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Administration**



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Consumer Assistance to Recycle and Save Act of 2009

**Report to the House Committee on Energy and Commerce,
the Senate Committee on Commerce, Science, and Transportation and
the House and Senate Committees on Appropriations**

Report to Congress

**National Highway Traffic Safety Administration
U.S. Department of Transportation
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Executive Summary

On June 24 2009, President Obama signed the Consumer Assistance to Recycle and Save (CARS) Act of 2009. The Act directed the Secretary of Transportation, acting through the National Highway Traffic Safety Administration (NHTSA), to establish and administer a program in which owners of vehicles meeting statutorily specified criteria could receive a monetary credit for trading in their vehicle and purchasing or leasing a new, more fuel-efficient vehicle. The credit amount was either \$3,500 or \$4,500, depending upon the amount of improved fuel efficiency. If all of the conditions of eligibility were met, NHTSA made an electronic payment to the dealer equal to the amount of the credit. The Act appropriated \$1 billion for the program, including up to \$50 million for its administration. The Act permitted transactions to occur from July 1 through November 1. The Act also required the Secretary of Transportation to provide a report describing the efficacy of the program by January 1, 2010.¹

NHTSA faced many challenges, including issuance of a final rule setting out program requirements and implementation of the program within 30 days of the statute's enactment. NHTSA issued its final rule on July 23 and opened the CARS system for dealer registration on July 24. Dealers were allowed to begin submitting transactions for approval on July 27. Within just a few days, it became clear that the pace of dealer submissions was so great that the appropriated funds would soon be exhausted. On August 7, Congress appropriated an additional \$2 billion for the program, tripling the potential number of transactions originally expected when the program was being designed in July. The volume of program transactions grew quickly, outstripping the transaction review capacity NHTSA had created to deal with the much lower volume envisioned by the original legislation. To ensure that the appropriated monies would be available for all completed transactions, NHTSA closed the program to new transactions on August 24 and required all transactions to be submitted for approval by August 25.

¹ Section 1302 (g) of the CARS Act states:

- (2) REPORT ON EFFICACY OF THE PROGRAM- Not later than 60 days after the termination date described in subsection (c)(1)(A), the Secretary shall submit a report to the Committee on Energy and Commerce of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate describing the efficacy of the Program, including-
 - (A) a description of Program results, including-
 - (i) the total number and amount of vouchers issued for purchase or lease of new fuel-efficient automobiles by manufacturer (including aggregate information concerning the make, model, model year) and category of automobile;
 - (ii) aggregate information regarding the make, model, model year, and manufacturing location of vehicles traded in under the Program; and
 - (iii) the location of sale or lease;
 - (B) an estimate of the overall increase in fuel efficiency in terms of miles per gallon, total annual oil savings, and total annual greenhouse gas reductions, as a result of the Program; and
 - (C) an estimate of the overall economic and employment effects of the Program.

NHTSA increased the workforce assigned to review dealer submissions to more than 7,000 people by early September and employed a variety of methods to improve dealers' understanding of the system and their ability to submit proper documentation of their transactions. NHTSA managed to complete its review of 99 percent of dealer submissions by late September. NHTSA handled three times as many transactions as initially envisioned and most of them had to be reviewed more than once due to incomplete dealer submissions. The average time from receipt of a fully documented voucher to payment was just under 17 days.

A total of 18,908 dealerships participated from all 50 states as well as the District of Columbia, the Virgin Islands, Puerto Rico, the Northern Mariana Islands, and Guam. There were 690,114 voucher applications filed by August 25 at 8 PM EST (the final deadline for filing)² which resulted in 677,842 paid vouchers and 12,272 transactions which were cancelled by the dealer or NHTSA.³ The average voucher issued was \$4,209, and the vouchers totaled to \$2.85 billion.

The total new vehicles sold or leased under the CARS program included 401,274 passenger cars, 274,602 light trucks (Category 1 and 2) and 1,966 heavy trucks (Category 3). The new vehicles have an average combined EPA rating of 24.9 miles per gallon (MPG) and replaced vehicles that had an average rating of 15.8 miles per gallon, with an average difference equal to 9.2 miles per gallon.⁴ Forty-nine (49) percent of the new vehicles were manufactured domestically. The agency estimates that the program resulted in a \$3.8 billion to \$6.8 billion increase in GDP and over 60,000 jobs created or saved.

The reduction in fuel consumption over the next twenty-five years is estimated to be 824 million gallons, with a saving roughly 33 million gallons annually. Carbon dioxide (CO₂) savings are estimated as a function of fuel consumption, changes in behavior and the vehicle miles traveled. The estimated reduction in carbon dioxide emissions and related greenhouse gases over the next twenty-five years is 9 million metric tons, a reduction with an estimated social benefit of \$278 million over 25 years (in 2008 dollars).

The CARS program achieved the objectives set out by Congress to increase automotive sales and aid the environment. In just a few short weeks of sales, nearly 680,000 older vehicles were replaced by new, more fuel-efficient vehicles. The nation's economy benefited immediately from this stimulus program, which caused a distinct upward movement in GDP and created or saved tens of thousands of jobs at a very critical time in the recovery process. Because of the unanticipated strength of consumer response, the program led to a sharp decline in dealer inventories and caused several major automakers to increase production schedules through the end of 2009, leading to an increase in employment and GDP in the

² CARS Program Statistics August 26, 2009. Available at: <http://www.cars.gov/files/official-information/August26Stats.pdf>

³ NHTSA only cancelled transactions at the request of the dealer or due to NHTSA's determination that the transaction did not meet the Program criteria.

⁴ Calculated as an arithmetic mean.

fourth quarter as well. The environment will benefit over the longer term because operation of the new vehicles in place of the trade-ins will reduce oil consumption and emissions of carbon dioxide and related greenhouse gases over the next 25 years.

1. Establishment and Operation of the CARS Program

1.1 CARS Act and NHTSA's Challenges

In early 2009, with the nation suffering from a recession of historic proportions and the automobile industry experiencing drastically reduced sales volumes compared to recent years, Congress considered a variety of proposals for fleet modernization programs. Several countries had already enacted such programs using various models, with the common trait being a government incentive to trade in an older vehicle for a new, more fuel-efficient one.

Congress eventually enacted the Consumer Assistance to Recycle and Save (CARS) Act of 2009, 49 U.S.C. § 32901, signed by President Obama on June 24. The Act set out the basic requirements concerning which vehicles were eligible to be traded in, which new vehicles were eligible to be purchased or leased, credit amounts, how the trade-ins had to be disposed of, penalties for fraud, and the general period for eligible transactions (July 1 through November 1). For example, trade-in vehicles had to have been continuously insured in accordance with State law for a period of at least one year immediately prior to the trade-in. The statute defined passenger automobiles and three categories of trucks, and set fuel economy and other restrictions on which types of trade-ins could be paired with which types of new vehicles.

The Act required the Secretary (acting through NHTSA) to establish and administer the program. Under the Act, NHTSA had just 30 days to issue a final rule setting out the program's more detailed requirements and establish an informational website for dealers and the public. The Act appropriated \$1 billion for the program, including up to \$50 million for administrative expenses.

To achieve what the Act required, NHTSA had to accomplish several tasks very quickly:

- Learn relevant facts about car dealerships, vehicle sales transactions, and vehicle disposal.
- Establish a new CARS program office to administer the program and recruit employees to staff it through temporary detail assignments or hiring.
- Set up a computerized system to register dealers interested in participating.
- Create a new website to provide information to dealers and the public on how to participate.
- Work with the Environmental Protection Agency (EPA) to link its fuel economy website to the CARS website and ensure that it incorporated relevant CARS program categories and eligibility criteria.

- Establish a hotline sufficient to handle thousands of calls daily from the public, dealers, and recyclers.
- Conduct a public awareness campaign to encourage participation in the program.
- Retain a contractor to develop a software system capable of processing up to 250,000 transactions over four months and have it ready in 30 days.
- Obtain the services of a contractor or contractors to review dealer submissions for accuracy and completeness and have them trained and ready to start in 30 days.
- Determine efficient methods for review of dealer submissions by the agency's contractors and for NHTSA to monitor the quality of their review.
- Determine how to identify the disposal facilities that would be eligible to receive trade-in vehicles.
- Determine how to ensure proper entry of information about the disposal of vehicles into the National Motor Vehicle Title Information System (NMVTIS).
- Find ways to deter fraud with regard to both the eligibility of the sales transaction and the disposal of the trade-in.
- Draft and issue the final rule and associated paperwork requirements within 30 days.

