

Law and Lemons

Chihoon Cho, Richard Frankel, and Xiumin Martin

Olin Business School
Washington University in St. Louis
Campus Box 1133
One Brookings Drive
St. Louis, MO 63130-4899

First draft: January 2018

Revised: April 2019

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 prohibitions. Exploiting time variations in state implementation of odometer regulations, we find increased disclosure of mileage in classified ads, increased sensitivity of asking price to mileage, a 5.8 percent increase in asking price, and a reduction in repeated ads—implying an increase in trade liquidity. We also find that mileage disclosures substitute for puffery in classified ads. Overall, our results indicate that statutes facilitating verification and thus enforcement of fraud prohibitions can reduce information asymmetry between transacting parties and improve market outcomes.

We thank seminar participants at UC Berkeley, University of Illinois-Chicago, and Washington University in St Louis. We thank Henry Schneider and Jerome Altman for valuable comments.

Law and Lemons

1. *Introduction*

Evidence suggests 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 (US DOT, 2002). To reduce odometer fraud, Congress passed the Truth in Mileage Act (TIMA) of 1986, requiring sellers to record a vehicle's mileage on its title when ownership is transferred. This creates a record of mileage readings.¹ A subsequent 1992 study found a notably lower rollback rate of 3.91 percent, suggesting 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 and the speed of used-car trades? The answer to these questions yields insight into how laws and institutions help traders overcome information frictions and improve efficiency in a market prone to a lemons problem (Akerlof 1970). The dishonesty on display in odometer rollback seems crass and comic on the surface. The welfare loss from crippled markets can be substantial. As Akerlof (1970, p. 495) notes, "The cost of dishonesty...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."

¹ The requirement that transferors 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 Act of 1972. However, such disclosure requirements were not implemented by the States before TIMA as discussed below.

If TIMA enforcement enhanced the credibility of odometer readings, we expect the following effects post TIMA:

- (1) more used-car sellers will disclose mileage information in classified ads, because mileage information, though costly to disclose, can reduce buyers' search cost (Ozga, 1960, Stigler, 1961, Stiglitz, 1979);²
- (2) trade liquidity will increase, because more credible odometer readings reduce information asymmetry with regard to vehicle quality. The liquidity increase is expected to be more pronounced for sellers disclosing mileage information to the extent that non-disclosure pool is heterogeneous with respect to vehicle quality;
- (3) used-car sales price will increase, because more credible odometer readings mitigate information asymmetry, leading to more participation of high-quality-car sellers in this market (extensive margin), and reducing the adverse selection and inventory cost component of pricing (intensive margin) (Glosten and Milgrom 1985; Amihud and Mendelson, 1986).³ We also expect mileage disclosers to have more pronounced increase in sales price post TIMA, if sellers are able to charge buyers a premium for their reduced search costs resulting from sellers' disclosure.

We exploit time variation of TIMA implementation across states and use a difference-in-difference research design to measure these effects. To limit the cost of collecting ad information, we focus on two states. All titles issued in Illinois after January 1, 1990 must have an odometer statement while California did not implement this requirement until April 18, 1994.⁴ 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

² We use the standard definition of buyer search cost in the economic literature, i.e., 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.

³ The bid-ask spread literature uses models with competitive market makers who incur inventory costs to stand ready to buy or sell. In so doing, they absorb timing differences between arrival of buyers and sellers. In the used-car market, the vehicle seller directly bears this inventory-holding cost. Thus, the time necessary to match buyers and sellers, whether due to search frictions or adverse selection, reduces the value of car ownership.

⁴ 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 TIMA adoption dates by state.

in Illinois. We choose Toyota Corollas because they are manufactured throughout the sample period and are an economy vehicle, ensuring that mechanical reliability and therefore mileage information is an important consideration for buyers. We also choose the Corolla believing it to be a car that would have the best chance of providing an adequate sample size.

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 *Chicago Tribune*, while those from California advertise in the *Los Angeles Times*. This is a reasonable assumption given that used-car buyers tend to be geographically close to the sellers as buyers commonly request a test-drive and inspection before purchase. Classified advertisements represent the major market place for 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.

Difference-in-differences estimation yields four results: First, we find a 7.6 percent increase in the frequency of car ads disclosing mileage information post-TIMA implementation in Illinois relative to the change in California over the same period. The magnitude of the increase translates into 19.3 percent relative to the average frequency of mileage disclosure in Illinois before TIMA implementation. We use multivariate analysis controlling for factors that might affect the costs and benefits of disclosing mileage information such as vehicle age, vehicle generation, and whether the seller is a dealer.

Second, we test whether TIMA increases trade liquidity and whether the increase is more pronounced for mileage disclosers. Using the number of times the same ad is repeated in the newspaper as the measure of liquidity, we find that TIMA reduces ad repetition by 24.8 percent, on average, implying a significant increase in trade liquidity. Mileage disclosers experience a more

pronounced reduction in this measure (43.8 percent) compared to that for non-disclosers (16.2 percent). To investigate whether the liquidity increase is indeed due to the improved credibility of the odometer reading, we focus on the subsample of mileage disclosers and gauge the credibility of the odometer reading via the sensitivity of asking price to miles disclosed. We find that the sensitivity of asking price to miles disclosed increases significantly after the implementation of TIMA in Illinois. Before TIMA, an additional 10,000 miles reduces the asking price of an average Illinois car by \$384. Post TIMA, asking price is reduced by an additional \$99 per 10,000 miles, implying that the odometer reading became more credible post TIMA. The magnitude of this added reduction is economically large, \$488, given the average car advertised in Illinois post-TIMA has 49,500 miles and asking price of \$3,929.

Third, we examine whether TIMA associates with a pricing effect. We find the average asking price increases by \$227 or 5.8 percent post TIMA for Corollas advertised in Illinois, consistent with our expectation. However, we do not find a statistically significant difference in the change of asking price between mileage disclosers and non-disclosers, though the difference is economically meaningful (\$234 for disclosers and \$173 for non-disclosers).

Our final analyses checks whether TIMA implementation affects the disclosure of less credible information in ads. Adding additional information to the ad is costly to the seller who must pay based on the number of ad lines.⁵ We predict that sellers facing this cost choose to include signals that yield the highest net benefit. If TIMA improves the credibility of 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 5.0 percentage point reduction in the frequency of “low mileage” disclosure, which corresponds to a

⁵Appendix B lists advertising rates and gives details.

43.9 percent decrease relative to the average pre-TIMA frequency in Illinois. The effect on unverifiable statements is more nuanced. We find, on average, a statistically insignificant increase in the number of these statements following TIMA implementation. However, further investigation suggests that this increase is driven by mileage-non-disclosing ads.

