

Appendix

Toyota's Troubles—A Timeline

February 2004—State Farm Insurance notifies the National Highway Traffic Safety Administration (NHTSA) of increased claims of “unintended acceleration” for 2002 and 2003 model year Lexus ES300s and Toyota Camrys.

February 2004—The NHTSA begins an investigation into electronic throttle control malfunction complaints in 2002 and 2003 model year Lexus ES300s. In July 2004, the investigation is closed with no defects found.

December 31, 2004—Toyota vehicles represent 20 percent of total unintended acceleration complaints in 2004. This represents an increase of 4 percent from 2000. Toyota's U.S. market share in 2004 was 12.2 percent compared to 9.3 percent in 2000.

April 2005—The NHTSA investigates 2002–2005 model year Toyota Camry, Lexus ES, and Solara vehicles for an electronic cause of the unintended acceleration, but closes the investigation in January 2006 with no evidence of a defect.

October 2005—Toyota recalls 1.41 million vehicles for defective headlight switching systems.

March 2007—Toyota receives five complaints against its 2007 Lexus ES350 vehicles for unintended acceleration, as well as problems with its Tundra model. Toyota begins investigation. The NHTSA begins similar investigation and identifies the floor mats as the problem in preliminary analysis.

July 26, 2007—A driver is killed in San Jose, California, after his car is rammed by a 2007 Toyota Camry; the Camry driver is seriously hurt.

September 13, 2007—The NHTSA finds the floor mats catching the gas pedal as the cause of the crash in San Jose in July and notifies Toyota that a recall is required.

- September 26, 2007—The company recalls 55,000 floor mats in its 2007 and 2008 model year Camrys and Lexus ES350s.
- October 2007—*Consumer Reports* magazine removes three Toyota vehicles from its safety recommendation list, stating that “after years of sterling reliability, Toyota is showing cracks in its armor.”
- April 2008—The NHTSA begins investigation on 2004 Sienna minivans and 2004–2008 model year Tacoma trucks for unintended acceleration.
- April 19, 2008—The crash of a 2005 Camry into a tree due to “out of control acceleration” causes the death of its driver. The vehicle does not have the floor mats that were seen as the cause of accidents pertaining to the previous recall. A lawsuit alleged that the software controlling the vehicle’s systems is flawed. Toyota denies the allegations.
- June 2008—Toyota states, in regard to accelerator complaints, that “while accelerator pedal feeling could change under certain conditions, Toyota considered it to be a driver-ability issue unrelated to safety.”
- January 2009—Toyota recalls 1.3 million vehicles for vehicle and seatbelt defects and 26,501 Siennas for a floor carpet defect.
- April 27, 2009—Reports from Ireland about sticking pedals are sent to engineers at Toyota in Los Angeles.
- July 2009—Toyota “estimates that it saved \$100 million by negotiating with regulators to limit a previous recall to 2007 Toyota Camry and Lexus ES models for sudden acceleration.”
- August 28, 2009—A 2009 Lexus ES350 travelling 120+ mph crashes in Santee, California, killing a family of four. The 911 call from a passenger in the car before the vehicle crashes states that the gas pedal was stuck. It is believed the pedal may have been caught in the floormat.
- August 2009—Toyota recalls 690,000 vehicles in China for a defect in window stitching.
- September 29, 2009—The NHTSA informs Toyota that it needs to recall defective pedals in its vehicles. Toyota announces a 3.8 million vehicle recall for the removal of floor mats that could catch accelerator pedals, causing unintended acceleration. Offers “safe” replacements, while recommending that consumers remove the mats until the company can fix the problem. Recall involves most Toyota vehicles from 2007 to 2010, as well as Toyota Prius models from 2004 to 2010.
- November 25, 2009—Toyota expands its recall to 4.26 million vehicles, stating it will reconfigure the length of its gas pedals, install a