In June, NHTSA assembled a core team of about 20 people with the necessary expertise in information technology, procurement, communications, law, and program issues. Faced with unprecedented challenges and little time, the team worked continuously to identify issues and develop solutions. In late July, in order to implement the program being developed, NHTSA established within the Office of Vehicle Safety Enforcement the new CARS program office, staffed by at the outset by 25 people assigned on detail from all parts of NHTSA or hired temporarily.

With the active support of the Office of the Secretary of Transportation (OST) and the Office of Management and Budget (OMB), the team accomplished all of these tasks in the allotted time. The agency issued the final rule on July 23. By July 24, the website was available for dealers to register. On July 27, dealers began submitting transactions for review. The program was so well received by dealers and the public that deals sufficient to absorb the \$1 billion available for credits were entered within the program's first several days. On August 7, just 12 days after the system was opened to submissions, Congress enacted an appropriations bill that provided an additional \$2 billion to the program's initial \$1 billion. (Pub. L. No. 111-47.) This tripled the volume of transactions NHTSA had expected to receive.

1.2 NHTSA Outreach Prior to Program's Launch

Neither NHTSA nor any other federal agency in the United States had ever designed or administered a fleet modernization program. NHTSA needed to learn certain basic information very quickly. In June, even prior to the enactment of the CARS Act, the agency started holding a series of meetings and conference calls with organizations that might be able to help NHTSA understand the issues the agency would need to address. NHTSA spoke to officials in Germany who had implemented that country's fleet modernization program

early in 2009. The agency also spoke to officials in Texas and California, which had implemented state programs with some features similar to the CARS program. All of these governmental contacts made NHTSA very concerned about the possibility of fraud, particularly with regard to the continued use of the trade-ins that are supposed to be crushed or shredded under the program.

NHTSA met several times with dealers and their associations (the National Automobile Dealers Association and the American International Automobile Dealers Association) to learn more about typical vehicle sales transactions and how the statute's requirements might be applied in that context. The agency also met with vehicle manufacturers and their trade associations (the Alliance of Automobile Manufacturers and the Association of International Automobile Manufacturers) to determine the best way to register dealers and ensure that only legitimate dealers were able to register.

NHTSA also met with representatives of companies that auction trade-in vehicles, remove and recycle their parts, and crush or shred vehicles and organizations knowledgeable on those subjects (the American Salvage Pool Association, the Automotive Recyclers Association, CoPart, Mannheim, Insurance Auto Auctions, the Institute of Scrap Recycling Industries, Inc, and the National Salvage Vehicle Reporting Program). These meetings helped educate the agency on how vehicles move through the system after a trade-in, which types of companies play different roles in dismantling vehicles and selling their parts, and how vehicles are ultimately destroyed. The agency conversed several times with the Department of Justice (DOJ) concerning its NMVTIS program and with the American Association of Motor Vehicle Administrators, which operates that program for DOJ. These contacts were essential in developing the rule's provisions about vehicle titling and reporting to NMVTIS. The agency met with EPA representatives several times to coordinate on how EPA's data on each vehicle's fuel efficiency rating would be displayed on the two agencies' websites. NHTSA also met with environmental organizations to learn of their concerns about how the statute would be implemented. Finally, NHTSA met several times with the Department's Office of Inspector General, which provided very helpful support in conveying the agency's anti-fraud message to the public and affected industries.

1.3 The Final Rule

The CARS Act required NHTSA to issue a final rule within 30 days of enactment “notwithstanding” the requirements of the Administrative Procedure Act, which would ordinarily have required the agency to provide notice and opportunity to comment on a proposed rule prior to issuance of a final rule. NHTSA issued its final rule (74 Fed. Reg. 37878, codified at 49 C.F.R. Part 599) on July 23.

The final rule includes all of the regulatory provisions necessary to establish and implement the program.⁵ One section sets out the registration system for dealers, requiring that they be

⁵ The rule defined “CARS Program” to make clear that the agency would refer to the program as the Car Allowance Rebate System. Thus, depending on context, “CARS” can mean either “Consumer Assistance to

currently franchised by a manufacturer and licensed by a state. The rule explains that NHTSA would send authorization codes to entities identified as legitimate dealers by the manufacturers and that dealers could use those codes to register electronically through the dealer portion of the CARS website. NHTSA used this system to ensure that only valid dealers participated in the system and that all payments would be made only to the bank accounts identified by those dealers. The rule also sets out requirements for participation by salvage auctions and disposal facilities. NHTSA required that only facilities that participate in a particular environmental program⁶ would be eligible to participate as CARS disposal facilities.

The rule borrows the statutory definitions of passenger automobile and three categories of trucks. Some of these definitions were taken from the fuel economy statute that NHTSA administers, but one (i.e., “Category 2 truck”) was based on an EPA guideline.

The rule sets out the basic requirements for eligible vehicles and qualifying transactions, taken largely from the CARS Act. Where necessary to document the eligibility of a transaction or to help deter fraud, NHTSA added other requirements. The key to the eligibility of both the trade-in and new vehicle was the official EPA fuel economy rating found on www.fueleconomy.gov. NHTSA worked with EPA to ensure that the side-by-side comparisons of old and new vehicles’ fuel economy ratings found on EPA’s website contained the vehicle categories and transaction eligibility standards of the CARS Act.

Under the rule, the trade-in vehicle must be drivable, continuously insured and registered for the entire preceding one-year period, and manufactured less than 25 years before the date of the trade-in. Generally, the trade-in must have a combined fuel economy rating of 18 mpg or less. However, in the case of Category 3 vehicles (which are not rated by EPA), the vehicle must be from model year 2001 or earlier.

The new vehicle must have a base manufacturer’s suggested retail price (MSRP) of not more than \$45,000 (before any dealer accessories, optional equipment, taxes or destination charges are added to the price). The new vehicle must also achieve a minimum combined fuel economy level (see Table 1). For passenger automobiles, the new vehicles must have a combined fuel economy value of at least 22 miles per gallon. A Category 1 truck (sport utility vehicles (SUVs), small and medium pickup trucks and small and medium passenger and cargo vans) must have a combined fuel economy value of at least 18 miles per gallon. A Category 2 truck (a large van or a large pickup truck) must have a combined fuel economy value of at least 15 miles per gallon. A Category 3 truck (generally a work truck and rated between 8,500 and 10,000 pounds gross vehicle weight, such as very large pickup trucks and very large cargo vans) has no minimum fuel economy requirement because EPA does not

Recycle and Save” when used in reference to the statute, or “Car Allowance Rebate System” when used in reference to the program established under the statute.

⁶ That program was the End-of-Life Vehicle Solutions program for the proper disposal of mercury switches. EPA suggested that participation in this program was a useful indicator of a facility’s intention to comply with environmental laws related to vehicle disposal.

rate those vehicles. However, special requirements apply to the purchase of Category 3 vehicles.

The value of the credit given for the purchase or lease of a passenger car depends on the level of fuel efficiency improvement that is achieved by moving from the trade-in vehicle to the new vehicle. Table 1 summarizes the conditions that qualify vehicles in each category for specific incentive amounts. For new passenger cars, the new fuel-efficient vehicle must have a combined fuel economy value at least 4 miles per gallon greater than that of the trade-in vehicle to qualify for a \$3,500 rebate. If the difference were 10 mpg or more, it would qualify for a \$4,500 rebate. If the new vehicle is a Category 1 truck that has a combined fuel economy value that is at least two, but less than five, miles per gallon higher than the traded-in vehicle, the credit is \$3,500. If the new Category 1 truck has a combined fuel economy value that is at least five miles per gallon higher than the traded-in vehicle, the credit is \$4,500. If the transaction involves two Category 2 trucks each meeting the eligibility criteria, a gain of 1 mile per gallon results in a credit of \$3,500; a gain of at least 2 miles per gallon results in a credit of \$4,500. A Category 3 truck that is traded-in for a new Category 2 truck is entitled to a \$3,500 credit, without fuel economy restriction. If the Category 3 truck is traded in for a new Category 3 truck, the credit is \$3,500 only if the new truck is of equal or lesser gross vehicle weight than the trade-in. Only 7.5 percent of the funds appropriated for the program may be used for credits for Category 3 trucks.