Taken together, our findings suggest that TIMA increases the credibility of the odometer reading, which in turn increases sellers' propensity to disclose mileage information in car ads. TIMA implementation is also associated with increased trade liquidity, and increased asking price; mileage disclosers show disproportionately higher liquidity and price improvement. Thus, laws and institutions that enhance the credibility of mileage information can mitigate the "lemons problem" (Akerlof, 1970) in the used-car markets and improve market outcome.

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, suggests 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 their quality of cars using text and photographs. During the time period we study, it was technically infeasible for classified ads to include photographs of sufficient resolution to provide credible information. Still, sellers and buyers likely exercise creativity beyond that conceived by social-science researchers to secure available gains to trade via some means to contract on quality (Coase, 1974). Therefore, the effects of statutory requirements, even in the pre-eBay used-car market, are unclear. Moreover, many of the studies in the law and finance literature are cross-country (Acheson

et al., 2019, is a notable exception). Thus, 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 can relate to a particular (used-car) market in a setting that allows us to exploit staggered implementation. We provide causal evidence that laws enhancing information credibility reduce information asymmetry between traders and improve market outcomes.

Second, our study contributes to the trackless voluntary and mandatory disclosure literature. It relates to studies on economic consequences of regulations improving financial statements reliability. For example, Daske et al. (2008) show that world-wide adoption of International Financial Reporting Standard improves stock market liquidity and reduces issuers' cost of capital; However, Zhang (2007) finds significant negatively market reactions to the passage of Sarbanes-Oxley Act (SOX) that supposedly enhances financial reporting quality (Cohen et al. 2008), and Daske et al. (2013) suggest effects associated with demand for better information are difficult to distinguish from regulatory-requirement effects. We find that regulations increasing signal reliability (odometer reading), while holding signal relevance constant, can increase market liquidity—demonstrating a regulatory effect in markets with information asymmetry. In addition, research argues about the confirmatory role of mandatory financial reports. That is, the usefulness of audited financial statements in disciplining managers' voluntary disclosures (Gigler and Hemmer 2002). Research provides evidence that independent verification of outcomes enhances disclosure credibility, leading to a complementary relation between audited financial reporting and managers' disclosure.⁶ Using a shock that enhances the credibility of mileage information

⁶ See Ball et al. (2007), Li and Yang (2016), and Frankel, et al., (2019)

(“mandatory disclosure”), our study demonstrates causal evidence that car sellers’ propensity to provide this information in the ads (“voluntary disclosure”) improves.

2. *Institutional background*

2.1. Legislative history

In Illinois, the post-TIMA, statutory-disclosure requirements culminate a series of statutory stipulations. The requirement that transferors 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 for mileage rollback fraud. It forced any person who violated the disclosure requirement with intent to defraud to pay three times actual damages or \$1,500 whichever ever 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. The 1976 amendment also created a budget for “carrying out this title” of \$650,000 for fiscal 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.’⁷

State’s 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.⁸ The study concluded, “It appears that Federal Law 15 USC 1981 [the Cost Savings Act of 1972] may

⁷ Section 3 ‘Violations of Odometer Requirement’; Public Law 99-579, October 29, 1986.

⁸ U. S. Department of Transportation, National Highway Traffic Safety Administration (1977)

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 been altered (p. vii.)” The study recommended states take actions to make odometer tampering by dealers and private owners a prohibitive act. A 1985 study of 5,000 cars sold by a leasing company found 49.8 percent of the vehicles had mileage rolled back below that mileage recorded by the lease company at sale.⁹

The stated purpose of the Truth in Mileage Act of 1986 (TIMA) is to strengthen the reporting requirements of the 1972 Cost Savings Act.¹⁰ 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 meet this deadline and the National Highway Traffic Safety Administration granted extensions.¹¹ Illinois met reporting requirements in January 1990.¹² 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 and of 3,630 cars examined found that 5.07 percent of the resold lease vehicles had had their mileage rolled back, suggesting that such requirement can limit mileage rollback.¹³

We argue that the implementation of TIMA increased the expected cost of rolling back an odometer, thereby reducing the probability of rollback. First, TIMA increased the penalty for

⁹ The study was conducted by the Illinois Attorney General’s Consumer Products Division and is cited in USDOT (2002).

¹⁰ 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).

¹¹ 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).

¹² (625 ILCS 5/3-112.1) (from Ch. 95 1/2, par. 3-112.1) Sec. 3-112.1. Odometer.

¹³ 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).

tampering with odometers. Second, TIMA increased the probability of being caught given a violation. Because of TIMA, vehicle titles serve as a mileage record, compiling mileage readings on each vehicle-transfer date. This record enables buyers and prosecutors to verify whether the current vehicle mileage is reasonable.¹⁴

2.2. The Corolla's instrument cluster

Toyota began manufacturing Corollas in 1967. By 1990, Toyota produced more than 15 million Corollas, which surpassed the Model T (made for 19 years between 1908 and 1927) to become the second-most produced car. By 1990, more Volkswagen Beetles were 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 *not* considered a 'collectors' car. Instead the Corolla serves as a workhorse and buyers select it for low-cost, reliable transportation—apologies to the happy few choosing it for its style. In addition, Corollas are available in a limited number of versions, making 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.

We do not find differences in the Corolla's speedometer instrument cluster between 1987 and 1993 that would significantly affect a used-car buyer's confidence in the mileage reading or increase the buyer's ability to detect mileage rollback. Between 1987 and 1993, Toyota introduced

¹⁴ 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 muffler-shop bill stuck between the glove box and dashboard of his Mercury Cougar. The bill indicated the mileage on his just-purchased Cougar was 30 percent lower than the mileage at the time of the muffler repair that occurred two-years earlier. In this case, the jury also heard testimony from a mechanic who explained that the odometer showed signs of tampering (Sjostrom, 1989).

four ‘generations’ of Corolla. None had sealed instrument clusters or other means that would allow the buyer to detect odometer tampering. Access to the odometer 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 scratches would not be visible on the reassembled instrument cluster itself, though wear might be observed on the bolts and screws affixing the cluster assembly to the dashboard. A digital odometer requires specialized instruments 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 problem. If truthful disclosure is possible and disclosure is costly, partial disclosure occurs (e.g., Jovanovic, 1982; Verrecchia, 1983) and price is a function of the disclosed quality.¹⁵ 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.

¹⁵ Akerlof (1970) and Grossman (1981) also note that warranties can facilitate trade if some of the vehicle’s disclosed characteristics can be verified ex post. For example, transmissions are unlikely to fail on Corollas with 40,000 miles and the seller of a Corolla whose odometer read 40,000 miles could agree to pay the buyer for the cost of any subsequent transmission repairs.