- brake override system, and redesign its floor mats. Vehicles recalled now include 2007–2010 Camry and Tundra models, 2005–2010 Avalons, and more Lexus models.
- December 26, 2009—A Toyota Avalon crashes into a pond after speeding off a road, killing four people. Police report that they found floor mats, the stated cause for the unintended acceleration, in the trunk.
- December 28, 2009—In New Jersey, a driver drove his speeding, uncontrollable 2007 Avalon to a dealership by shifting in and out of neutral. Once parked, the motor was still running and the tires/brakes began to smoke.
- January 16, 2010—Toyota tells the NHTSA that its pedals manufactured by CTS Corporation have a defect that can make them become stuck.
- January 21, 2010—Toyota recalls 2.3 million vehicles (2005–2010 Camrys and Tundras; 2008–2010 Sequoias; 2009–2010 Rav4s, Corollas, Matrixes; 2010 Highlanders; 2009–2010 Pontiac Vibes) for sticking gas pedals that may cause unintended acceleration. Toyota recommended that drivers use firm pressure when braking until they can fix their vehicles.
- January 26, 2010—Toyota stops selling its defective models and ceases production for a week in February.
- January 27, 2010—Toyota adds 1.1 million vehicles to the recall involving floor mats (2008–2010 Highlanders, 2009–2010 Corollas, 2009–2010 Venzas, 2009–2010 Matrixes, 2009–2010 Pontiac Vibes).
- January 28, 2010—Toyota announces it will recall an indeterminate number of vehicles in Europe and 75,000 RAV4s in China for the gas pedal defect.
- January 28, 2010—The NHTSA approves Toyota's pedal fix.
- January 29, 2010—Toyota announces recalls of 1.8 million vehicles in Europe.
- February 2, 2010—The U.K.'s *Guardian* reports that U.K. drivers will have to wait a few weeks before they are able to know whether their vehicle has a defective accelerator pedal.
- February 2, 2010—The NHTSA restarts its investigation into Toyota's electric throttle control system. Transportation Secretary Ray LaHood states, "While Toyota is taking responsible action now, it unfortunately took an enormous effort to get to this point." He calls Toyota "a little safety deaf."
- February 3, 2010—The Japanese government orders Toyota to investigate braking problems with its 2010 Prius. The NHTSA states that it has received 124 complaints against the Prius's braking.

- February 3, 2010—Ray LaHood recommends that Toyota drivers who own a car with potential defects to “stop driving it,” although later that morning, he rescinds his comments, explaining they were a misstatement.
- February 3, 2010—Toyota announces it has sent information of 180,865 recalled vehicles to the United Kingdom’s auto licensing office. Toyota states that the repair should take only 30 minutes at a service center.
- February 4, 2010—Toyota identifies a flaw with the 2010 Prius’s braking systems and states that it is a software error—Prius vehicles built since January already have been modified. The NHTSA announces investigation into 2010 model year Prius vehicles. The number of recalled vehicles reaches 8.1 million. Toyota estimates that it will lose \$2 billion from costs associated with the recalls.
- February 5, 2010—President of Toyota, Akio Toyoda, makes a public apology at a Japanese news conference for the problems associated with its vehicles. Toyoda announces he is creating a task force to investigate quality issues and that the company is deciding whether to make another Prius recall. This is amidst reports by the *Guardian* that Toyota was aware of the accelerator fault in the winter of 2008–2009 but had originally identified it not as a safety problem but as a quality problem, and did not inform the U.K. government until ordered to do so.
- February 9, 2010—Toyota recalls 437,000 hybrid vehicles (2010 Prius’s, Sais, Prius PHVs, and Lexus HS250hs) for a problem with their regenerative braking system.
- February 12, 2010—8,000 Toyota 2010 Tacoma trucks are recalled for front propeller shaft issues. The front propeller could malfunction, potentially affecting vehicle control.
- February 16, 2010—Toyota states that it will stop production at two of its plants due to decreased sales from the recalls; The NHTSA orders the company to provide evidence as to when it knew of the defects in its vehicles.
- February 17, 2010—President Akio Toyoda begins rebuilding the company’s tarnished image by introducing new safety measures, such as more prompt defect notification and mandatory brake override systems in future models (something that many German automakers already do). The NHTSA announces it will investigate steering issues in 500,000 Corollas.
- February 22, 2010—Politicians on the U. S. House of Representatives Energy and Commerce Committee assert that Toyota used a faulty study to assess whether there was a software issue with its

unintended acceleration problems. They further assert that the company made deceptive comments about the recalls. Toyota is subpoenaed by a federal grand jury of the Southern District of New York for documents pertaining to unintended acceleration and disclosure policies.

