used to control for selection of mileage disclosure. Panel B of Table 5 shows that the number of advertisements increases significantly on Sundays, and ads on Sunday are more likely to contain mileage disclosures. This result is consistent with increased competition among sellers in Sunday ads resulting in a greater likelihood that the ad will disclose mileage. The result supports our hypothesis that car price becomes more sensitive to mileage following the implementation of TIMA. The coefficient on the three-way interaction of *Mile*, *Illinois*, and *Post* is of similar economic magnitude to the OLS results and significant at the 5 percent level. We note that the \$323 drop in value per 10,000 mileage appears consistent with expert remarks. In 1992, Richard Morse, Chief of the Odometer Fraud Section at NHTSA, estimated that the value of a 40,000 mile

rollback was between \$3,000 and \$4,000 on the wholesale price of a car (\$300 to \$400 per 10,000 miles).<sup>25</sup> This independent confirmation suggests that the values produced by our estimates are of reasonable magnitude. Finally,  $\chi^2$  for the test of independent equations from column (3) is 39.39 and significant, indicating that we must account for sample selection bias.

#### **4.5 TIMA enforcement and disclosure of puffery**

To further assess the impact of TIMA implementation on the credibility of mileage disclosure, we analyze car-sale rapidity, proxied by the number of ad repetitions of a given car by a given seller. Table 6 displays the results. We use both OLS and an estimation that assumes *Repetition*—a limited dependent variable—follows a Poisson distribution. We estimate variants of model (2) with *Repetition* and the log of *Repetition* as the dependent variable. We find that repetition of classified ads declines significantly in all specifications after TIMA implementation (*Illinois*  $\times$  *Post*). The decline is heightened when miles are disclosed in the ad (*MileDis*  $\times$  *Illinois*  $\times$  *Post*). Results are consistent with improved liquidity in the used-car market after TIMA enforcement.

Our final set of results, shown in Tables 7 and 8, examine whether mileage disclosures are more likely to substitute for puffery in classified ads following TIMA enforcement in Illinois. We measure puffery in ads with proxies for imprecise, subjective disclosures that are therefore unverifiable. One such ad disclosure that most closely relates to mileage is “low miles.” Table 7 shows that such disclosures are significantly less likely after TIMA implementation in Illinois. The coefficient on (*Illinois*  $\times$  *Post*) is significantly negative in both the OLS and the Probit specifications, columns (1) and (2), respectively.

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<sup>25</sup> <https://www.justice.gov/archives/usam/civil-resource-manual-178-response-objections-presentence-report>

We also measure puffery by counting the number of unverifiable disclosures contained in the ad. Examples include “like new,” “excellent,” and “reliable.” Table 8 shows the result of both OLS and Poisson-based estimations. Such disclosures decline significantly in all specifications following TIMA enforcement in Illinois.  $Illinois \times Post$  is significantly negative. The interaction is significantly negative for the coefficient on  $MileDis \times Illinois \times Post$ . This result suggests that the mileage disclosure does not simply squeeze out puffery because of space constraints related to the step-cost function nature of classified ads. If that were true, mileage disclosure could displace puffery, because the cost of the ad increases when it expands to another line. However, the results suggests that another factor is at play, reinforcing the effect of the credibility of mileage on information asymmetry in the used-car market. The effect is stronger, *conditional on mileage disclosure*, in the post-TIMA period. Puffery seems to lose its allure in the presence of credible information. In sum, the results support the idea that good information drives out bad.

#### **4.6 Additional Analyses**

We conduct two additional, untabulated analyses. First, we test whether the number of lines of classified advertisements increases following the implementation of TIMA. We expect to observe such a result if used-car sellers purchase more ad lines to include mileage information in advertisements. We find that the number of lines increases significantly by 0.36 (approximately one-third more lines per ad) in Illinois in post-TIMA-enforcement-period ads, suggesting that overall disclosure increases to accommodate additional mileage disclosures.

Second, we re-examine the effect of TIMA using its implementation in California in April 1994. Following the adoption we expect to observe similar changes in California to the ones we

find in Illinois post-1990. Therefore, *Los Angeles Times* ads serve as the treatment group in this analysis, and *Chicago Tribune* ads are used as the control group.

The sample period is from 1990 to 1994—the pre-treatment years are from 1990 to 1993, and the post-treatment year is 1994. The sample period begins in 1990 because the pre-treatment period in this analysis should capture the difference between the two states after Illinois' adoption of TIMA. We have only one-year's data for the post-treatment period because the ProQuest Historical Newspaper file ends in 1994. The final sample includes 770 observations. The 1990 - 1993 sample (607 observations) is the same as that used in the main analyses (Panel B, Table 1). The 1994 sample (163 observations) consists of 69 (94) observations from California (Illinois). Since the sample size is smaller than the main analysis, we expect to see weaker statistical significance.

The untabulated results are consistent with the main results. The probability of mileage disclosure increases by 5.2 percent (t-statistic: 1.84). Selling price increases by \$270 (t-statistic: 3.20), and is reduced by an additional \$107 per 10,000 miles (z-statistics: 1.99). As expected, the weaker statistical significance appears to be attributable to the smaller sample size. For example, in the test for price-mileage sensitivity, the coefficient of interest in this analysis is comparable in size to that from the main analysis (\$107 vs. \$110), but the statistical significance is smaller (1.99 vs. 2.73). Overall, the results confirm our predictions regarding the effect of TIMA implementation.