Table 1: Incentive Amounts

Type of new vehicle purchased	The combined MPG* of the new vehicle must be...	The type of vehicle traded-in^ is...	Amount of incentive		
			If the difference in combined MPG between the new vehicle and trade-in vehicle is...	The incentive is...	
Passenger Automobile <ul style="list-style-type: none"> All passenger cars. 	At least 22 MPG	Passenger car, Category 1 or 2 truck	4-9 MPG	\$3,500	
			10 MPG or more		\$4,500
Category 1 Truck:† <ul style="list-style-type: none"> All SUVs w/ GVWR <=10,000 lbs. Pickups w/ GVWR <8,500 lbs. & wheelbase <= 115 in. Passenger vans & cargo vans w/ GVWR <8,500 lbs. & wheelbase <= 124 in. 	At least 18 MPG	Passenger car, Category 1 or 2 truck	2-4 MPG	\$3,500	
			5 MPG or more		\$4,500
Category 2 Truck:† <ul style="list-style-type: none"> Pickups w/ GVWR <= 8,500 lbs. & wheelbase > 115 in. Passenger vans & cargo vans w/ GVWR <= 8,500 lbs. & wheelbase > 124 in. 	At least 15 MPG	Category 2 truck	1 MPG	\$3,500	
			2 MPG or more		\$4,500
		Category 3 truck	NA‡	\$3,500	
Category 3 Truck:† <ul style="list-style-type: none"> Trucks w/ GVWR 8,500-10,000 lbs. that are either pickup trucks with cargo beds 72” or longer or very large cargo vans. 	NA‡	Category 3 truck	NA‡ However, the new vehicle must have an equal or lesser GVWR.	\$3,500	

*MPG requirements are based on EPA’s combined city/highway rating

^All trade-in passenger, Category 1 or Category 2 vehicles must have a combined fuel economy rating of 18 MPG or less

†GVWR = Gross Vehicle Weight Rating

‡Not applicable; Category 3 trucks do not have EPA MPG ratings

Implicit in these restrictions on eligible transactions is the ineligibility of transactions not listed (e.g. trading in a vehicle with an EPA rating of more than 18 mpg; or purchasing a new vehicle with an EPA rating below the minimum levels).

The rule sets out the process and contents for dealer submissions for reimbursement. The dealer must submit basic information to identify the purchaser and both the trade-in and new

vehicle so that NHTSA could determine eligibility. For the purchaser, this includes name, address, and driver's license or state identification number. This information was necessary to ensure that individuals did not participate more than once in the CARS program. For the trade-in, the dealer must submit proof of insurance and registration and the title. NHTSA determined that assignment of the title to the dealer prior to submission of the transaction was necessary to give effect to the dealer's certification that it would dispose of the vehicle properly in accordance with the rule. In addition, having the title as an attachment proved useful in helping establish ownership of the trade-in vehicle and supplementing registration and insurance documents.

To help deter fraud, the rule requires that the title be marked, "Junk Automobile, CARS.gov," which would flag the title in such a way as to discourage resale of the trade-in for any purpose other than salvage. The rule also requires that the purchaser and dealer sign a document called a summary of sale, which contained very specific certifications from both parties as to the truth of the facts set forth. This was intended to ensure that the dealer provided the purchaser with the dealer's best estimate of the scrappage value of the trade-in and to deter either party from trying to deceive NHTSA as to the eligibility of the purchaser, the vehicles, or the transaction. The rule also requires submission of the actual sales or lease contract and the CARS purchaser survey.

The rule requires that the dealer permanently disable the engine of the trade-in vehicle. Based on discussions with a foreign government and two State governments that had administered fleet modernization programs, NHTSA was very concerned about the possibility of the trade-in vehicles being resold for use as an automobile, which is expressly prohibited by the CARS Act and contrary to its environmental purpose. The agency concluded that the opportunity for such fraud would be greatly reduced if the vehicle's engine were rendered inoperable prior to the dealer offering the vehicle to a disposal facility or salvage auction. NHTSA explored various disablement procedures and chose one that was determined to be safe, effective, and environmentally sound.⁷ The rule originally required that the disablement occur prior to the dealer's submission of the request for reimbursement. NHTSA later amended the rule to permit the dealer to wait until the seventh day after receiving the CARS credit to disable the engine. See 74 Fed. Reg. 38974 (August 5, 2009).

The rule contains several requirements concerning the proper disposal and tracking of the trade-in vehicle. Under the rule, salvage auctions or disposal facilities that receive a trade-in from a dealer must submit signed certifications acknowledging receipt of the vehicle and promising compliance with all relevant rules. Both entities are required to report the status of the vehicle—using its vehicle identification number (VIN)—to the National Motor Vehicle Title Information System (NMVTIS), a national database that the public and state registration officials can access. This is intended to discourage registration and use of the vehicle as an automobile. The disposal facility may sell parts of the vehicle, but these parts

⁷ The agency developed a quick, safe, inexpensive, and environmentally benign process to disable the engine: drain the oil from the crankcase, replace it with a 40 percent solution of sodium silicate, and run the engine for a short time. See 49 C.F.R. Part 599, appendix B.

cannot include the engine or the drive train (unless with respect to the drive train, the transmission, drive shaft, or rear end are sold as separate parts). Within 180 days of receiving the vehicle, the disposal facility must crush or shred the vehicle. At this writing, a proposed rule to extend this period by 90 days is pending. See 74 Fed. Reg. 62275 (Nov. 27, 2009).

The rule also contains provisions on record retention, agency access to records, penalties for rule violations, and a process for assessing and collecting civil penalties.

1.4 CARS Website and Hotline

Effective communications were vital to implementation of the CARS program. NHTSA created and activated its www.Cars.gov website by June 19, prior to the final enactment of the CARS Act. The website provided basic program information for the public and dealers, with a specific portal for dealer registration. Consumers considering trading in their vehicle under the program could become familiar with program rules and determine their vehicles' eligibility through a link to the EPA's www.fueleconomy.gov website. More than nine million people have visited the website (which has had more than 18 million visits), primarily in July and August. The website also contained a list of disposal facilities eligible to receive CARS vehicles. The website contains a link to the final data concerning approved CARS transactions.

The overwhelming response to the program brought with it a deluge of calls to the CARS hotline that the agency established on June 25. At its peak, the hotline received over 50,000 calls per day. NHTSA retained contractors to field these calls, which were coming primarily from consumers with detailed questions about their vehicles' eligibility or complaints about the program's criteria or dealer actions. Dealers and recyclers also called with questions or complaints. Ensuring prompt and correct answers in the face of the enormous volume of calls provided one of the greatest challenges to the program, particularly in its earliest weeks. NHTSA's program and legal personnel trained the hotline personnel and developed answers for the most frequent questions. In just a few short weeks, the hotline operation managed to provide helpful responses to nearly 900,000 inquiries about this new program.

1.5 CARS Computerized Systems for Dealer Registration and Transaction Processing

The only feasible way to process the anticipated 20,000 dealer registrations and up to 250,000 CARS transactions was to develop a computerized system capable of receiving data from dealers and making payments electronically to dealers for valid transactions. NHTSA had just 30 days to determine the system requirements, retain a software development contractor, work closely with the contractor to develop the system, test the system, and put it in operation. Deploying a secure, nation-wide transactional system in 30 calendar days was an unprecedented challenge. NHTSA entered into an interagency agreement with the Federal Aviation Administration's Enterprise Service Center (ESC) in Oklahoma City, which is responsible for processing payments to vendors across the Department of Transportation, for

assistance with the CARS program's financial aspects. ESC was working with the Oracle Corporation on implementation of software known as iSupplier, a commercial off-the-shelf (COTS) software designed for processing payments to vendors. NHTSA considered hiring a contractor to develop completely new software but quickly concluded that a customized application of the iSupplier software was the only viable option for having an operational system in so short a period.

Shortly after enactment of the CARS Act, NHTSA contracted with Oracle to modify the iSupplier software to incorporate legislatively mandated business rules and other managerial controls. Oracle provided the technical knowledge for development and implementation of the system components as well as the necessary infrastructure and hosting services for the CARS system. Adapting COTS software to the needs of a very complex program posed significant technical challenges, particularly given the aggressive time frame for development.