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 that can allow a buyer to find a better price given they expect 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 mileage reading by discouraging rollback and 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 benefits of disclosure will increase as the number becomes 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 abbreviation in ads indicates that sellers respond 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 increases as the ad is run for more days. Presumably, these considerations would lead the seller to disclosure information about the type and quality of the car. Inspection of the ads confirms this presumption. 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 by 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 Mendleson, 1986). This logic is the basis for Hypothesis 2, 3, and 4.

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

The increased credibility of mileage disclosures leading to this increased price implies that 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 leading 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 springs from another implication of the enhanced credibility of odometer miles as an indicator of used-car quality following TIMA implementation. Returning to the discussion leading to hypothesis 1, in composing the ad, a seller chooses which vehicle attributes to include from a large set of candidates, based on the net benefit of including an attribute. These net benefits vary according to an attribute's perceived ability to quickly attract a buyer willing to pay a higher price. Our discussion in the prior hypotheses assumed 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.

Nonverifiable either because the item is a matter of opinion (“beautiful” “can’t miss,”) because of the item’s generality (“low miles” “runs well”), or because the items would be difficult to verify (“garage kept” “grandma’s car”). The neoclassical model has difficulty explaining the inclusion of such items in ads. However, to the extent the seller perceives non-zero benefit in their inclusion, we expect them to be squeezed out of ads as the benefit of including 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 *LA Times* from 1985 to 1993. These ads are in pdf files of pictures of newspaper pages and are provided via ProQuest Historical Newspapers and Newspapers.com. During this time period, classified advertising at major local newspapers is a dominant venue for matching buyers and sellers in automotive, employment, and real estate markets.¹⁶

To list a car in a *Chicago Tribune* classified ad, a seller can pay a fixed fee for each ad line. The pricing per line at the *Chicago Tribune* has increased overtime. Appendix B provides 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 *LA Times*, respectively. The description in classified ads is far shorter and contains far less

¹⁶ Data available from the Pew Research Center shows 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/>)

detail than ads currently posted on Craigslist where ad cost is free except for dealers. Dealer ads cost five dollars. Moreover, most ads are two lines and few contain more than three lines. These observations suggest that advertising cost is non-trivial and these costs force sellers to weigh the net-benefit of each letter included in an ad.

Due to data-coding costs, we limit our sample to advertisements for Toyota Corollas posted in May of each year, yielding a total sample of 9,759 classified advertisements.¹⁷ We then eliminate repeated advertisements based on the seller contact and identifying 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 the 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 the source Carfax with its mileage data during our sample period. Carfax collected other vehicle history information (e.g., flood and wrecked cars) from other sources. Moreover, Carfax should affect all car sellers in Illinois and California equally. Therefore, our difference-in-differences research design addresses the concern that Carfax availability might drive our results.

4.2. Descriptive statistics

Panel A of Table 3 presents descriptive statistics for the sample. 48 percent of our sample comes from *Chicago Tribune*, and 36 percent of ads were posted after implementation of TIMA in Illinois. About 30 percent of car ads disclose mileage. An average car discloses 45,260 miles, which is much smaller than the corresponding figure of 90,000 miles in Lewis (2011), whose

¹⁷ We collect the 1991 *Chicago Tribune* data from April because the raw newspaper images from May are illegible.

sample period is 2006. The average car age is 4.9 years, whereas Lewis (2011) shows an average age of 15.8 years. The evidence reflects the significant improvement in car quality and durability over 1980s and 1990s. About 30 percent of our sample cars are advertised by dealers, comparable to that in Lewis (2011). 22.6 percent of car ads were posted on Sunday edition, much higher than 14 percent if days are chosen randomly for posting.

Panel B of Table 3 shows descriptive statistics for subsamples based on state. Approximately 41 and 21 percent of cars in Illinois and California, respectively, disclose mileage. Panels C and D of Table 3 display descriptive statistics for Illinois and California subsamples, respectively, divided into pre-1990 (before Illinois-TIMA-reporting implementation) and post-1990. Mileage disclosure increases in Illinois, but this change is not significant. No increase is observed in California. Ad repetition declines in Illinois and increases in California. Unverifiable disclosures decline in both states. The univariate results also suggest that far more dealer ads comprise the post-1990 samples in both states. Because dealer ads differ from individual ads in that dealers are less likely to disclose miles in ads, 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. The correlations indicate that car ads in Illinois are more likely to disclose mileage information, but also tend to contain more unverifiable disclosures. Illinois ads also run for shorter durations. Cars in Illinois are less likely to be sold by dealers, more likely to be sold by original owners, and also tend to have lower asking prices. Mileage disclosure is positively associated with asking price, original-owner status, 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 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 the *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 include *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")); α_j are car body type fixed effects; and α_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 β_2 , which measures the effect of the implementation of TIMA.

Table 5 column (1) 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. The 7.6 percent point increase is economically significant, representing a 19.3 percent increase relative to the average likelihood of mileage disclosure in Illinois before TIMA implementation. As for the control variables, the coefficients on *Dealer*, *MustSell*, and *UnverifiableDis* are all significantly negative. Thus, dealers, cars indicated as “Must Sell”, and ads with unverifiable disclosures are less likely to disclose mileage. The latter results suggests that more solid information substitutes for puffery. Car mileage could drive both in opposite directions (i. e., sellers of high mileage cars disclose puffery rather than mileage).

Because the dependent variable, whether a seller discloses mileage in ads, is an indicator variable, we also use a Probit model to estimate Model (1). The average marginal effects are reported in column (2). The inferences are similar to those of 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:

$$\begin{aligned}
 y_i = & \beta_1 \times Mile_i + \beta_2 \times Mile_i \times Illinois_i + \beta_3 \times Mile_i \times Illinois_i \times Post_i \\
 & + \beta_4 \times Illinois_i + \beta_5 \times Illinois_i \times Post_i + \boldsymbol{\gamma}_1' \mathbf{X}_i + \boldsymbol{\gamma}_2' \mathbf{X}_i \times Mile_i \\
 & + \alpha_j + \alpha_j \times Mile_i + \alpha_t + \alpha_t \times Mile_i + \epsilon_i,
 \end{aligned} \tag{2}$$

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); \mathbf{X} is the vector of control variables, which includes the control variables in model (1), *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); α_j are car-body-type fixed effects (see Table 2 for full description); and α_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 β_3 , which measures the effect of the implementation of TIMA on the sensitivity of price to mileage.