## **5. Conclusion**

We examine the relation between the Truth in Mileage Act (TIMA) and mileage disclosure in used-car classified advertisements. TIMA requires that the mileage of a vehicle be disclosed on

the title of the vehicle, which creates a record of mileage readings. Using data collected from used-car classified advertisements posted on local newspapers, we find that following the implementation of the TIMA in Illinois, 1) more used-car sellers disclose mileage, 2) car price becomes more sensitive to mileage, 3) used cars tend to sell more quickly, as indicated by fewer repeat ads, and 4) fewer used-car sellers disclose “low” mileage or other puffery. These results suggest that TIMA increases in the credibility of mileage information, thereby causing more used-car sellers to disclose mileage in classified advertisements. Our study provides evidence that regulators can attenuate market inefficiencies caused by search costs and adverse selection by using legislation and law enforcement to improve the credibility of advertising and therefore increase its production.

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## APPENDIX A

### Implementation Date of the Truth in Mileage Act by State

Date		State
1989	Apr 29	Kansas
	Jul 1	Utah
	Aug 1	Montana
	Dec 31	Alabama, Tennessee
1990	Jan 1	Colorado, <b>Illinois</b> , Louisiana, Mississippi, Missouri, Oklahoma, Pennsylvania
	Mar 15	Virginia
	Apr 1	Massachusetts
	Apr 29	Florida, Michigan, New York, Texas, Washington
	May 1	Alaska, Hawaii
	Jul 1	Georgia, Minnesota, New Mexico, Vermont
	Aug 1	Idaho
	Sep 1	Iowa, Kentucky, Wyoming
	Sep 30	Arkansas, Delaware
	Oct 1	North Carolina
	Oct 29	Rhode Island
	Dec 1	Arizona
	Dec 31	West Virginia
1991	Jan 1	Indiana, Maine, Nebraska, New Hampshire, North Dakota, South Carolina
	Apr 1	District of Columbia
	Apr 30	Maryland
	May 1	New Jersey
	Oct 1	Oregon, South Dakota
	Oct 29	Wisconsin
1992	Jan 1	Nevada
	Apr 30	Connecticut
	Jun 30	Ohio
1994	Apr 18	<b>California</b>

## APPENDIX B

### Classified Advertising Costs

#### Panel A. Costs of Advertising in the *Chicago Tribune* and *Los Angeles Times*

(per line per day, in dollars)

Year	<i>Chicago Tribune</i>		<i>Los Angeles Times</i>		
	4-Day Ads	7-Day Ads	Cars under \$2,000	Cars over \$2,000	% of Cars over \$2,000
1985			1.25	3.14	71.78
1986			1.25	3.57	66.91
1987			1.25	3.57	79.83
1988			1.25	3.57	72.82
1989			1.25	3.57	83.95
1990			1.25	3.57	90.90
1991			1.25	4.29	82.47
1992	2.78	2.27	2.00	4.71	95.92
1993			2.00	4.71	98.08
<b>Total</b>					80.77

#### Panel B. Examples of Classified Advertisement Pricing Schemes

< *Los Angeles Times*, May 1992 >

### REACH NEARLY 3 MILLION READERS

Deliver your advertising message to nearly 3 million Times readers every day. Choose one of these special, low-price advertising plans\* (exclusively for private parties).

#### **SUPER SELLERS**

**2 lines/4 days/\$16**

(\$8 each additional line)

Items for sale or wanted priced for \$2000 or less. (Not available for pets or livestock classifications, or "Exception" classifications). Price must appear in ad.

#### **ACTION ADS**

**2 lines/7 days/\$66**

(\$33 each additional line)

Our most popular private party program! No limit on the price of your personal, non-commercial items ... home, car, single pet or animal, and some other personal effects. (Certain classification restrictions apply, for situations which may qualify for the Action Ad rate, consult the Classified Department).



FIGURE 1

Examples of Classified Advertisements

Panel A. *Chicago Tribune*, May 1990

**TOYOTA '83 COROLLA-56K  
miles, clean, 5spd, AC, cas-  
sette. \$3000. 708-366-0931**

**TOYOTA '86 Corolla-auto, a/c,  
am/fm ster, runs great, exc  
cond. \$4350. 708-882-0906**

Panel B. *Los Angeles Times*, May 1990

**'82 Corolla 5 sp, 86K mi, nice,  
(DQA279)\$1990 818-285-7438pp**

**'85 CORLA GTS 5sp, ac, ps, cruise  
red, twin cam 16V, lo mi, nu tires  
\$4650(2r)x736)213/437-4111pp**

**TABLE 1**  
**Sample Selection and Composition**

**Panel A. Sample Selection**

<u>Sample Selection Criteria</u>	<u><i>Chicago Tribune</i></u>	<u><i>Los Angeles Times</i></u>	<u>Total</u>
Corolla classified ads in <i>Chicago Tribune</i> or <i>Los Angeles Times</i> every May from 1985 to 1993	3,954	5,805	9,759
Less: Repeated ads	(3,013)	(4,700)	(7,713)
Non-repeated ads	941	1,105	2,046
Less: Ads listing multiple cars	(57)	(67)	(124)
Less: Ads missing price	(45)	(58)	(103)
Less: Ads for cars older than 10 years	(35)	(92)	(127)
Final sample	804	888	1,692

**Panel B. Sample Composition by State and Year**

<u>State</u>	<u>Year</u>									<u>Total</u>
	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>1990</u>	<u>1991</u>	<u>1992</u>	<u>1993</u>	
<b>Illinois</b>	99	103	107	100	74	86	83	64	88	804
<b>California</b>	163	136	119	103	81	88	97	49	52	888
<b>Total</b>	262	239	226	203	155	174	180	113	140	1,692