The new system included an electronic form into which dealers entered basic data about each transaction (e.g., the names of the dealer and purchaser, date of the purchase or lease, vehicle description and VIN for the trade-in and new vehicle, etc.). Because the system had to be developed so quickly, it could contain only very limited edit checks to screen out invalid entries (e.g., checking individuals' identification numbers to prevent participation by the same person more than once and checking for duplicate VINs). The backup data that dealers were required to submit to prove eligibility for the credit (e.g., vehicle titles, purchase and sale agreements) were in varying formats that could only be scanned into the system as attachments to the electronic application form and reviewed manually. Moreover, entire blocks of data (such as the consumer survey forms voluntarily submitted by purchasers and certification forms required to be submitted by salvage auctions and disposal facilities) could not be incorporated into the system. Instead, the disposal forms were emailed to NHTSA and later converted to usable form in a database. Similarly, the consumer survey forms, which had been scanned into the system as attachments to dealer submissions, had to be converted so that the data from them could be part of a database.

The system was ready on time to permit dealer registration to begin on July 24 and to receive the first transaction submissions from dealers on July 27. Following initial system launch, NHTSA encountered several technical issues with the tailored software and capacity-related deficiencies with the host environment. Unplanned system outages and periods of slowness occurred at various times throughout the program, causing frustration among dealers and disrupting NHTSA's ability to review submissions. In the period between July 24 and August 3, 2009, the outages and system slowness were especially pronounced. During this period dealers submitted nearly all of the transactions originally anticipated to occur over three months and there were substantially more concurrent users, including back-end processors, than originally anticipated. After NHTSA visited a dealership to observe firsthand the problems dealers were experiencing, Oracle made adjustments to the system that overcame some of the initial problems.

On August 7, Congress appropriated an additional \$2 billion in program funds, which tripled the potential volume with which the system would have to cope. Transactions continued to flow into the system at a very rapid pace. This enormous volume exposed system weaknesses that were both present in the tailored software and the underlying system architecture. NHTSA worked diligently with Oracle to rectify these technical issues to achieve satisfactory performance and system stability. Initially, there was uncertainty as to whether the fundamental cause was software problems or system capacity. By performing root cause analyses of the system problems, the software was tuned to remediate inherent software bugs, which improved transactional performance, and the underlying architecture was upgraded to accommodate the needed capacity to support both the dealer and transaction processor communities. As a result, system stability was achieved on August 28, after closing the system to submission of new transactions on August 25. The system's problems were magnified by the pace and volume of transactions, and the contractor needed to make frequent adjustments to both correct underlying problems and accommodate NHTSA's needs as necessary revisions to the transaction review process were made. Ultimately, however, the system provided a platform for the receipt and processing of more than 20,000 dealer registrations and some 690,000 transactions. The database now holds more than eight terabytes of information.

1.6 Review of Dealer Submissions by NHTSA and its Contractors

As the rule was being drafted and the software system developed, NHTSA was also seeking prospective contractors for the task of reviewing dealer submissions for the agency. NHTSA was mindful of the fact that section 1302(d)(2) of the CARS Act required the agency to establish procedures for reimbursement of dealers "no longer than 10 days after the submission of information supporting the eligible transaction, as deemed appropriate by the Secretary." The agency assumed at that time that the transactions would total from 220,000 to no more than 250,000 and would be submitted somewhat evenly over the period from the program's initiation through November 1. The agency's expectation that the transactions would extend over a considerable period of time and that participation may actually need to be encouraged was consistent with the Act's requirement to conduct a public awareness campaign to inform consumers about the program.⁸

With those assumptions, NHTSA developed a review process and hired one contractor⁹ (Citibank) to start reviewing transactions in time for receipt of the first submissions on July 27. In the program's first seven days, dealers entered more than 100,000 transactions into the system. On the ninth day alone, dealers created over 42,000 vouchers. Meanwhile, review of the earliest submissions revealed that dealers were generally not following the

⁸ In light of the program's instant and overwhelming popularity, NHTSA did not conduct a public awareness campaign.

⁹ NHTSA evaluated several potential contractors before selecting Citibank to process transactions. Because of the unusual and compelling urgency of the very short lead time mandated by Congress for implementing the program, however, NHTSA used other than full and open competition procedures to award contracts in the CARS program.

detailed requirements set out in the CARS rule. The contractor was rejecting more than 90 percent of the submissions for inadequate documentation. These things became exceedingly clear: the agency's capacity to review transactions had been overwhelmed by the unanticipated volume of submissions; dealers needed detailed instruction on how to submit proper applications; and the \$1 billion appropriation would be exhausted very soon.

Congress moved quickly to address the funding issue by appropriating an additional \$2 billion for the program on August 7. Thus, on just the twelfth day of the program, its anticipated transaction volume tripled and it was clear that the additional funds would not last very long. The pace of submissions slowed a bit after the infusion of new funds, but it was still several times greater than anticipated when NHTSA was designing the program in July.

NHTSA worked with Citibank to expand its workforce and began receiving bids from additional organizations. Building a workforce to address the enormous backlog that was developing took two to three weeks, since each new contract had to be negotiated and approved, the contractors had to recruit new workers, and NHTSA program personnel had to travel to several different parts of the country to train the new workers. NHTSA reviewed progress with each of the processing sites on a daily basis. NHTSA continuously improved the review process and workflow to increase its efficiency.

Meanwhile, NHTSA continued educating dealers on how to submit proper claims through frequent updates to its website and a series of webinars that provided detailed instructions and an opportunity for questions and answers. In all, NHTSA conducted 10 dealer webinars reaching thousands of dealers, starting on July 27, the day the system first opened for submissions, and continuing after the system closed for those dealers who had not gotten their submissions approved. NHTSA also provided advice to dealers through its hotline and a special helpdesk. NHTSA learned through these contacts that its reviewers were at times rejecting valid claims, and the agency worked to correct those problems in its review process.

By the time NHTSA closed the CARS system to new transactions on August 25, it had received a little over 690,000 submissions but still had 615,000 of those under review, having had to reject most of the early submissions due to dealer errors that would have to be corrected. However, by mid to late August NHTSA had already brought new contractors on line. It took some time for each new processing site to gain enough experience in this unique process to develop speed in its work. By the end of August, NHTSA was reviewing up to 30,000 transactions and approving up to 10,000 vouchers per day, and the approval rate was steadily climbing due to the education of the dealers and their greater success after repeated submissions.

By early September NHTSA assembled a transaction review workforce of more than 7,000 review personnel at 14 sites across the country. Citibank, the initial transaction review contractor, had processing sites in Delaware and Buffalo, New York. FAA and its Enterprise Service Center assigned personnel to the task primarily in Oklahoma City, but a group at FAA headquarters in Washington, D.C. also participated. The Internal Revenue Service

employed people in four cities (Austin, Atlanta, Fresno, and Kansas City) to review transactions. ACS, Inc. employed reviewers at sites in Kentucky and Utah. Vangent had processing sites in Virginia, Florida, and Kentucky. Finally, about 100 DOT employees from across the department (in addition to the FAA employees) worked as reviewers at DOT headquarters. In addition to posting trainers at each of the sites, NHTSA held daily conference calls with all of the sites to address workload distribution and process issues and ensure consistency in the handling of transactions. The system's throughput capacity peaked with over 90,000 approvals on a single day in early September. By September 24 (just 90 days from the signing of the CARS Act, 60 days after the issuance of the rule and opening of the CARS system, and 30 days after closing the system to new transactions), NHTSA had disposed of 99 percent of the submissions.

To ensure that every valid and timely submitted deal would ultimately be approved, NHTSA then started interacting with dealers one by one over the phone and through emails to ensure submission of supporting documentation on the last few thousand claims. NHTSA vastly cut back its contractor workforce and retained just two key sites to finish the work on the remaining claims. On November 1, NHTSA closed the dealer portal to the system.

However, because some dealers claimed that they were prevented from submitting their claims by the August 25 submission deadline due to problems created by NHTSA's system, the agency amended its rule to create an exceptions process. See 74 Fed. Reg. 49338 (Sept. 28, 2009). NHTSA received approximately 650 requests for reimbursement as part of this process and is close to completing its review of all of those requests.

NHTSA did not anticipate the volume of the initial demand on the CARS system or a tripling of the demand on that system just twelve days after it began as a result of additional appropriations. Nor did the agency anticipate that the statute's many requirements and those added by NHTSA's rule in order to help deter fraud would prove so difficult for many dealers to meet without repeated submissions. More than half of all the submissions had to be submitted and reviewed more than once, and tens of thousands of them took several iterations before approval was possible. Moreover, to ensure the integrity of the process, any transaction had to be reviewed by two different people in order to be approved for payment. In all, NHTSA conducted approximately two million transaction reviews in order to eventually approve 677,000 requests for payment.