February 23, 2010—*Consumer Reports* takes two Toyota cars off of its “Top Pick” list due to their halt in sales because of the recall. Congressional hearing witnesses identify software issues as the cause for unintended acceleration in some Toyota vehicles. Jim Lentz, COO of Toyota USA, states the company is still investigating whether there is an electronics issue in its vehicles’ accelerator pedals.

February 24, 2010—After U.S. pressure, Toyota president Akio Toyoda appears before a U.S. congressional hearing, stating, “I’m deeply sorry for any accident that Toyota drivers have experienced” and pledging full cooperation from Toyota.

March 4, 2010—The NHTSA announces that it is investigating recalled Toyotas that were repaired, after receiving 60 complaints of unintended acceleration from them. Toyota suggests that these vehicles may not have been repaired properly.

April 5, 2010—The U.S. Department of Transportation announces that it will pursue a \$16.4 million fine of Toyota (the maximum allowed under current legislation) for failing to notify the government of the defects within the allowed time frame. It is the largest fine against an automaker in U.S. history.

April 13, 2010—Toyota’s luxury division, Lexus, stops the sale of its 2010 Lexus GX460 vehicles when *Consumer Reports* magazine tells potential buyers that the vehicle has an increased chance of roll-overs and steering control issues.

April 16, 2010—Toyota recalls 870,000 Sienna vehicles (2008–2010 models) due to a cable holding the rear-mounted spare tire potentially corroding from road salt. This could cause the tire to fall onto the road while driving.

April 19, 2010—Toyota agrees to pay the \$16.4 million fine from the U.S. Department of Transportation. Toyota recalls 10,000 Lexus GX460 vehicles that *Consumer Reports* magazine warned buyers against, stating that the issue is with the electronic stability control system.

April 28, 2010—Toyota recalls 50,000 Sequoia vehicles due to “low-speed acceleration” issues with its electronic stability system.

Notes

Prologue

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14. The discussion on global toy industry and the aftermath of recalls was excerpted from Bapuji H, Beamish P. 2008. *Mattel and the Toy Recalls*. Cases A and B with permission from Ivey Publishing.
15. CBC News, "China recalls leukemia drugs, rejects North American meat exports," September 17, 2007, <http://www.cbc.ca/consumer/story/2007/09/17/china-exports.html> and "China rejects U.S. imports of pulp, apricots for contamination," June 26, 2007, <http://www.cbc.ca/consumer/story/2007/06/26/china-trade.html>.
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2 Toy Recalls: Up, Up, and Up

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3. CPSC, "RC2 Corp. Recalls Various Thomas & Friends™ Wooden Railway Toys Due to Lead Poisoning Hazard," June 13, 2007, <http://www.cpsc.gov/cpscpub/prerel/prhtml07/07212.html>.
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10. The number of recalls in each year presented in this book and those in other works relying on the CPSC data may not exactly match, particularly because the CPSC uses a different time frame for each year. This book uses the CPSC raw data to compute the recalls issued in each calendar year, running from January to December. In contrast, the CPSC uses a different budget year that runs from October to September.
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3 Toy Recalls and China: The Twain that Always Meet?

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4 China's Toy Recalls: The High Cost of Low Price?

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4. The discussion in this section only focuses on low-priced toy recalls for the purposes of brevity. Further, the high-priced toy recalls are simply the opposite of low-priced toy recalls, in general. Therefore, the patterns for low-priced recalls are the opposite of those for high-priced toy recalls.