**Table 2**  
**Variable Definitions**

<b>Variable</b>	<b>Definition</b>
<b>Variables of Interest</b>	
<i>Illinois</i>	1 if an advertisement is posted in <i>Chicago Tribune</i> and 0 otherwise (i.e., if posted in <i>Los Angeles Times</i> ).
<i>Post</i>	1 if an advertisement is posted in or after 1990—the year when the Truth In Mileage Act began taking effect in Illinois—and 0 otherwise (i.e., if posted before 1990).
<i>MileDis</i>	1 if an advertisement discloses mileage and 0 otherwise.
<i>Mile</i>	The disclosed mileage of a car (in 10,000 miles).
<i>Price</i>	The asking price of a car (in 1985 dollars).
<i>Repetition</i>	The number of times the advertisement for a car is repeated over time.
<i>lnRepetition</i>	The natural logarithm of <i>Repetition</i> .
<i>Low</i>	1 if an advertisement states that the car has “low” mileage and 0 otherwise.
<i>UnverifiableDis</i>	The number of unverifiable statements about the car’s condition in an advertisement (e.g., “like new”, “excellent”, or “reliable”).
<b>Control Variables</b>	
<i>Age</i>	The age of a car in years, computed as the year of advertisement minus the production year.
<i>Generation</i>	The Toyota Corolla generation of a car. Our sample includes the third to seventh generations. The third generation was introduced in 1974, the fourth in 1979, the fifth in 1983, the sixth in 1987, and the seventh in 1991.
<i>Dealer</i>	1 if an advertisement is posted by a dealer and 0 otherwise.
<i>OriginalOwner</i>	1 if an advertisement is posted by the car’s original owner and 0 otherwise.
<i>MustSell</i>	1 if a seller must sell the car (e.g., if the advertisement states “must sell” or “moving overseas”) and 0 otherwise.
<i>Damage</i>	1 if a car is damaged (e.g., if the advertisement states “salvage title”, “needs engine work”, “won’t start”, or “rusty”) and 0 otherwise.
<i>CertifiedMile</i>	1 if the disclosed mileage of a car is ‘certified’ and 0 otherwise.
<i>OriginalMile</i>	1 if the disclosed mileage of a car is original and 0 otherwise.
<i>Sunday</i>	1 if an advertisement is posted on a Sunday and 0 otherwise.
<b>Car-Body-Type Indicators</b>	
<i>Sedan</i>	1 if a car’s body type is sedan and 0 otherwise.
<i>Hatchback</i>	1 if a car’s body type is hatchback and 0 otherwise.
<i>Wagon</i>	1 if a car’s body type is wagon and 0 otherwise.
<i>LuxuryEdition</i>	1 if a car’s body type is luxury edition and 0 otherwise.
<i>SR5</i>	1 if a car’s body type is SR5 (Sport Rally 5-speed) and 0 otherwise.
<i>GTS</i>	1 if a car’s body type is GTS (Gran Turismo Sport) and 0 otherwise.

**TABLE 2**  
**Descriptive Statistics**

**Panel A. Descriptive Statistics for the Total Sample**

<b>Variable</b>	<b>Obs.</b>	<b>Mean</b>	<b>Median</b>	<b>Std. Dev.</b>	<b>Min</b>	<b>Max</b>
<b>Variables of Interest</b>						
<i>Illinois</i>	1,692	0.475	0	0.500	0	1
<i>Post</i>	1,692	0.359	0	0.480	0	1
<i>MileDis</i>	1,692	0.305	0	0.461	0	1
<i>Mile</i> (in 10,000 miles)	516	4.500	4.300	2.346	0.400	10.400
<i>Price</i> (in 1985 dollars)	1,692	4032	3842	2137	643	9035
<i>Repetition</i>	1,692	4.808	4	3.548	1	19
<i>lnRepetition</i>	1,692	1.304	1.386	0.762	0	2.944
<i>Low</i>	1,692	0.092	0	0.289	0	1
<i>UnverifiableDis</i>	1,692	0.633	1	0.614	0	2
<b>Control Variables</b>						
<i>Age</i> (in years)	1,692	4.867	5	2.660	0	10
<i>Generation</i>	1,692	4.757	5	1.007	3	7
<i>Dealer</i>	1,692	0.287	0	0.453	0	1
<i>OriginalOwner</i>	1,692	0.070	0	0.256	0	1
<i>MustSell</i>	1,692	0.025	0	0.157	0	1
<i>Damage</i>	1,692	0.011	0	0.103	0	1
<i>CertifiedMile</i>	1,692	0.013	0	0.113	0	1
<i>OriginalMile</i>	1,692	0.008	0	0.091	0	1
<i>Sunday</i>	1,692	0.226	0	0.419	0	1
<b>Car-Body-Type Indicators</b>						
<i>Sedan</i>	1,692	0.033	0	0.177	0	1
<i>Hatchback</i>	1,692	0.132	0	0.338	0	1
<i>Wagon</i>	1,692	0.061	0	0.240	0	1
<i>LuxuryEdition</i>	1,692	0.056	0	0.229	0	1
<i>SR5</i>	1,692	0.177	0	0.382	0	1
<i>GTS</i>	1,692	0.037	0	0.188	0	1