Nevertheless, despite the many obstacles it faced and the unprecedented nature of this program, NHTSA managed to achieve an overall mean processing time of 16.9 days from the final submission (i.e., when all necessary documentation was included and errors corrected)¹⁰ of a transaction to the date of payment.

¹⁰ In light of the number of times the average claim had to be resubmitted before it was sufficiently documented to warrant approval, the average processing time was 30 days when measured from the initial submission date to payment. However, measuring processing time from the receipt of an acceptable claim (which, as noted in the text, was 16.9 days) is a more meaningful way to assess the efficiency of the review process.

1.7 Determining When and How to Close the CARS System

One overriding concern NHTSA faced from the beginning was how to ensure that dealers did not enter into the system more CARS transactions than the appropriated monies could provide credits for. By the time transactions were entered into the CARS system, the dealer and consumer had already completed a sales transaction, so the system itself was an inadequate predictor of future activity. The volume of transactions was so great and the pace so fast that it was quite possible that dealers and consumers could be greatly disappointed by the rapid exhaustion of funds. NHTSA hired a contractor to survey dealers in the second week of the program. The survey was the only predictive tool NHTSA had available to develop an estimate as to the appropriate date to close the system to new transactions. The survey data indicated the funds would be exhausted by the end of the program's second week, and NHTSA prepared to shut the program down. However, Congress added \$2 billion to the initial appropriation on August 7.

NHTSA continued to survey dealers because the rapid pace of transactions once again threatened quick depletion of the funds. The National Automobile Dealers Association presented NHTSA with its own projections indicating that the number of deals already entered into would exceed the appropriated funds. NHTSA attempted to achieve a "soft landing" in which it would close the program only when the appropriated funds were close to exhaustion but with sufficient warning that dealers and consumers could complete planned transactions before the system closed. NHTSA chose August 24 as the final date for transactions. When system availability problems occurred in days leading up to that date, NHTSA extended the date for final submission to August 25 but restricted submissions to those completed by August 24.

NHTSA paid \$2,853,416,000 in claims, leaving sufficient funds to cover the agency's administrative costs with some margin for error due to the difficulty in precisely estimating those costs.¹¹

1.8 Compliance Issues

NHTSA designed the CARS program with fraud deterrence as a major goal. The program restricted participation to licensed and franchised dealers and relied on manufacturers to identify those entities. The rule required dealers and consumers to sign certifications, under penalty of law, as to the veracity of all basic facts of the transaction relevant to the eligibility of the buyer, the trade-in vehicle, and the new vehicle. The rule required dealers to mark the trade-in vehicle's title with a unique "brand" identifying it as a junk automobile traded in under the CARS program and to disable the engine using a process NHTSA created just for this program. Salvage auctions and disposal facilities that received CARS vehicles were required to submit legally binding certifications and make timely notifications to NMVTIS to ensure trade-in vehicles were properly accounted for.

¹¹ Total value of vouchers for 677,842 paid transactions at time of writing.

On its website, in its rulemaking documents, and in webinars and meetings with dealers and recyclers, NHTSA stressed the penalties that it would impose against those who might violate the rule's provisions. The Department's Office of Inspector General (OIG) joined NHTSA in some of these webinars to help emphasize that certain types of violations could lead to criminal prosecution.

NHTSA's CARS office includes a compliance division made up of detailees and temporary employees at headquarters and in the field. At its peak, the division had 25 employees. After very quick training, these staff members provided a recognizable NHTSA field presence from the first week the program began. In the first few weeks of the program, these employees conducted over 1,000 inspections at dealerships, salvage auctions, and disposal facilities. Since then, they have investigated a number of complaints about possible violations and explored possible violations revealed by NHTSA's detailed review of the CARS data. In some cases, NHTSA has required that payments made to dealers be refunded to the government because the deals were ineligible. To date, refunds made by dealers, either because the dealer or NHTSA determined a transaction was not eligible, have totaled \$3.4 million. This group continues to work closely with NHTSA's Office of Chief Counsel and the OIG to investigate suspicious activities and take appropriate enforcement actions. In addition, the OIG has facilitated a cooperative working relationship with the Department of Homeland Security to help ensure that none of the CARS trade-in vehicles find their way to other countries for use as automobiles, which is statutorily prohibited. At this writing, no evidence of widespread fraud has been detected.

1.9 Audits of the CARS Program and NHTSA's Own Audits

In the law (Pub. L. No. 111-47) that added \$2 billion in additional appropriations to the CARS program, Congress directed the Department's OIG and the Government Accountability Office to review the implementation of the program and report to Congress within 180 days of the program's expiration on November 1. The OIG is assessing whether NHTSA's oversight and management controls ensure that CARS transactions meet Federal requirements, use data that are accurate and reliable, and protect against fraud and abuse. NHTSA has worked closely with both organizations to provide them with information they need for their audits of the program.

Meanwhile, NHTSA has conducted its own audit of transactions approved by its various contractors. In a study of 1,200 transactions, NHTSA estimated a reviewer's error rate of 2.42 percent. Most of those errors, however, could be and were readily corrected by the dealer's submission of additional information. A very small percentage (0.04%) appeared to have been paid in error because the underlying errors could not be cured. NHTSA has required the dealers to refund the credit amounts in those cases. As part of its compliance efforts, NHTSA continues to study the transaction data for evidence of possible fraud or incorrect payments and will take appropriate action if problems are found.

1.10 Remaining Tasks

NHTSA has several CARS-related tasks remaining. NHTSA is implementing a data quality plan to ensure that the CARS database is as free of error as practicable. For example, the data now include some anomalous VINs and other entries that should, if possible, be corrected to ensure that information in public databases concerning those VINs is fully accurate. The agency will need to ensure public access to program data for the indefinite future on the CARS website and must determine the most cost effective way to accomplish that. NHTSA will also have to preserve its own access to the voluminous documentation supporting CARS transactions for some time to come. This is necessary to facilitate compliance investigations and refunds of any improper payments detected in audits by NHTSA or other agencies. This will entail choosing appropriate storage and maintenance procedures.

NHTSA will not receive a database containing all of the certification forms submitted by salvage auctions and disposal facilities until early in 2010. The agency will need some time to review all of that data for discrepancies and possible indications of fraud.

Disposal facilities have several more months before they must crush or shred the trade-in vehicles they received under the CARS program. The original rule sets the deadline at 180 days from receipt of the trade-in vehicles by the disposal facility, and NHTSA has recently proposed to extend that deadline an additional 90 days. NHTSA will be carefully tracking the final disposition of these vehicles through the CARS Compliance Division.

In addition, that division and the Office of Chief Counsel will be working on investigations and compliance actions related to violations of the rule for at least several more months. The duration and volume of that activity depends on what violations are revealed by ongoing complaint investigations and data reviews.

2. Summary of CARS Transactions

In the United States, the on-road vehicle fleet includes 255 million¹² personal vehicles available for regular use:

- 57 percent are cars or station wagons,
- 21 percent are vans or SUVs, and
- 19 percent are light trucks.¹³

The CARS program attracted trade-ins of 677,842 vehicles or roughly 0.30 percent of the on-road fleet. Trade-ins were concentrated among light trucks, vans, and SUVs (LTVs).

¹² Department of Transportation, National Highway Transportation Statistics 2008

¹³ National Household Travel Survey, 2001-2002. Assumed proportional increase in vehicle type from 2002 to 2008.

Traded-in LTVs represent 0.50 percent of the on-road LTV fleet, while traded-in passenger cars account for only 0.07 percent of the on-road passenger car fleet. The 677,842 vehicle transactions generated State sales receipts totaling over \$15 billion (based on Manufacturer's Suggested Retail Price) with corresponding State sales tax revenue of approximately \$900 million.¹⁴ The total value of the rebates allocated during the program was \$2.85 billion.¹⁵ The average MSRP of vehicles purchased through the program was \$22,450.

On a per-capita basis, participation in the CARS program was highest across the Mid-Western States as well as several Northeastern and Atlantic seaboard States. Participation was notably lower in most Southern and some Western states.

The number of transactions, dollars worth of vouchers, per capita voucher dollars, gross sales based on MSRP, and number of CARS transactions by State is shown in Table 2.

¹⁴ Sales tax revenues are estimated from 2009 sales tax rates by State and do not include any local, franchise, gross receipt taxes or automotive sale specific taxes.

¹⁵ Based on 677,842 transactions at the time of writing.