Table 6, Panel C, column (2) presents the result of an OLS estimation using the subsample that discloses mileage. We find that an additional 10,000 miles reduces asking price by \$321 in Illinois before TIMA implementation. Thus, sellers appear to factor in mileage when pricing their cars, despite its dubious reliability. 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 TIMA enforcement, by requiring mileage information to be recorded on vehicle titles and thereby increasing the potential legal penalty for lying, improves the credibility of mileage disclosed in ads. From an economic-magnitude perspective, an additional 10,000 miles reduces asking price by \$99 more 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 in ads that do not disclose mileage. The economic magnitude is large. On average, the asking price increases by \$227, accounting for 5.8 percent of the pre-TIMA Illinois sample mean.

With respect to control variables, the asking price for cars advertised in Illinois is on average \$363 lower than that for cars advertised in LA for car 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 certified are associated with a higher asking price. You've seen it on TV. In addition, asking price is less sensitive to mileage for older cars,

cars advertised by a dealer, and for cars with disclosed damage, but more sensitive for cars with unverifiable disclosures and with ‘certified’ mileage. ‘Certified’ is an empty phrase, because the dealer cannot provide credible evidence that the Corolla odometer was not rolled back. The dealer-mileage effect suggests that price reflects the greater dexterity of dealer mechanics. It also suggests why dealers are less likely to disclose miles. The information content of the mileage disclosure is lower for dealers than private sellers.

Column (3) presents the result generated using Heckman maximum likelihood estimation. *Sunday* is used to control for selection of mileage disclosure. Panel B of Table 6 shows that the number of advertisements increases significantly on Sundays and that Sunday ads are more likely to disclose mileage. This result is consistent with the notion that increased competition among sellers in Sunday ads makes it more likely that an ad will disclose mileage. The Heckman estimation 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 one 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 40,000 mile rollback to between \$3,000 and \$4,000 on the wholesale price of a car (\$750 to \$1000 per 10,000 miles).¹⁸ His estimate is approximately double ours. Finally, a χ^2 for the test of independent equations from column (3) is 19.59 and significant, indicating that we must account for the sample selection bias.

4.5 TIMA enforcement and advertisement repetition

¹⁸ <https://www.justice.gov/archives/usam/civil-resource-manual-178-response-objections-presentence-report>

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 7 displays the results. We use both OLS and an estimation that assumes that repetitions—a limited dependent variable—follows a Poisson distribution. We estimate variants of model (2) with *Repetition* and 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. As for the control variables, the coefficient on *MustSell* is significantly negative across all model specifications, suggesting that such sellers indeed manage to sell their cars more quickly.

4.6 TIMA enforcement and disclosure of puffery

Our final set of results, shown in Tables 8 and 9, examines 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 8 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 Probit specifications, presented in columns (1) and (2), respectively.

We also measure puffery by counting the number of unverifiable disclosures contained in the ad. Examples include “like new,” “excellent,” and “reliable.” Table 9 shows the result of both OLS and Poisson-based estimations. The result is more nuanced than the preceding one on “low mile” disclosure. The coefficient on *Illinois* \times *Post* is positive, albeit statistically not significant,

in column (1), and positive and significant in column (3). This result suggests that TIMA implementation does not lead to a decrease in the use of unverifiable statements, contrary to our prediction. To further investigate the dynamics behind the result, we examine the differential effect of TIMA enforcement on unverifiable disclosures of mileage disclosers and non-disclosers by interacting *Illinois* \times *Post* with *MileDis*. The results, presented in columns (2) and (4), reveal that the coefficient on *Illinois* \times *Post* is positive and significant, indicating that mileage non-disclosers increase the use of unverifiable statements in their ads post TIMA. However, the coefficient on *MileDis* \times *Illinois* \times *Post* is significantly negative, suggesting that mileage disclosers reduce the use of such statements relative to non-disclosers following TIMA implementation. In summary, the number of unverifiable disclosures on average does not decrease in response to TIMA enforcement, mainly due to more use of such statements in ads by mileage non-disclosers.

4.7 Additional analyses

To corroborate the validity of our difference-in-differences research design, we check whether the main outcome variables of interest trend similarly between Illinois and California before TIMA implementation in Illinois in 1990. In particular, we re-estimate Model (1) with *MileDis*, *lnRepetition*, and *Price* as dependent variables, and Model (2) with *Price* as the dependent variable to examine price-mileage sensitivity. However, this analysis departs from the main analysis in that *Post* is replaced by the set of year indicators. Therefore, the coefficients on the interactions of *Illinois* and year indicators in the modified Model (1) allows us to examine how the difference between Illinois and California evolves over time. Similarly, the coefficients on the triple interactions of *Mile*, *Illinois*, and year indicators in the modified Model (2) illustrates the difference in the trend between the two states.

Figure 2 describes the trends graphically. For expositional purposes, we set the level of difference between Illinois and California in 1985 as the base level of difference, and then show the difference in the other years relative to the base level. The graphs reveal that the two states do not trend differently in the pre-period, thereby lending support to the validity of our research design. Additionally, we note that after TIMA implementation in California in 1994, the inter-state differences approach their levels before 1990.¹⁹ The gap between the two states induced by TIMA enforcement in Illinois appears to disappear once both states implement TIMA.

5. Conclusion

We examine the relation between the Truth in Mileage Act (TIMA) and mileage disclosure in used-car classified advertisements. The TIMA requires that the mileage of a vehicle be disclosed on the title of the vehicle creating 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 in Illinois disclose mileage, 2) car price becomes more sensitive to mileage in Illinois, 3) used cars tend to sell more quickly, based on fewer repeat ads in Illinois, and 4) fewer used-car sellers disclose “low” mileage or other puffery in Illinois. These results suggest that the TIMA leads to an increase 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 increase its information content.

¹⁹ The 1994 sample (163 observations) consists of 94 (69) observations from Illinois (California)

We emphasize two caveats. 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 its implementation. Mileage reporting requirements are costly to implement and maintain. The resources devoted to these requirements are drawn from the overall economy. In other words, state governments are forced to direct more of their limited resources to odometer reporting, and the opportunity costs of these resources is unclear. It likely varies with the efficiency of each states 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 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 provider of vehicle history reports to individuals and businesses, began providing vehicle history reports that could be used to verify mileage, but at the time CARFAX used odometer records created by TIMA protocols. 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.