## Panel B. Descriptive Statistics for State Subsamples

Variable	Illinois			California			Difference (IL - CA)	t-stat.
	Obs.	Mean	Std. Dev.	Obs.	Mean	Std. Dev.		
Variables of Interest								
<i>Illinois</i>	804	1	0	888	0	0	1	
<i>Post</i>	804	0.399	0.490	888	0.322	0.468	0.077	3.31***
<i>MileDis</i>	804	0.404	0.491	888	0.215	0.411	0.189	8.62***
<i>Mile</i> (in 10,000 miles)	325	4.577	2.367	191	4.369	2.310	0.208	0.97
<i>Price</i> (in 1985 dollars)	804	3920	2167	888	4135	2105	-215	-2.07**
<i>Repetition</i>	804	4.185	3.337	888	5.372	3.640	-1.186	-6.96***
<i>lnRepetition</i>	804	1.136	0.788	888	1.457	0.704	-0.321	-8.86***
<i>Low</i>	804	0.101	0.301	888	0.083	0.277	0.017	1.24
<i>UnverifiableDis</i>	804	0.771	0.625	888	0.508	0.576	0.263	9.02***
Control Variables								
<i>Age</i> (in years)	804	4.929	2.575	888	4.811	2.734	0.118	0.91
<i>Generation</i>	804	4.813	0.943	888	4.706	1.060	0.107	2.19**
<i>Dealer</i>	804	0.210	0.408	888	0.357	0.479	-0.147	-6.75***
<i>OriginalOwner</i>	804	0.088	0.284	888	0.054	0.226	0.034	2.76***
<i>MustSell</i>	804	0.039	0.193	888	0.014	0.116	0.025	3.28***
<i>Damage</i>	804	0.021	0.144	888	0.001	0.034	0.020	4.02***

## Panel C. Descriptive Statistics for Illinois Pre-1990 and Post-1990 Subsamples

Variable	Pre-1990			Post-1990			Difference (Post - Pre)	t-stat.
	Obs.	Mean	Std. Dev.	Obs.	Mean	Std. Dev.		
Variables of Interest								
<i>Illinois</i>	483	1	0	321	1	0	0	
<i>Post</i>	483	0	0	321	1	0	1	
<i>MileDis</i>	483	0.393	0.489	321	0.421	0.494	0.027	0.77
<i>Mile</i> (in 10,000 miles)	190	4.337	2.187	135	4.914	2.570	0.577	2.18**
<i>Price</i> (in 1985 dollars)	483	3914	2200	321	3929	2120	15	0.09
<i>Repetition</i>	483	4.447	3.413	321	3.791	3.185	-0.656	-2.74***
<i>lnRepetition</i>	483	1.196	0.805	321	1.044	0.755	-0.153	-2.70***
<i>Low</i>	483	0.114	0.318	321	0.081	0.273	-0.033	-1.52
<i>UnverifiableDis</i>	483	0.820	0.630	321	0.698	0.612	-0.122	-2.72***
Control Variables								
<i>Age</i> (in years)	483	4.843	2.448	321	5.059	2.754	0.217	1.17
<i>Generation</i>	483	4.364	0.740	321	5.489	0.803	1.125	20.40***
<i>Dealer</i>	483	0.141	0.348	321	0.315	0.465	0.174	6.05***
<i>OriginalOwner</i>	483	0.095	0.294	321	0.078	0.268	-0.017	-0.85
<i>MustSell</i>	483	0.037	0.190	321	0.040	0.197	0.003	0.23
<i>Damage</i>	483	0.023	0.149	321	0.019	0.136	-0.004	-0.39

**Panel D. Descriptive Statistics for California Pre-1990 and Post-1990 Subsamples**

Variable	Pre-1990			Post-1990			Difference	
	Obs.	Mean	Std. Dev.	Obs.	Mean	Std. Dev.	(Post - Pre)	t-stat.
Variables of Interest								
<i>Illinois</i>	602	0	0	286	0	0	0	
<i>Post</i>	602	0	0	286	1	0	1	
<i>MileDis</i>	602	0.216	0.412	286	0.213	0.410	-0.003	-0.09
<i>Mile</i> (in 10,000 miles)	130	4.569	2.354	61	3.942	2.170	-0.627	-1.76*
<i>Price</i> (in 1985 dollars)	602	3925	2192	286	4576	1836	651	4.35***
<i>Repetition</i>	602	5.213	3.655	286	5.706	3.590	0.494	1.89*
<i>lnRepetition</i>	602	1.413	0.724	286	1.550	0.649	0.137	2.73***
<i>Low</i>	602	0.075	0.263	286	0.101	0.302	0.027	1.34
<i>UnverifiableDis</i>	602	0.573	0.596	286	0.371	0.505	-0.202	-4.96***
Control Variables								
<i>Age</i> (in years)	602	5.146	2.713	286	4.105	2.648	-1.041	-5.39***
<i>Generation</i>	602	4.254	0.854	286	5.657	0.787	1.403	23.46***
<i>Dealer</i>	602	0.312	0.464	286	0.451	0.498	0.139	4.07***
<i>OriginalOwner</i>	602	0.063	0.243	286	0.035	0.184	-0.028	-1.73*
<i>MustSell</i>	602	0.015	0.121	286	0.010	0.102	-0.004	-0.54
<i>Damage</i>	602	0.000	0.000	286	0.003	0.059	0.003	1.45

Panel A of Table 2 reports descriptive statistics for the variables used in our analyses for the total sample.

Panel B of Table 2 reports descriptive statistics for the variables used in our analyses for the Illinois and California subsamples.

Panel C of Table 2 reports descriptive statistics for the variables used in our analyses for the Illinois pre-1990 (i.e., 1985 – 1989) and post-1990 (i.e., 1990 – 1993) subsamples.

Panel D of Table 2 reports descriptive statistics for the variables used in our analyses for the California pre-1990 (i.e., 1985 – 1989) and post-1990 (i.e., 1990 – 1993) subsamples.