5 Toys Made in China, but Designed in ... ?

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 22. Coding for the flaw type based on product recall notices is a difficult task because the notices do not give sufficient information about the processes behind the recall. The notices are crafted carefully (often with the involvement of lawyers from recalling companies) to avoid future litigation. Nevertheless, it is possible to infer in most cases if the product recall was likely due to a flaw in design or manufacturing. Design flaw is systemic and affects the entire product as opposed to a few items (or a few batches of production). In contrast, manufacturing flaw is a deviation from original product plan and specifications.

Therefore, the following rules can be applied to infer if a recall was due to a design or a manufacturing flaw in the product:

- Is the problem/problematic component likely an integral part of the original product plan and specifications? For example, small parts that are detachable or become detached during use are an integral part of the original product plan. In contrast, lead paint or needles in stuffed toys could not conceivably be designed into the products. Is the problem a result of non-adherence to standards and regulations that describe safety features? Is it a deviation from standards or likely a deviation from specifications?
- Could the problem/problematic component have been reasonably identified during routine inspections (that are likely to have taken place)? In other words, is it reasonable to expect that the company selling the product could have realized (with relative ease) that it was not as per specifications?
- Did the company recall a few batches manufactured during a short period of time or the entire production? In the former case, the problem likely occurred during manufacturing and might not have been noted during inspections (or simply fell through the cracks). In other words, the problem was not inherent to the product but to the production on a few days.
- Did the company offer a replacement of the same product or one of the following: refund, store coupon, retrofit repair kit? If the same product is offered, it indicates that the product itself was not problematic but certain units were affected. So, the remedy was to offer the same product produced on different dates. If a retrofit repair kit was provided, it is likely that the problem was not initially envisaged but was addressed by adding components that would eliminate the hazard (for example, cap to close a gap or covers to ensure that sharp parts are not reachable). Refund would mean that the entire product line was likely problematic.
- Did the recall notice (or related Web sites) mention specifically if it was a manufacturing or a design problem? Did the recall notice mention which batches of similar/same products are not recalled and why? What is different between the recalled and not recalled products: is it improved design?
- Did the recall notice refer to a redesigned product, sold now or offered as a replacement for the recalled product?

Although most of the recall notices could be coded with the help of above rules, in some cases it is not possible to code based on the information given because the problem could have been either manufacturing or design. For example, seam separation and the resultant small beads falling off the toys could arguably be the result of either the seam (design) or manufacturing (easy separation). In some cases, it is difficult to tell—for example, the nozzle

- coming off unexpectedly from a water gun. These are coded as “Not Sure.”
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6 More Players and More Recalls

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7. Although the recall notices indicate the type of company, we realized that this categorization was not consistent because the same companies were listed as manufacturers in some and importers in others. Therefore, we conducted extensive searches to collect data on the business activities of each company in our sample. We collected information about the business operations of the recalling company from their industry codes in Compustat. For privately listed firms, we checked in the Dun and Bradstreet directory, as well as with Hoovers and on the companies’ own Web sites.
8. In recent years Hasbro has closed nearly all its manufacturing facilities and relied on contract manufacturers. However, during our relatively

long study period, Hasbro maintained factories and, more importantly, continues to design its own toys. Therefore, we coded Hasbro as a manufacturer. Mattel not only designs toys but also maintains its own manufacturing facilities where nearly 50 percent of the toys sold by Mattel are made. For the remaining half, Mattel relies on contract manufacturers. The manufacturing facilities of Mattel exist in several countries, including China.

9. Our categorization was a subjective exercise since it involved reading information about a company and assigning an appropriate code. In order to ensure that the categorization was reliable, a member of the research team and a graduate student coded the variable independently. The agreement level between the coders was 91.3 percent. We computed Cohen's Kappa to estimate the reliability of the coding and found that the coding was highly reliable (Kappa=0.82 and $p < 0.001$). Following this, the companies on which the coders could not agree were discussed and resolved, which resulted in a complete agreement over the categorization.
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7 Slow to React in a Fast-Paced World

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