Table 2: Dollars worth and number of transactions, dollars per capita, mean and total MSRP, and sales tax revenue by State

<i>State</i>	<i>Number of Paid Transactions</i>	<i>Total CARS Rebate Value</i>	<i>Rebate Dollars per capita</i>	<i>Mean MSRP</i>	<i>Total MSRP</i>	<i>Sales Tax¹⁶</i>
Alabama	7,385	\$30,890,500	\$6.63	\$23,003	\$169,878,380	\$6,795,135
Alaska	1,146	\$4,828,000	\$7.03	\$23,892	\$27,379,914	NA
Arizona	9,143	\$38,773,500	\$5.96	\$21,094	\$192,860,925	\$10,800,212
Arkansas	5,473	\$23,149,500	\$8.11	\$23,239	\$127,185,095	\$7,631,106
California	76,637	\$323,344,500	\$8.80	\$22,276	\$1,707,140,231	\$149,374,770
Colorado	8,718	\$36,982,000	\$7.49	\$23,009	\$200,593,623	\$5,817,215
Connecticut	9,175	\$38,703,500	\$11.05	\$22,732	\$208,562,939	\$12,513,776
Delaware	2,661	\$11,173,500	\$12.80	\$22,913	\$60,971,121	NA
District of Columbia	17	\$67,500	\$0.11	\$25,554	\$434,422	\$24,979
Florida	34,295	\$144,354,500	\$7.88	\$21,631	\$741,817,865	\$44,509,072
Georgia	16,616	\$69,687,000	\$7.19	\$22,615	\$375,770,775	\$15,030,831
Guam	153	\$653,500	\$3.66	\$24,149	\$3,694,735	\$147,789
Hawaii	1,716	\$7,212,000	\$5.60	\$21,647	\$37,146,055	\$1,485,842
Idaho	2,723	\$11,514,500	\$7.56	\$22,403	\$61,004,447	\$3,660,267
Illinois	33,986	\$142,336,000	\$11.03	\$22,682	\$770,860,027	\$48,178,752
Indiana	15,506	\$65,343,000	\$10.25	\$22,131	\$343,159,033	\$24,021,132
Iowa	8,896	\$37,393,000	\$12.45	\$22,848	\$203,257,360	\$12,195,442
Kansas	7,409	\$31,197,500	\$11.13	\$22,414	\$166,061,888	\$8,801,280
Kentucky	8,909	\$37,478,500	\$8.78	\$22,229	\$198,038,146	\$11,882,289
Louisiana	7,890	\$33,009,000	\$7.48	\$23,464	\$185,131,587	\$7,405,263
Maine	3,887	\$16,501,500	\$12.53	\$21,871	\$85,013,817	\$4,250,691
Maryland	17,678	\$74,317,000	\$13.19	\$22,999	\$406,569,303	\$24,394,158
Massachusetts	15,162	\$64,028,000	\$9.85	\$22,443	\$340,273,185	\$21,267,074
Michigan	31,249	\$130,514,500	\$13.05	\$22,622	\$706,906,174	\$42,414,370
Minnesota	17,099	\$72,320,500	\$13.85	\$22,441	\$383,719,227	\$26,380,697
Mississippi	2,928	\$12,277,000	\$4.18	\$22,630	\$66,259,221	\$4,638,145
Missouri	14,423	\$60,801,500	\$10.29	\$22,444	\$323,712,068	\$13,676,835
Montana	1,472	\$6,289,000	\$6.50	\$23,386	\$34,423,590	NA
N. Mariana Islands	7	\$30,500	\$0.34	\$21,725	\$152,077	NA
Nebraska	5,140	\$21,583,000	\$12.10	\$23,822	\$122,442,792	\$6,734,354
Nevada	3,361	\$14,226,500	\$5.47	\$21,574	\$72,510,776	\$4,966,988
New Hampshire	5,374	\$22,784,000	\$17.32	\$22,468	\$120,744,758	NA
New Jersey	24,562	\$102,497,000	\$11.80	\$23,143	\$568,445,476	\$39,791,183
New Mexico	3,230	\$13,649,000	\$6.88	\$22,581	\$72,935,889	NA
New York	36,811	\$154,632,500	\$7.93	\$22,514	\$828,745,365	\$33,149,815

¹⁶ Any local, franchise, gross receipt taxes or automotive sale specific taxes are not included.

<i>State</i>	<i>Number of Paid Transactions</i>	<i>Total CARS Rebate Value</i>	<i>Rebate Dollars per capita</i>	<i>Mean MSRP</i>	<i>Total MSRP</i>	<i>Sales Tax</i>
North Carolina	18,433	\$77,772,500	\$8.43	\$22,182	\$408,879,314	\$22,488,362
North Dakota	2,106	\$8,860,000	\$13.81	\$23,980	\$50,501,794	\$2,525,090
Ohio	32,148	\$135,250,000	\$11.78	\$22,005	\$707,410,580	\$49,518,741
Oklahoma	8,735	\$36,900,500	\$10.13	\$22,380	\$195,487,287	\$8,796,928
Oregon	8,644	\$36,718,000	\$9.69	\$21,745	\$187,959,901	NA
Pennsylvania	32,885	\$138,222,500	\$11.10	\$22,527	\$740,797,987	\$44,447,879
Puerto Rico	506	\$2,168,000	\$0.55	\$21,347	\$10,801,586	\$594,087
Rhode Island	2,518	\$10,600,000	\$10.09	\$21,912	\$55,174,525	\$3,862,217
South Carolina	8,815	\$36,870,500	\$8.23	\$22,654	\$199,691,081	\$11,981,465
South Dakota	2,440	\$10,274,000	\$12.78	\$23,656	\$57,719,536	\$2,308,781
Tennessee	11,947	\$50,432,500	\$8.11	\$22,261	\$265,953,035	\$18,616,712
Texas	43,011	\$181,328,500	\$7.45	\$22,615	\$972,677,834	\$60,792,365
Utah	5,605	\$23,781,500	\$8.69	\$21,518	\$120,609,694	\$5,728,960
Vermont	2,322	\$9,793,000	\$15.76	\$22,509	\$52,265,942	\$3,135,957
Virgin Islands	13	\$55,500	\$0.51	\$23,981	\$311,759	\$12,470
Virginia	23,587	\$99,226,500	\$12.77	\$22,550	\$531,895,022	\$34,573,176
Washington	13,078	\$55,342,000	\$8.45	\$22,043	\$288,275,268	\$17,296,516
West Virginia	3,157	\$13,354,500	\$7.36	\$21,613	\$68,232,520	\$3,411,626
Wisconsin	16,463	\$69,448,500	\$12.34	\$22,897	\$376,959,280	\$15,078,371
Wyoming	592	\$2,475,000	\$4.65	\$24,386	\$14,436,367	NA
Total/Average	677,842	\$2,853,416,000	\$9.25	\$22,453	\$15,219,842,600	\$897,109,167

NA – The following do not levy a State sales tax: Alaska, Delaware, Montana, the N. Mariana Islands, New Hampshire, New Mexico, Oregon, and Wyoming.

2.1 Description of Trade-in Vehicles

SUVs and light trucks (Category 1 and 2 trucks) comprised 85 percent of trade-in vehicles while passenger cars were 14 percent of the trade-in vehicles. The remaining 1 percent were Category 3 trucks. The trade-in vehicles by category are summarized in Table 3.

Table 3: Trade-In Vehicle by Category

<i>Category of Trade-in Vehicle</i>	<i>Number of Transactions</i>	<i>Share of Transactions (percent)</i>
Passenger Car	94,834	13.99
Category 1 Truck	446,323	65.84
Category 2 Truck	129,732	19.14
Category 3 Truck	6,953	1.03
Total	677,842	100.00

Source: NHTSA calculation

The average age of a trade-in vehicle was 14 years (median: 13), and the average odometer reading was 160,170 miles (median: 144,860). The trade-in vehicle by model year is presented in Table 4. The arithmetic mean of the combined EPA fuel economy rating for vehicles traded-in was 15.7 miles per gallon.¹⁷ The mean fuel economy by trade-in vehicle category is presented in Table 5.