All variables are defined in Table 2. All non-indicator variables are winsorized at the 1% and 99% levels. \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% level, respectively, on a two-tailed test.

**TABLE 3**  
**Correlation Table**

Variables	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.
1. <i>Illinois</i>	1.000														
2. <i>Post</i>	0.080 <sup>a</sup>	1.000													
3. <i>MileDis</i>	0.205 <sup>a</sup>	0.029	1.000												
4. <i>Mile</i>	0.043	0.037	0.000	1.000											
5. <i>Price</i>	-0.050 <sup>b</sup>	0.070 <sup>a</sup>	0.078 <sup>a</sup>	-0.809 <sup>a</sup>	1.000										
6. <i>Repetition</i>	-0.167 <sup>a</sup>	-0.024	-0.062 <sup>b</sup>	-0.158 <sup>a</sup>	0.121 <sup>a</sup>	1.000									
7. <i>lnRepetition</i>	-0.211 <sup>a</sup>	-0.021	-0.088 <sup>a</sup>	-0.134 <sup>a</sup>	0.099 <sup>a</sup>	0.901 <sup>a</sup>	1.000								
8. <i>Low</i>	0.030	-0.003	-0.201 <sup>a</sup>	-0.031	0.059 <sup>b</sup>	0.013	0.013	1.000							
9. <i>UnverifiableDis</i>	0.214 <sup>a</sup>	-0.109 <sup>a</sup>	0.011	0.153 <sup>a</sup>	-0.241 <sup>a</sup>	-0.060 <sup>b</sup>	-0.039	-0.017	1.000						
10. <i>Age</i>	0.022	-0.072 <sup>a</sup>	-0.069 <sup>a</sup>	0.771 <sup>a</sup>	-0.913 <sup>a</sup>	-0.114 <sup>a</sup>	-0.090 <sup>a</sup>	-0.040 <sup>c</sup>	0.274 <sup>a</sup>	1.000					
11. <i>Generation</i>	0.053 <sup>b</sup>	0.603 <sup>a</sup>	0.083 <sup>a</sup>	-0.467 <sup>a</sup>	0.654 <sup>a</sup>	0.054 <sup>b</sup>	0.042 <sup>c</sup>	0.005	-0.235 <sup>a</sup>	-0.715 <sup>a</sup>	1.000				
12. <i>Dealer</i>	-0.162 <sup>a</sup>	0.152 <sup>a</sup>	-0.177 <sup>a</sup>	-0.258 <sup>a</sup>	0.385 <sup>a</sup>	0.039	0.028	0.002	-0.310 <sup>a</sup>	-0.334 <sup>a</sup>	0.326 <sup>a</sup>	1.000			
13. <i>OriginalOwner</i>	0.067 <sup>a</sup>	-0.037	0.054 <sup>b</sup>	0.062	-0.153 <sup>a</sup>	-0.047 <sup>c</sup>	-0.034	0.025	0.127 <sup>a</sup>	0.185 <sup>a</sup>	-0.154 <sup>a</sup>	-0.129 <sup>a</sup>	1.000		
14. <i>MustSell</i>	0.079 <sup>a</sup>	0.004	-0.017	-0.039	-0.026	-0.066 <sup>a</sup>	-0.062 <sup>b</sup>	0.001	0.109 <sup>a</sup>	0.014	-0.006	-0.094 <sup>a</sup>	0.014	1.000	
15. <i>Damage</i>	0.097 <sup>a</sup>	0.007	0.056 <sup>b</sup>	0.125 <sup>a</sup>	-0.147 <sup>a</sup>	-0.033	-0.032	-0.013	0.024	0.103 <sup>a</sup>	-0.067 <sup>a</sup>	-0.066 <sup>a</sup>	-0.006	-0.017	1.000

Table 3 reports Pearson correlations between the variables used in our analyses.

All variables are defined in Table 2. All non-indicator variables are winsorized at the 1% and 99% levels. <sup>a</sup>, <sup>b</sup>, and <sup>c</sup> denote statistical significance at the 1%, 5%, and 10% level, respectively, on a two-tailed test.

TABLE 4

The Effect of Truth in Mileage Act Implementation on Mileage Disclosure

Variable	Pred. Sign	Dependent Variable: <i>MileDis</i>			
		(1) OLS		(2) Probit	
		Coeff.	t-stat.	Avg. Mrg. Effect	z-stat.
<i>Illinois</i>		0.136	7.24***	0.133	7.36***
<i>Illinois * Post</i>	+	0.069	2.41**	0.069	2.09**
<i>Age</i>		-0.016	-1.40	-0.016	-1.39
<i>Generation</i>		0.035	0.83	0.034	0.84
<i>Dealer</i>		-0.224	-6.82***	-0.229	-6.23***
<i>OriginalOwner</i>		0.086	1.69	0.083	1.85*
<i>MustSell</i>		-0.111	-2.06*	-0.114	-2.00**
<i>Damage</i>		0.199	1.84*	0.170	1.90*
<i>UnverifiableDis</i>		-0.042	-2.48**	-0.043	-2.48**
Car Type FE		Yes		Yes	
Year FE		Yes		Yes	
Adj. / Pseudo R <sup>2</sup>		0.090		0.088	
Observations		1692		1692	

Table 4 examines the effect of the implementation of the Truth in Mileage Act (TIMA) on mileage disclosure in used-car classified advertisements. *Illinois* is an indicator variable that is coded as 1 if an advertisement is posted in *Chicago Tribune* and 0 otherwise (i.e., if posted in *Los Angeles Times*). *Post* is an indicator variable that is coded as 1 if an advertisement is posted in or after 1990—the year when TIMA began taking effect in Illinois—and 0 otherwise (i.e., if posted before 1990). *MileDis* is an indicator variable that is coded as 1 if an advertisement discloses mileage and 0 otherwise.