6. References

- Acheson, G., Campbell, G., and Turner, J., 2019. Private contracting, law, and finance. *Review of Financial Studies*, forthcoming.
- Akerlof, G. 1970. The market for “lemons”: Quality uncertainty and the market mechanism. *Quarterly Journal of Economics* 84 (3): 488-500.
- Amihud, Y., and Mendelson, H. 1986. Asset pricing and the bid-ask spread. *Journal of Financial Economics* 17 (2): 223-249.
- Ball, R., Jayaraman, S., and Shivakumar, L., 2012. Audited financial reporting and voluntary disclosure as complements: A test of the Confirmation Hypothesis, *Journal of Accounting and Economics* 53, 136-166.
- Coase, R., 1974. The lighthouse in economics. *Journal of Law and Economics* 17, 357-376.
- Cohen, D., Dey, A., and Lys, T., 2008. Real and accrual-based earnings management in the pre- and post-Sarbanes-Oxley period. *The Accounting Review* 83, 757-787.
- Daske, H., Hail, L., Leuz, C., and Verdi, R., 2008. Mandatory IFRS Reporting around the World: Early evidence on Economic Consequences. *Journal of Accounting Research* 46, 1085-1142.
- Daske, H., Hail, L., Leuz, C., and Verdi, R., 2013. Adopting a label: Heterogeneity in the economic consequences around IAS/IFRS adoptions: Later evidence on Economic Consequences. *Journal of Accounting Research* 51, 495-547.
- Dye, R. 1985. Disclosure of nonproprietary information. *Journal of Accounting Research* 23, 123-145.
- Frankel, R., Kalay, A., Sadka, G., Zou, Y. 2019. Complementarity between audited financial reporting and voluntary disclosure: The case of former Andersen clients, working paper.
- Gigler, F., and Hemmer, T. 2002. Informational costs and benefits of creating separately identifiable operating segments. *Journal of Accounting and Economics* 33 (1): 69-90.
- Glosten, L., and Milgrom, P. 1985. Bid, ask and transaction prices in a specialist market with heterogeneously informed traders. *Journal of Financial Economics* 14 (1): 71-100.
- Grossman, S. 1981. The informational role of warranties and private disclosure about product quality. *Journal of Law and Economics* 24 (3): 461-483.
- Grossman, S., and Hart, O. 1980. Disclosure laws and takeover bids. *Journal of Finance* 35 (2): 323-334.
- Jovanovic, B., 1982. Truthful disclosure of information. *The Bell Journal of Economics* 13, 36-44.

- La Porta, R., Lopez-de-Silanes, F., Shleifer, A., and Vishny, R. 1997. Legal determinants of external finance. *Journal of Finance* 52 (3): 1131-1150.
- La Porta, R., Lopez-de-Silanes, F., Shleifer, A., and Vishny, R. 1998. Law and finance. *Journal of Political Economy* 106 (6): 1113-1155.
- Lewis, G. 2011. Asymmetric information, adverse selection and online disclosure: The case of eBay motors. *American Economic Review* 101 (4): 1535-46.
- Li, X. and Yang, H. 2016. Mandatory financial reporting and voluntary disclosure: The Effect of mandatory IFRS adoption on management forecasts, *The Accounting Review* 91 (3): 933-953.
- Milgrom, P. 1981. Good news and bad news: Representation theorems and applications. *Bell Journal of Economics* 12 (2): 380-391.
- New York Times, 1990. Corolla Sales Surpass Model T's. *New York Times*, July 4.
- Ozga, S., 1960. Imperfect markets through lack of knowledge. *Quarterly Journal of Economics* 74, 29-52.
- Sjostrom, J., 1989. Odometer suit costs 2 dealers. *Chicago Tribune*, April 12, S10.
- Staff writer. 1988. Safety administration targets odometer fraud, *Chicago Tribune* via Associated Press, August 3, B7.
- Stigler, G. 1961. The economics of information. *Journal of Political Economy* 61, 213-225.
- Stiglitz, J. 1979. Equilibrium in product markets with imperfect information. *American Economic Review* 69 (2): 339-345.
- U. S. Department of Transportation, National Highway Traffic Safety Administration, in cooperation with American Association of Motor Vehicle Administrators (1977) Disclosure of odometer readings on motor vehicle title documents.
- U. S. Department of Transportation, National Highway Traffic Safety Administration, (2002) Preliminary Report: The incidence rate of odometer fraud. National Technical Information Service, Springfield, VA.
- Verrecchia, R., 1983, Discretionary disclosure, *Journal of Accounting and Economics* 5: 179-194.
- Zhang, I. 2007. Economic consequences of Sarbanes-Oxley Act of 2002. *Journal of Accounting and Economics* 44, 74-115.

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, Illinois , 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	California

APPENDIX B

Classified Advertising Cost

Panel A. Costs of Advertising on *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 <= \$2,000	Cars > \$2,000	% of Cars > \$2,000
1985			1.25	3.14	68.10
1986			1.25	3.57	63.24
1987			1.25	3.57	74.79
1988			1.25	3.57	67.96
1989			1.25	3.57	82.72
1990			1.25	3.57	90.91
1991			1.25	4.29	80.41
1992	2.78	2.27	2.00	4.71	95.92
1993			2.00	4.71	98.08
Total					76.46

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

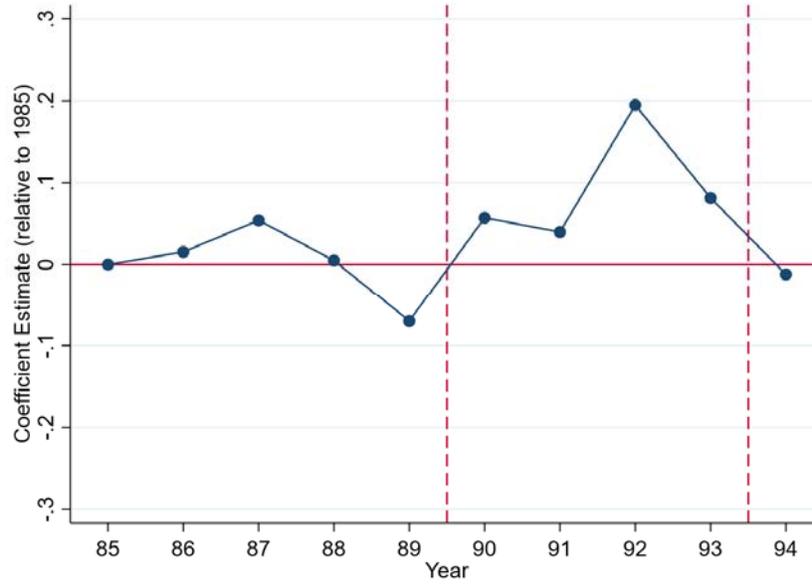
**'82 Corolla 5 sp, 86K mi, nice,
(DQA279)\$1990 818-285-7438pp**