Table 4: Trade-In Vehicle by Model Year

<i>Model Year of Trade-in Vehicle</i>	<i>Number of Transactions</i>	<i>Share of Transactions (percent)</i>
1984	1,839	0.27
1985	9,715	1.43
1986	10,799	1.59
1987	12,199	1.80
1988	18,572	2.74
1989	23,862	3.52
1990	24,028	3.54
1991	28,093	4.14
1992	32,267	4.76
1993	41,705	6.15
1994	57,195	8.44
1995	66,458	9.80
1996	61,488	9.07
1997	66,049	9.74
1998	65,929	9.73
1999	62,492	9.22
2000	43,799	6.46
2001	29,199	4.31
2002	16,105	2.38
2003	4,474	0.66
2004	1,230	0.18
2005	253	0.04
2006	53	0.01
2007	23	0.00
2008	16	0.00
<i>Total</i>	677,842	100.00

Source: NHTSA calculation

¹⁷ Average is calculated as the arithmetic mean for 673,195 transactions, excluding transactions where the miles per gallon had been entered as zero due to category 3 trucks or unknown vehicle model (0.69% of all transactions). Trade-in MPG range: 8 to 18 MPG. Vehicles over 18 MPG did not qualify.

Table 5: Trade-In Vehicle Fuel Economy by Vehicle Category¹⁸

<i>Category of Trade-in Vehicle</i>	<i>Trade-in Vehicle MPG (mean)</i>	<i>Trade-in Vehicle MPG (median)</i>
Passenger Car	17.7	18.0
Category 1 Truck	15.9	16.0
Category 2 Truck	14.1	14.0
<i>All Categories</i>	15.7	16.0

Source: NHTSA calculation

The frequency of trade-in vehicle aggregated by make for the 20 manufacturers most traded-in during the program is presented in Table 6. The frequency of all trade-in vehicles by make is summarized in Appendix B.

Table 6: Trade-In Vehicle by Make

<i>Make of Trade-in Vehicle</i>	<i>Number of Transactions</i>	<i>Share of Total Transactions (percent)</i>
Ford	195,644	28.86
Chevrolet	118,711	17.51
Dodge	74,114	10.93
Jeep	63,421	9.36
GMC	34,537	5.10
Mercury	24,206	3.57
Nissan	23,010	3.39
Toyota	17,672	2.61
Cadillac	17,307	2.55
Isuzu	13,207	1.95
Lincoln	11,774	1.74
Chrysler	11,238	1.66
Plymouth	10,734	1.58
Mazda	7,961	1.17
Oldsmobile	7,284	1.07
Mercedes-Benz	5,220	0.77
Mitsubishi	5,036	0.74
Lexus	4,454	0.66
BMW	3,521	0.52
Pontiac	3,461	0.51
Other	25,330	3.74
<i>Total</i>	677,842	100.00

Source: NHTSA calculation

¹⁸ Calculated with an arithmetic mean. Category 3 trucks do not have an MPG rating.

2.2 Description of New Vehicles

To qualify, new vehicles purchased under the program must have had a Manufacturer's Suggested Retail Price (MSRP) of less than \$45,000. The average MSRP was \$22,450 (median: \$21,745) with sales totaling \$15.2 billion. Purchased vehicles comprised 99 percent of transactions, and leases with a term of at least 5 years made up the remaining transactions. Approximately 49 percent of the vehicles were manufactured domestically.¹⁹ Passenger cars represent 59 percent of the new vehicles; 41 percent are SUVs and trucks (Category 1, 2 and 3 trucks). The CARS Act stated no more than 7.5 percent of the appropriated funds could be used for credits for Category 3 trucks; as shown below, those trucks accounted for less than one percent of vehicle sales. The new vehicles by category are summarized in Table 7.

Table 7: New Vehicle by Category

<i>Category of New Vehicle</i>	<i>Number of Transactions</i>	<i>Share of Transactions (percent)</i>
Passenger Car	401,274	59.20
Category 1 Truck	225,985	33.34
Category 2 Truck	48,617	7.17
Category 3 Truck	1,966	0.29
<i>Total</i>	677,842	100.00

Source: NHTSA calculation

Most of the new vehicles purchased were model year 2009. The new vehicles by model year are summarized in Table 8.

Table 8: New Vehicle Transactions by Model Year

<i>Model Year of New Vehicle</i>	<i>Number of Transactions</i>	<i>Share of Transactions (percent)</i>
2007	1,024	0.15
2008	7,981	1.18
2009	510,196	75.27
2010	158,641	23.40
<i>Total</i>	677,842	100.00

Source: NHTSA calculation

The majority of new vehicles were passenger cars, comprising 59 percent of all the vehicles purchased under the CARS program. The average new vehicle purchased had an EPA combined fuel economy of 28.0 mpg for passenger cars, 21.4 mpg for Category 1 trucks, and 16.2 mpg for Category 2 trucks. The mean combined fuel economy ratings of new vehicles are summarized in Table 9.

¹⁹ Manufacturing origin is determined by the VIN, which had been entered for each trade-in and new vehicle via the CARS database.

Table 9: New Vehicle Fuel Economy by Vehicle Category²⁰

<i>Category of New Vehicle</i>	<i>New Vehicle MPG (mean)</i>	<i>New Vehicle MPG (median)</i>
Passenger Car	28.0	27.0
Category 1 Truck	21.4	21.0
Category 2 Truck	16.2	16.0
<i>All Categories</i>	24.9	25.0

Source: NHTSA calculation

All new vehicles purchased under the CARS program by make are presented in Table 10. The frequency of new vehicles by make is shown in Appendix C.

Table 10: New Vehicle Transactions by Make

<i>Make of New Vehicle</i>	<i>Number of Transactions</i>	<i>Share of New Vehicles</i>
Toyota	120,507	17.78
Ford	90,135	13.30
Honda	87,585	12.92
Chevrolet	86,354	12.74
Nissan	58,700	8.66
Hyundai	48,780	7.20
Kia	28,974	4.27
Dodge	24,119	3.56
Subaru	16,816	2.48
Pontiac	16,644	2.46
Mazda	16,144	2.38
Volkswagen	12,418	1.83
Jeep	11,211	1.65
GMC	9,704	1.43
Chrysler	9,033	1.33
Scion	7,851	1.16
Mercury	6,626	0.98
Saturn	5,334	0.79
Suzuki	3,707	0.55
Lexus	3,663	0.54
Other	13,537	2.00
<i>Total</i>	677,842	100.00

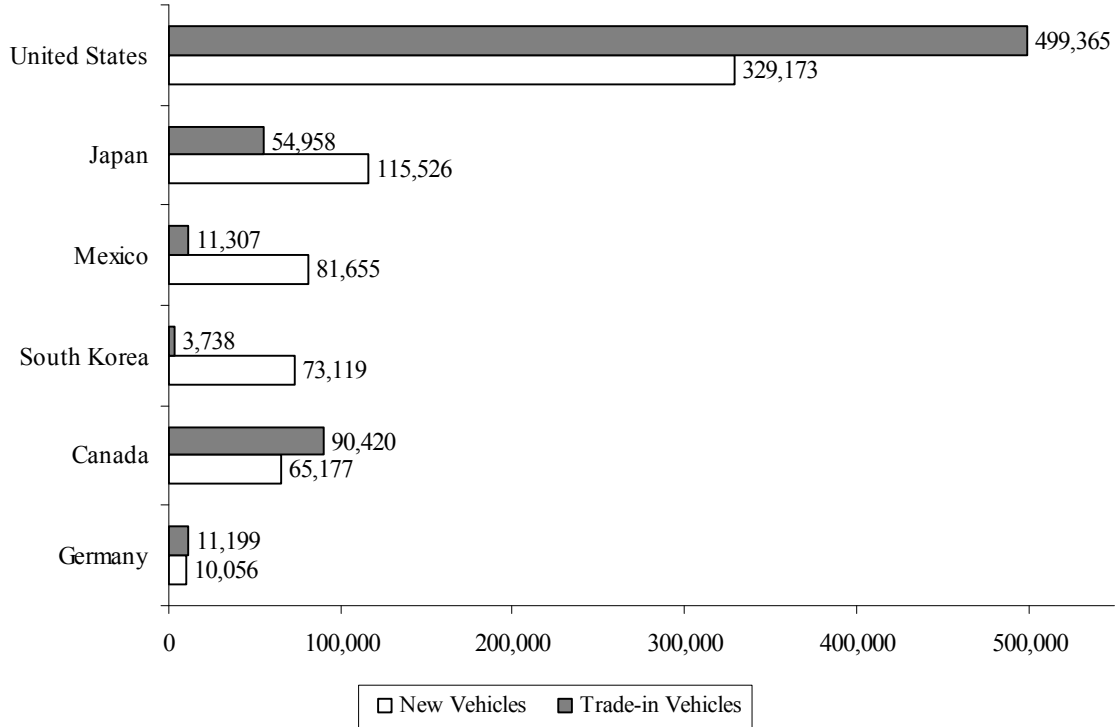
Source: NHTSA calculation

2.3 New Vehicles Compared to Trade-in Vehicles

Domestic manufacturing represented 49 percent of sales under the program. The exchange of trade-in vehicles for new vehicles by manufacturing origin is summarized in Figure 1.²¹

²⁰ Calculated as the arithmetic mean. Category 3 trucks do not have an MPG rating.