All other variables are defined in Table 2. All non-indicator variables are winsorized at the 1% and 99% levels. Standard errors are clustered at the state-year level. \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% level, respectively, on a two-tailed test.

**TABLE 5**

**The Effect of Truth in Mileage Act Implementation on the Sensitivity of Price to Mileage**

**Panel A. Descriptive Statistics for Mileage-Disclosing and Non-Disclosing Subsamples**

<b>Variable</b>	<b>Disclosers</b>			<b>Non-Disclosers</b>			<b>Diff.</b>	<b>t-stat.</b>
	<b>Obs.</b>	<b>Mean</b>	<b>Std. Dev.</b>	<b>Obs.</b>	<b>Mean</b>	<b>Std. Dev.</b>		
<b>Variables of Interest</b>								
<i>Illinois</i>	516	0.630	0.483	1,176	0.407	0.492	0.223	8.62***
<i>Post</i>	516	0.380	0.486	1,176	0.349	0.477	0.030	1.20
<i>MileDis</i>	516	1	0	1,176	0	0	1	
<i>Mile</i> (in 10,000 miles)	516	4.500	2.346	0				
<i>Price</i> (in 1985 dollars)	516	4283	2141	1,176	3923	2127	361	3.20***
<i>Repetition</i>	516	4.475	3.572	1,176	4.954	3.529	-0.479	-2.56**
<i>lnRepetition</i>	516	1.203	0.791	1,176	1.348	0.745	-0.145	-3.62***
<i>Low</i>	516	0.004	0.062	1,176	0.130	0.337	-0.126	-8.46***
<i>UnverifiableDis</i>	516	0.643	0.621	1,176	0.628	0.611	0.015	0.46
<b>Control Variables</b>								
<i>Age</i> (in years)	516	4.591	2.503	1,176	4.988	2.718	-0.397	-2.83***
<i>Generation</i>	516	4.884	0.944	1,176	4.702	1.029	0.182	3.44***
<i>Dealer</i>	516	0.167	0.373	1,176	0.340	0.474	-0.173	-7.37***
<i>OriginalOwner</i>	516	0.091	0.288	1,176	0.061	0.240	0.030	2.21**
<i>MustSell</i>	516	0.021	0.145	1,176	0.027	0.163	-0.006	-0.71
<i>Damage</i>	516	0.019	0.138	1,176	0.007	0.082	0.013	2.32**

**Panel B. Number of Advertisements and Mileage Disclosure Probability across Days of the Week**

<b>Day of the Week</b>	<b>Number of Advertisements</b>		<b>Probability of Mileage Disclosure</b>
	<b>Mean</b>	<b>Median</b>	
Sunday	25.36	24	0.397
Monday	15.62	14	0.256
Tuesday	12.80	11	0.281
Wednesday	11.54	10	0.240
Thursday	14.81	14	0.260
Friday	18.03	16	0.282
Saturday	21.15	19	0.267
<b>Total</b>	<b>17.07</b>	<b>15</b>	<b>0.305</b>

### Panel C. Estimation Results

Variable	Pred. Sign	(1) OLS		(2) OLS		(3) Heckman ML Estimation			
		Dep. Var.: Price		Dep. Var.: Price		Dep. Var.: MileDis		Dep. Var.: Price	
		Coeff.	t-stat.	Coeff.	t-stat.	Coeff.	z-stat.	Coeff.	z-stat.
<i>Mile</i>				-683.64	-2.27**			-750.58	-2.96***
<i>Mile * Illinois</i>				14.91	0.82			25.60	1.35
<i>Mile * Illinois * Post</i>	-			-96.65	-2.11**			-109.68	-2.73***
<i>Mile * Age</i>				59.80	4.23***			64.81	5.38***
<i>Mile * Generation</i>				19.02	0.33			30.01	0.62
<i>Mile * Dealer</i>				197.44	2.87**			190.20	3.15***
<i>Mile * OriginalOwner</i>				-69.00	-1.96*			-76.70	-1.83*
<i>Mile * MustSell</i>				-73.62	-0.81			-49.52	-0.57
<i>Mile * Damage</i>				352.56	2.67**			304.25	2.45**
<i>Mile * UnverifiableDis</i>				-55.68	-2.84**			-67.95	-3.66***
<i>Mile * CertifiedMile</i>				-121.96	-1.47			-67.82	-0.99
<i>Mile * OriginalMile</i>				45.06	1.39			46.60	1.49
<i>Illinois</i>		-221.51	-7.72***	-363.29	-2.75**	0.423	7.04***	-630.56	-3.93***
<i>Illinois * Post</i>		219.41	4.22***	691.84	2.91***	0.178	1.66*	627.06	2.64***
<i>Age</i>		-740.88	-35.10***	-914.65	-15.30***	-0.060	-1.69*	-911.66	-16.31***
<i>Generation</i>		-186.33	-2.16**	-303.87	-1.07	0.089	0.68	-404.29	-1.49
<i>Dealer</i>		457.10	6.60***	-355.47	-1.27	-0.671	-5.83***	70.64	0.23
<i>OriginalOwner</i>		124.72	1.87*	409.31	1.80*	0.305	2.36**	327.73	1.18
<i>MustSell</i>		-116.89	-1.05	-41.23	-0.10	-0.399	-2.30**	15.82	0.04
<i>Damage</i>		-1010.30	-4.61***	-3398.66	-3.80***	0.586	2.19**	-3339.10	-3.79***
<i>UnverifiableDis</i>		111.73	4.70***	408.68	3.54***	-0.116	-2.31**	547.18	4.21***
<i>CertifiedMile</i>				1101.25	3.00***			977.31	2.81***
<i>OriginalMile</i>				272.95	0.96			262.23	0.95
<i>Sunday</i>						0.160	1.74*		
Car Type FE		Yes		Yes		Yes		Yes	
Car Type FE * Mile				Yes				Yes	
Year FE		Yes		Yes		Yes		Yes	
Year FE * Mile				Yes				Yes	
Adjusted R <sup>2</sup>		0.865		0.916					
$\chi^2$ for Test of Indep. Eqns.							22.99***		
Observations		1692		516			1692		