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

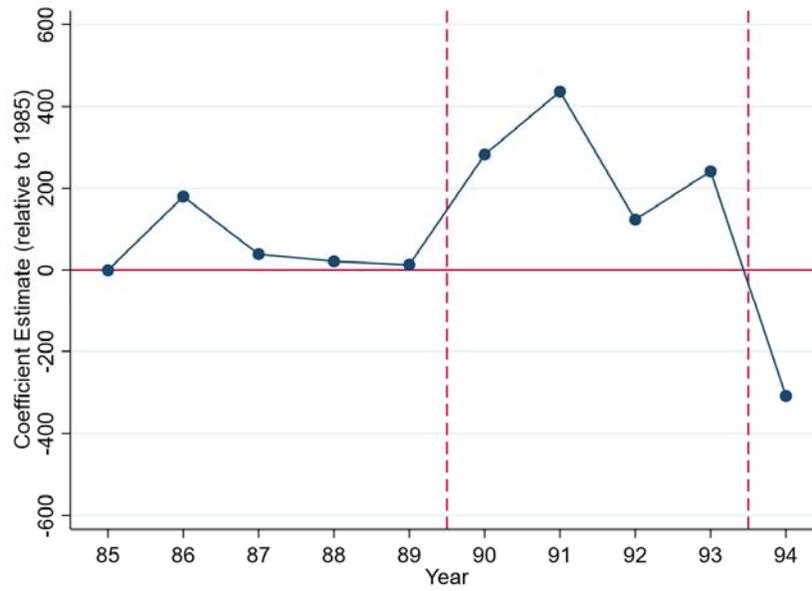
FIGURE 2

Trends in Outcome Variables

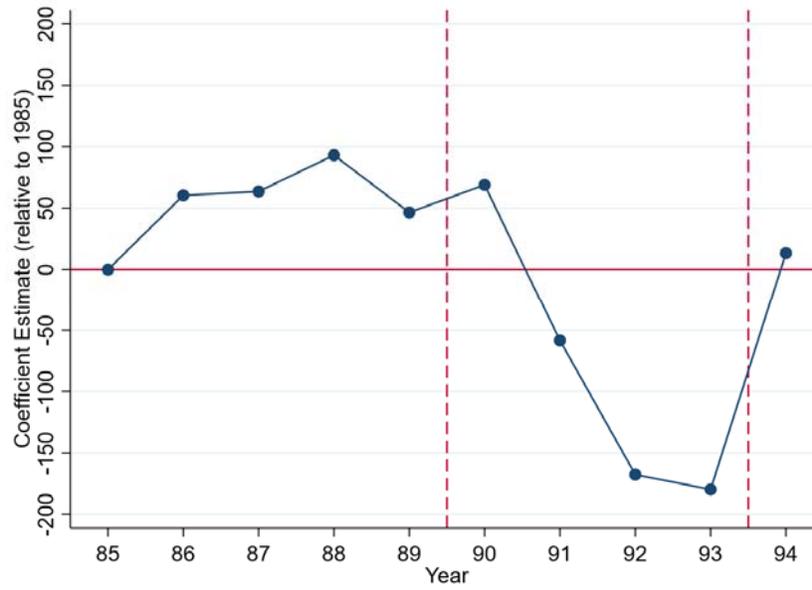
Panel A. Mileage Disclosure (*MileDis*)



Panel B. Price (*Price*)



Panel C. Price-Mileage Sensitivity



Panel D. Advertisement Repetition (*lnRepetition*)

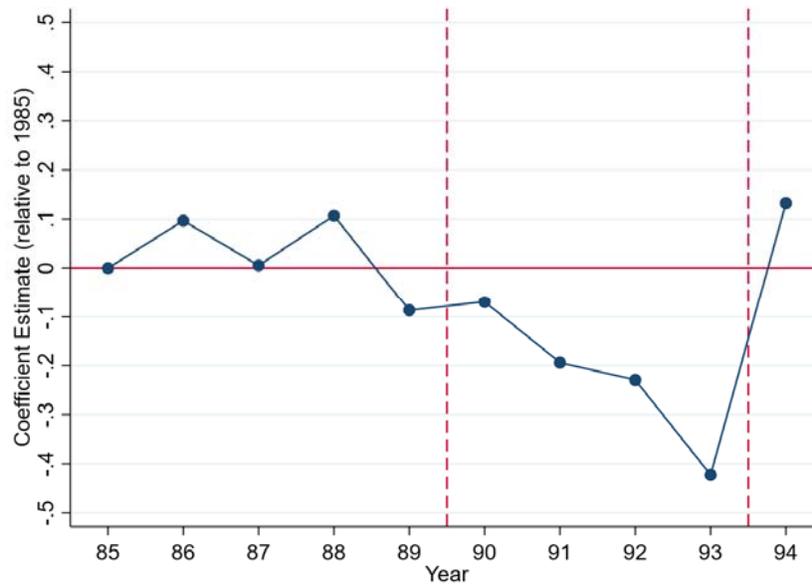


TABLE 1
Sample Selection and Composition

Panel A. Sample Selection

Sample Selection Criteria	<i>Chicago Tribune</i>	<i>Los Angeles Times</i>	Total
Corolla classified ads on <i>Chicago Tribune</i> or <i>Los Angeles Times</i> in 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

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

Table 2
Variable Definition

Variable	Definition
Variables of Interest	
<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”).
Control Variables	
<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.
Car-Body-Type Indicators	
<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 3
Descriptive Statistics

Panel A. Descriptive Statistics for the Total Sample

Variable	Obs.	Mean	Median	Std. Dev.	Min	Max
Variables of Interest						
<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	4.526	4.300	2.358	0.400	10.400
<i>Price</i> (in 1985 dollars)	1,692	4031	3848	2133	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
Control Variables						
<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	0.010	0	0.100	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
Car-Body-Type Indicators						
<i>Sedan</i>	1,692	0.033	0	0.177	0	1
<i>Hatchback</i>	1,692	0.131	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	0.178	0	0.383	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	0.412	0.492	888	0.208	0.406	0.203	9.30***
<i>Mile</i> (in 10,000 miles)	331	4.598	2.382	185	4.397	2.315	0.201	0.93
<i>Price</i> (in 1985 dollars)	804	3916	2158	888	4135	2105	-219	-2.11**
<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	0.020	0.140	888	0.001	0.034	0.019	3.88***

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	0.439	0.497	0.046	1.29
<i>Mile</i> (in 10,000 miles)	190	4.337	2.187	141	4.950	2.588	0.613	2.33**
<i>Price</i> (in 1985 dollars)	483	3908	2185	321	3929	2120	21	0.14
<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	0.021	0.143	321	0.019	0.136	-0.002	-0.20

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	0.208	0.406	286	0.210	0.408	0.002	0.07
<i>Mile</i> (in 10,000 miles)	125	4.634	2.354	60	3.903	2.166	-0.731	-2.03**
<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 3 reports descriptive statistics for the variables used in our analyses for the total sample.