Panel A of Table 6 reports descriptive statistics for the variables used in our analyses for mileage-disclosing and non-disclosing subsamples.

Panel B of Table 6 reports the number of advertisements and mileage disclosure probability across days of the week. The number of advertisements is the count of all Corolla classified advertisements on a day in a newspaper except for those listing multiple cars (i.e., it counts both repeated and non-repeated advertisements).

Panel C of Table 6 examines the effect of the implementation of the Truth in Mileage Act (TIMA) on the sensitivity of asking price to disclosed mileage in used-car classified advertisements. Model (1) examines the baseline effect of TIMA implementation on asking price. Model (2) examines the effect of TIMA implementation on price-mileage sensitivity using OLS. Model (3) examines the same effect after controlling for potential sample-selection bias arising from mileage disclosure using Heckman maximum likelihood estimation. *Illinois* is an indicator variable that

is coded as 1 if an advertisement is posted in *Chicago Tribune* and 0 otherwise (i.e., if posted in *Los Angeles Times*). *Post* is an indicator variable that is coded as 1 if an advertisement is posted in or after 1990—the year when TIMA began taking effect in Illinois—and 0 otherwise (i.e., if posted before 1990). *Mile* is the disclosed mileage of a car (in 10,000 miles). *Price* is the asking price of a car (in 1985 dollars). *MileDis* is an indicator variable that is coded as 1 if an advertisement discloses mileage and 0 otherwise.

All other variables are defined in Table 2. All non-indicator variables are winsorized at the 1% and 99% levels. Standard errors are clustered at the state-year level. \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% level, respectively, on a two-tailed test.  $\chi^2$  statistics reported for model (3) test the presence of sample selection bias. A significant value indicates that sample selection bias is present, thereby justifying the use of Heckman estimation.

TABLE 6

The Effect of Truth in Mileage Act Implementation on Advertisement Repetition

Variable	Pred. Sign	Dep. Var.: <i>lnRepetition</i>				Dep. Var.: <i>Repetition</i>			
		(1) OLS		(2) OLS		(3) Poisson		(4) Poisson	
		Coeff.	t-stat.	Coeff.	t-stat.	IRR	z-stat.	IRR	z-stat.
<i>MileDis</i>				-0.381	-2.70**			0.711	-2.32**
<i>MileDis</i> * <i>Illinois</i>				0.004	0.04			0.996	-0.05
<i>MileDis</i> * <i>Illinois</i> * <i>Post</i>	-			-0.250	-1.97*			0.810	-2.19**
<i>Illinois</i>		-0.236	-7.68***	-0.210	-3.56***	0.835	-6.77***	0.853	-3.28***
<i>Illinois</i> * <i>Post</i>	-	-0.248	-4.40***	-0.180	-2.33**	0.821	-4.01***	0.872	-2.17**
<i>Age</i>		-0.040	-2.46**	-0.043	-2.70**	0.970	-2.53**	0.968	-2.74***
<i>Generation</i>		-0.056	-1.04	-0.060	-1.15	0.957	-1.07	0.956	-1.17
<i>Dealer</i>		-0.047	-0.69	-0.074	-1.13	0.965	-0.70	0.946	-1.14
<i>OriginalOwner</i>		-0.033	-0.33	-0.039	-0.38	0.973	-0.33	0.968	-0.39
<i>MustSell</i>		-0.263	-2.88**	-0.265	-2.98***	0.796	-2.57**	0.795	-2.66***
<i>Damage</i>		-0.053	-0.50	-0.005	-0.04	0.950	-0.53	0.991	-0.08
<i>UnverifiableDis</i>		0.035	1.08	0.029	0.88	1.029	1.11	1.024	0.92
Car Type FE		Yes		Yes		Yes		Yes	
Year FE		Yes		Yes		Yes		Yes	
Year FE * <i>MileDis</i>				Yes				Yes	
Adj. / Pseudo R <sup>2</sup>		0.064		0.076		0.013		0.017	
Observations		1692		1692		1692		1692	

Models (1) and (3) of Table 5 examine the effect of the implementation of the Truth in Mileage Act (TIMA) on the repetition of used-car classified advertisements over time. Models (2) and (4) of Table 5 examine the incremental effect of TIMA implementation on advertisement repetition for mileage-disclosing advertisements over non-disclosing ones. *Illinois* is an indicator variable that is coded as 1 if an advertisement is posted in the *Chicago Tribune* and 0 otherwise (i.e., if posted in *Los Angeles Times*). *Post* is an indicator variable that is coded as 1 if an advertisement is posted in or after 1990—the year when TIMA began taking effect in Illinois—and 0 otherwise (i.e., if posted before 1990). *MileDis* is an indicator variable that is coded as 1 if an advertisement discloses mileage and 0 otherwise. *Repetition* counts the number of times the advertisement for a used car is repeated over time. *lnRepetition* is the natural logarithm of *Repetition*.

All other variables are defined in Table 2. All non-indicator variables are winsorized at the 1% and 99% levels. Standard errors are clustered at the state-year level. \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% level, respectively, on a two-tailed test. IRR, or the incidence rate ratio, indicates the relative change in the incidence rate of an additional advertisement repetition associated with a unit increase of the independent variable.

TABLE 7

The Effect of Truth in Mileage Act Implementation on “Low” Mileage Disclosure

Variable	Pred. Sign	Dependent Variable: <i>Low</i>			
		(1) OLS		(2) Probit	
		Coeff.	t-stat.	Avg. Mrg. Effect	z-stat.
<i>Illinois</i>		0.041	2.52**	0.041	2.46**
<i>Illinois * Post</i>	-	-0.050	-2.23**	-0.046	-2.17**
<i>Age</i>		-0.005	-0.79	-0.006	-1.00
<i>Generation</i>		-0.002	-0.10	-0.006	-0.30
<i>Dealer</i>		0.005	0.19	0.007	0.29
<i>OriginalOwner</i>		0.036	1.21	0.031	1.24
<i>MustSell</i>		-0.009	-0.17	-0.010	-0.20
<i>Damage</i>		-0.030	-0.58	-0.035	-0.48
<i>UnverifiableDis</i>		-0.009	-0.66	-0.010	-0.70
Car Type FE		Yes		Yes	
Year FE		Yes		Yes	
Adj. / Pseudo R <sup>2</sup>		0.007		0.033	
Observations		1692		1692	

Table 7 examines the effect of the implementation of the Truth in Mileage Act (TIMA) on “low”-mileage disclosure in used-car classified advertisements. *Illinois* is an indicator variable that is coded as 1 if an advertisement is posted in *Chicago Tribune* and 0 otherwise (i.e., if posted in *Los Angeles Times*). *Post* is an indicator variable that is coded as 1 if an advertisement is posted in or after 1990—the year when TIMA began taking effect in Illinois—and 0 otherwise (i.e., if posted before 1990). *Low* is an indicator variable that is coded as 1 if an advertisement states that the car has “low” mileage and 0 otherwise.

All other variables are defined in Table 2. All non-indicator variables are winsorized at the 1% and 99% levels. Standard errors are clustered at the state-year level. \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% level, respectively, on a two-tailed test.

TABLE 8

The Effect of Truth in Mileage Act Implementation on Unverifiable Disclosures

Variable	Pred. Sign	Dependent Variable: <i>UnverifiableDis</i>							
		(1) OLS		(2) OLS		(3) Poisson		(4) Poisson	
		Coeff.	t-stat.	Coeff.	t-stat.	IRR	z-stat.	IRR	z-stat.
<i>MileDis</i>		-0.067	-2.30**	-0.169	-4.64***	0.913	-1.92*	0.751	-3.52***
<i>MileDis</i> * <i>Illinois</i>				0.092	2.04*			1.206	2.65***
<i>MileDis</i> * <i>Illinois</i> * <i>Post</i>				-0.159	-1.85*			0.685	-1.76*
<i>Illinois</i>		0.208	8.46***	0.184	5.81***	1.354	7.49***	1.294	5.43***
<i>Illinois</i> * <i>Post</i>		0.046	1.27	0.092	2.53**	1.231	2.66***	1.369	3.27***
<i>Age</i>		0.040	2.67**	0.040	2.63**	1.065	2.60***	1.066	2.59***
<i>Generation</i>		-0.015	-0.30	-0.015	-0.29	0.980	-0.27	0.980	-0.26
<i>Dealer</i>		-0.285	-7.10***	-0.280	-7.16***	0.550	-6.42***	0.556	-6.68***
<i>OriginalOwner</i>		0.117	2.34**	0.120	2.28**	1.135	2.21**	1.138	2.12**
<i>MustSell</i>		0.276	3.25***	0.280	3.33***	1.359	3.73***	1.366	3.81***
<i>Damage</i>		-0.135	-0.67	-0.135	-0.66	0.803	-0.84	0.807	-0.81
Car Type FE		Yes		Yes		Yes		Yes	
Year FE		Yes		Yes		Yes		Yes	
Year FE * <i>MileDis</i>				Yes				Yes	
Adj. / Pseudo R <sup>2</sup>		0.172		0.172		0.059		0.061	
Observations		1692		1692		1692		1692	

Models (1) and (3) of Table 8 examine the effect of the implementation of the Truth-In-Mileage Act (TIMA) on unverifiable disclosures in used-car classified advertisements. Models (2) and (4) of Table 5 examine the incremental effect of TIMA implementation on unverifiable disclosures for mileage-disclosing advertisements over non-disclosing ones. *Illinois* is an indicator variable that is coded as 1 if an advertisement is posted in *Chicago Tribune* and 0 otherwise (i.e., if posted in *Los Angeles Times*). *Post* is an indicator variable that is coded as 1 if an advertisement is posted in or after 1990—the year when TIMA began taking effect in Illinois—and 0 otherwise (i.e., if posted before 1990). *MileDis* is an indicator variable that is coded as 1 if an advertisement discloses mileage and 0 otherwise. *UnverifiableDis* counts the number of unverifiable statements about the car’s condition in an advertisement (e.g., “like new”, “excellent”, or “reliable”).

All other variables are defined in Table 2. All non-indicator variables are winsorized at the 1% and 99% levels. Standard errors are clustered at the state-year level. \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% level, respectively, on a two-tailed test. IRR, or the incidence rate ratio, indicates the relative change in the incidence rate of an additional advertisement repetition associated with a unit increase of the independent variable.