Panel B of Table 3 reports descriptive statistics for the variables used in our analyses for Illinois and California subsamples.

Panel C of Table 3 reports descriptive statistics for the variables used in our analyses for Illinois pre-1990 (i.e., 1985 – 1989) and post-1990 (i.e., 1990 – 1993) subsamples.

Panel D of Table 3 reports descriptive statistics for the variables used in our analyses for 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 4
Pearson Correlation

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 ^a	1.000													
3. <i>MileDis</i>	0.221 ^a	0.043 ^c	1.000												
4. <i>Mile</i>	0.041	0.038	0.000	1.000											
5. <i>Price</i>	-0.051 ^b	0.071 ^a	0.075 ^a	-0.807 ^a	1.000										
6. <i>Repetition</i>	-0.167 ^a	-0.024	-0.069 ^a	-0.148 ^a	0.120 ^a	1.000									
7. <i>lnRepetition</i>	-0.211 ^a	-0.021	-0.100 ^a	-0.125 ^a	0.098 ^a	0.901 ^a	1.000								
8. <i>Low</i>	0.030	-0.003	-0.201 ^a	-0.031	0.060 ^b	0.013	0.013	1.000							
9. <i>UnverifiableDis</i>	0.214 ^a	-0.109 ^a	0.011	0.152 ^a	-0.240 ^a	-0.060 ^b	-0.039	-0.017	1.000						
10. <i>Age</i>	0.022	-0.072 ^a	-0.066 ^a	0.768 ^a	-0.913 ^a	-0.114 ^a	-0.090 ^a	-0.040 ^c	0.274 ^a	1.000					
11. <i>Generation</i>	0.053 ^b	0.603 ^a	0.088 ^a	-0.454 ^a	0.655 ^a	0.054 ^b	0.042 ^c	0.005	-0.235 ^a	-0.715 ^a	1.000				
12. <i>Dealer</i>	-0.162 ^a	0.152 ^a	-0.168 ^a	-0.244 ^a	0.385 ^a	0.039	0.028	0.002	-0.310 ^a	-0.334 ^a	0.326 ^a	1.000			
13. <i>OriginalOwner</i>	0.067 ^a	-0.037	0.064 ^a	0.064	-0.153 ^a	-0.047 ^c	-0.034	0.025	0.127 ^a	0.185 ^a	-0.154 ^a	-0.129 ^a	1.000		
14. <i>MustSell</i>	0.079 ^a	0.004	-0.017	-0.040	-0.025	-0.066 ^a	-0.062 ^b	0.001	0.109 ^a	0.014	-0.006	-0.094 ^a	0.014	1.000	
15. <i>Damage</i>	0.094 ^a	0.011	0.049 ^b	0.115 ^a	-0.143 ^a	-0.031	-0.032	-0.011	0.022	0.096 ^a	-0.058 ^b	-0.064 ^a	-0.028	-0.016	1.000

Table 4 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. ^a, ^b, and ^c 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 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>		0.146	11.29***	0.143	11.49***
<i>Illinois * Post</i>	+	0.076	3.18***	0.075	2.74***
<i>Age</i>		-0.014	-1.27	-0.014	-1.26
<i>Generation</i>		0.038	0.93	0.037	0.94
<i>Dealer</i>		-0.212	-6.38***	-0.217	-5.79***
<i>OriginalOwner</i>		0.104	2.16**	0.100	2.36**
<i>MustSell</i>		-0.109	-1.99*	-0.111	-1.93*
<i>Damage</i>		0.172	1.61	0.147	1.68*
<i>UnverifiableDis</i>		-0.043	-2.59**	-0.044	-2.60***
Car Type FE		Yes		Yes	
Year FE		Yes		Yes	
Adj. / Pseudo R ²		0.096		0.093	
Observations		1692		1692	

Table 5 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 the *Chicago Tribune* and 0 otherwise (i.e., if posted in the *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 6

The Effect of Truth In Mileage Act Implementation on Price and Price-Mileage Sensitivity

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

Variable	Disclosers			Non-Disclosers			Diff.	t-stat.
	Obs.	Mean	Std. Dev.	Obs.	Mean	Std. Dev.		
Variables of Interest								
<i>Illinois</i>	516	0.641	0.480	1,176	0.402	0.491	0.239	9.30***
<i>Post</i>	516	0.390	0.488	1,176	0.345	0.476	0.044	1.75*
<i>MileDis</i>	516	1	0	1,176	0	0	1	
<i>Mile</i> (in 10,000 miles)	516	4.526	2.358	0				
<i>Price</i> (in 1985 dollars)	516	4273	2134	1,176	3924	2124	349	3.10***
<i>Repetition</i>	516	4.436	3.587	1,176	4.971	3.520	-0.535	-2.86***
<i>lnRepetition</i>	516	1.189	0.797	1,176	1.355	0.741	-0.165	-4.13***
<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
Control Variables								
<i>Age</i> (in years)	516	4.601	2.499	1,176	4.984	2.720	-0.383	-2.73***
<i>Generation</i>	516	4.891	0.951	1,176	4.698	1.026	0.193	3.65***
<i>Dealer</i>	516	0.172	0.378	1,176	0.338	0.473	-0.165	-7.01***
<i>OriginalOwner</i>	516	0.095	0.293	1,176	0.060	0.237	0.035	2.63***
<i>MustSell</i>	516	0.021	0.145	1,176	0.027	0.163	-0.006	-0.71
<i>Damage</i>	516	0.017	0.131	1,176	0.007	0.082	0.011	2.02**

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

Day of the Week	Number of Advertisements		Probability of Mileage Disclosure
	Mean	Median	
Sunday	25.51	24	0.407
Monday	15.05	14	0.256
Tuesday	12.16	11	0.281
Wednesday	11.16	10	0.298
Thursday	14.68	14	0.260
Friday	18.17	16	0.282
Saturday	21.47	19	0.275
Total	16.92	15	0.305

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>				-346.22	-5.73***			-354.93	-7.27***
<i>Mile * Illinois</i>				25.63	1.37			46.85	2.48**
<i>Mile * Illinois * Post</i>	-			-98.64	-2.34**			-118.89	-3.39***
<i>Mile * Age</i>				56.71	3.48***			62.10	4.55***
<i>Mile * Generation</i>				13.34	0.21			23.75	0.46
<i>Mile * Dealer</i>				140.33	2.05*			146.22	2.57**
<i>Mile * OriginalOwner</i>				-62.87	-1.55			-85.97	-2.09**
<i>Mile * MustSell</i>				-78.95	-0.87			-41.86	-0.47
<i>Mile * Damage</i>				338.69	2.47**			274.54	2.13**
<i>Mile * UnverifiableDis</i>				-63.31	-3.25***			-80.47	-3.95***
<i>Mile * CertifiedMile</i>				-63.06	-0.61			-7.73	-0.11
<i>Mile * OriginalMile</i>				49.68	1.54			42.97	1.34
<i>Illinois</i>		-230.59	-10.12***	-306.04	-4.67***	0.455	9.73***	-567.85	-7.73***
<i>Illinois * Post</i>		226.88	4.65***	265.78	3.42***	0.198	2.09**	129.00	1.12
<i>Age</i>		-738.46	-36.03***	-638.00	-37.50***	-0.055	-1.57	-610.82	-22.49***
<i>Generation</i>		-182.56	-2.12**	-229.80	-2.44**	0.095	0.74	-290.82	-2.44**
<i>Dealer</i>		454.85	6.54***	436.15	3.93***	-0.622	-5.31***	858.21	4.79***
<i>OriginalOwner</i>		115.05	1.70	55.51	0.50	0.361	3.17***	-94.60	-0.65
<i>MustSell</i>		-115.26	-1.04	-380.59	-2.01*	-0.393	-2.21**	-200.79	-0.73
<i>Damage</i>		-1070.15	-4.83***	-1888.24	-5.78***	0.504	1.91*	-2012.89	-5.49***
<i>UnverifiableDis</i>		116.09	4.70***	155.89	4.03***	-0.111	-2.43**	254.39	3.86***
<i>CertifiedMile</i>				667.96	2.04*			814.09	3.23***
<i>OriginalMile</i>				459.60	2.74**			447.81	2.83***
<i>Sunday</i>						0.175	1.84*		
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 ²		0.865		0.917					
χ^2 for Test of Indep. Eqns.							19.59***		
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 on 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 the *Chicago Tribune* and 0 otherwise (i.e., if posted in the *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. χ^2 statistics reported for Model (3) tests the presence of sample selection bias. A significant value indicates that sample selection bias is present, thereby justifying the use of Heckman estimation.

TABLE 7

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>				-0.393	-2.62**			0.775	-1.06
<i>MileDis</i> * <i>Illinois</i>				0.028	0.26			0.984	-0.12
<i>MileDis</i> * <i>Illinois</i> * <i>Post</i>	-			-0.276	-2.03*			0.790	-1.47
<i>Illinois</i>		-0.236	-7.68***	-0.220	-3.46***	0.847	-3.89***	0.868	-1.98**
<i>Illinois</i> * <i>Post</i>	-	-0.248	-4.40***	-0.162	-2.06*	0.810	-3.22***	0.864	-1.68*
<i>Age</i>		-0.040	-2.46**	-0.043	-2.80**	0.950	-3.00***	0.949	-3.09***
<i>Generation</i>		-0.056	-1.04	-0.060	-1.17	0.918	-1.42	0.920	-1.43
<i>Dealer</i>		-0.047	-0.70	-0.079	-1.20	0.967	-0.48	0.950	-0.73
<i>OriginalOwner</i>		-0.034	-0.33	-0.034	-0.34	0.931	-0.79	0.927	-0.84
<i>MustSell</i>		-0.263	-2.88**	-0.269	-3.04***	0.730	-3.02***	0.730	-3.13***
<i>Damage</i>		-0.056	-0.49	-0.014	-0.11	0.915	-0.83	0.954	-0.40
<i>UnverifiableDis</i>		0.035	1.07	0.029	0.87	1.004	0.11	1.002	0.04
Car Type FE		Yes		Yes		Yes		Yes	
Year FE		Yes		Yes		Yes		Yes	
Year FE * <i>MileDis</i>				Yes				Yes	
Adj. / Pseudo R ²		0.064		0.075		0.031		0.036	
Observations		1692		1692		1692		1692	

Models (1) and (3) of Table 7 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 7 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 *Chicago Tribune* and 0 otherwise (i.e., if posted in the *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 8

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	2.49**	0.040	2.42**
<i>Illinois * Post</i>	-	-0.050	-2.22**	-0.046	-2.16**
<i>Age</i>		-0.005	-0.80	-0.006	-1.00
<i>Generation</i>		-0.002	-0.10	-0.006	-0.29
<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	-0.009	-0.19
<i>Damage</i>		-0.019	-0.35	-0.021	-0.31
<i>UnverifiableDis</i>		-0.009	-0.65	-0.010	-0.69
Car Type FE		Yes		Yes	
Year FE		Yes		Yes	
Adj. / Pseudo R ²		0.006		0.033	
Observations		1692		1692	

Table 8 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 the *Chicago Tribune* and 0 otherwise (i.e., if posted in the *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 9

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>				-0.171	-4.96***			0.747	-3.75***
<i>MileDis</i> * <i>Illinois</i>				0.096	2.26**			1.217	2.96***
<i>MileDis</i> * <i>Illinois</i> * <i>Post</i>				-0.156	-1.85*			0.694	-1.74*
<i>Illinois</i>		0.199	8.53***	0.184	5.85***	1.338	7.58***	1.293	5.47***
<i>Illinois</i> * <i>Post</i>		0.042	1.15	0.088	2.51**	1.223	2.52**	1.354	3.50***
<i>Age</i>		0.041	2.72**	0.040	2.64**	1.066	2.62***	1.066	2.60***
<i>Generation</i>		-0.017	-0.35	-0.015	-0.31	0.974	-0.37	0.980	-0.27
<i>Dealer</i>		-0.271	-6.60***	-0.280	-7.18***	0.560	-6.08***	0.555	-6.64***
<i>OriginalOwner</i>		0.111	2.16**	0.118	2.26**	1.125	1.97**	1.133	2.05**
<i>MustSell</i>		0.285	3.35***	0.280	3.34***	1.376	3.83***	1.367	3.85***
<i>Damage</i>		-0.147	-0.69	-0.138	-0.65	0.792	-0.83	0.802	-0.79
Car Type FE		Yes		Yes		Yes		Yes	
Year FE		Yes		Yes		Yes		Yes	
Year FE * <i>MileDis</i>				Yes				Yes	
Adj. / Pseudo R ²		0.170		0.172		0.059		0.061	
Observations		1692		1692		1692		1692	

Models (1) and (3) of Table 9 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 9 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 the *Chicago Tribune* and 0 otherwise (i.e., if posted in the *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 unverifiable disclosure associated with a unit increase of the independent variable.