Figure 1: Manufacturing Origin of New and Trade-in Vehicles



Source: NHTSA calculation

There were 322,872 SUVs and light trucks (Category 1 and 2) traded-in for passenger vehicles, and 6,780 Category 3 trucks (1.0 percent of all transactions) traded-in for Category 2 and 3 trucks.²² The exchange of trade-in vehicles to new vehicles by category is summarized in Table 11.

²¹ Manufacturing origin is derived from the first character of the VIN. The manufacturing origin of new vehicles not included in Figure 1: 1,836 Asia (not including Korea, Japan and China), 1,201 Europe (not including Germany), 69 Africa, 17 China, 11 Australia (including New Zealand), 2 Brazil.

Table 11: All Transactions by Vehicle Category²³

<i>Category of Trade-in Vehicle</i>	<i>Category of New Vehicle</i>				<i>Total</i>
	<i>Passenger Car</i>	<i>Category 1 Truck</i>	<i>Category 2 Truck</i>	<i>Category 3 Truck</i>	
Passenger Car	78,402	16,412	-	-	94,814
Category 1 Truck	270,038	175,281	-	-	445,319
Category 2 Truck	52,746	34,207	42,733	-	129,686
Category 3 Truck	-	-	4,895	1,885	6,780
<i>Total</i>	401,186	225,900	47,628	1,885	676,599

Source: NHTSA calculation

The fuel efficiency of trade-in vehicles averaged 15.7 miles per gallon (MPG) and new vehicles averaged 24.9 miles per gallon. The average increase in fuel economy by category is summarized in Table 12. Category 3 trucks do not have an EPA fuel economy rating.²⁴

Table 12: Average Difference in Fuel Economy by Vehicle Category

<i>Category of New Vehicle</i>	<i>Trade-in Vehicle MPG (mean)</i>	<i>New Vehicle MPG (mean)</i>	<i>Difference in MPG (mean)</i>
Passenger Car	17.7	28.0	10.3
Category 1 Truck	15.9	21.4	5.5
Category 2 Truck	14.1	16.2	2.1
<i>All Categories</i>	15.7	24.9	9.2

Source: NHTSA calculation

Hybrid car sales experienced a year over year increase of almost 50 percent in August 2009, although fuel prices were significantly higher in 2008.²⁵ The July hybrid market share was 3.55 percent, a record high in the U.S. as hybrids account for slightly more than 4 percent of CARS program transactions.²⁶ About 78 percent of those purchasing a hybrid were trading-in a truck or SUV.

3. CARS Consumer Survey Data

While vehicle sales increased significantly during the period of the CARS program, not all sales can be attributed to the program. Some level of normal sales and some trade-ins of vehicles with a trade-in value less than or equal to \$4,500 would have occurred regardless of the existence of the CARS program. Data obtained from the consumer survey is used to estimate the number of vehicles, which would have been sold or leased (as part of a trade-in transaction), in the absence of the program.

²³ There are 1,243 transactions (0.18% of 677,842), which have been removed from the table due to improper categorization by the dealer. The agency continues to work on improving the data quality to ensure that these are data entry errors and not improper payments.

²⁴ Category 3 trades are subject to size requirements, i.e. the new vehicle must have an equal or lesser GVWR.

²⁵ <http://hybridreview.blogspot.com/2009/09/hybrid-car-sales-august-2009.html>

²⁶ <http://www.hybridcars.com/news/cash-clunkers-fuel-economy-boost-25956.html>

The CARS consumer survey was voluntary and did not affect the consumers' eligibility for the program (see Appendix A for a copy of the survey). The response rate was 27 percent where the rejection rate is unknown since it appears not all dealers consistently offered the survey to consumers. There are a total of 143,998 valid survey forms of the 185,342 submitted due to incomplete, incorrect or duplicate forms. Those who indicated in the survey that they would not have replaced their vehicle (about 35 percent) are not included in the subsequent analyses of survey data since there is no alternate vehicle purchased in the absence of the CARS scenario with which to compare their actual purchase in the CARS program. Excluding these transactions, and those with unknown vehicle classification either the trade-in or new vehicle, the sample size is reduced to 88,286 for the analysis of the environmental and fuel impacts.

Question 1 of the consumer survey indicates the number of years the consumer would have delayed the resale or trade of the trade-in vehicle. At the start of the program, dealers had large inventories of unsold vehicles, and accelerating the purchase of those vehicles was a primary goal of the CARS program. If a consumer was encouraged to purchase or lease a vehicle much earlier than they would otherwise have done, then there is a greater benefit to the manufacturer and dealer, and therefore, the overall program. The further into the future a consumer would have waited to purchase a vehicle, the more beneficial the program has been to manufacturers and dealerships. If the consumer indicates in Question 1 that they would have purchased a vehicle this month without the incentive, then the sale is not included in the number of vehicles sold as a result of the program.

In Question 2, the consumer is asked to identify which type of vehicle they would have chosen in the absence of the incentive (the "hypothetical baseline vehicle"). If the consumer would have purchased or leased the same type of vehicle then the incentive had no determinable impact on consumer choice. If the incentive motivated the consumer to purchase or lease a more fuel-efficient vehicle, then the program would be beneficial in terms of decreasing fuel consumption and pollution. If the consumer indicates that they would have purchased a used vehicle, then the average fuel economy based on vehicle type is substituted into the equation. These data will also indicate whether the more fuel-efficient cars were purchased or leased out of preference or due to the incentive.

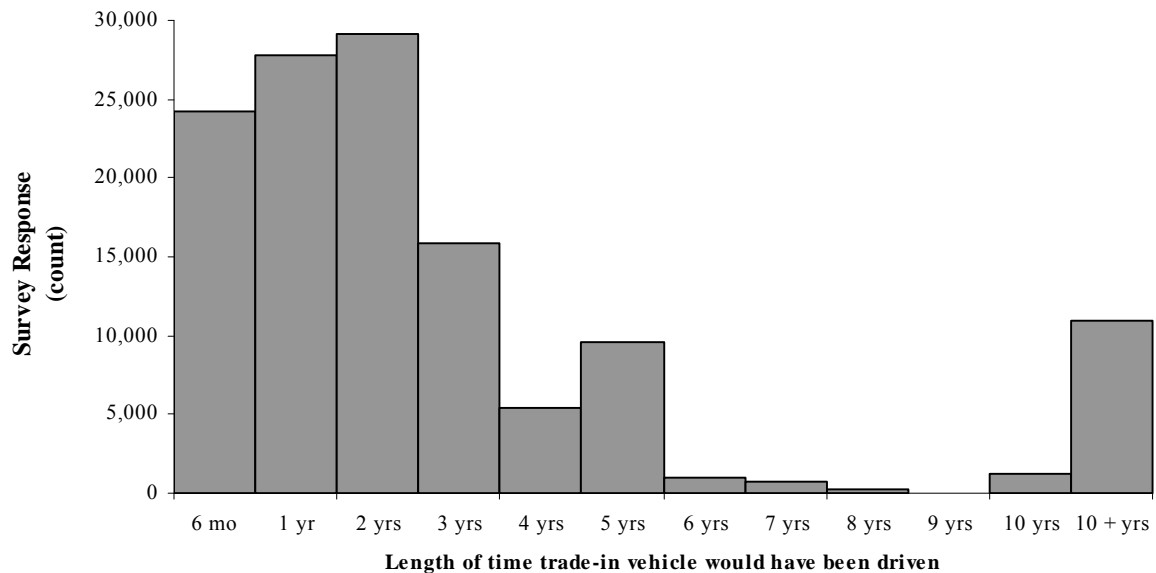
In Question 3, the consumer provides an estimate of the miles driven in the past twelve (12) months. The number of miles driven in the past year provides information about the type of car the trade in represented to the consumer; a primary vehicle (e.g. to commute to work) or a rarely used vehicle. Replacing more frequently driven vehicles will have a larger benefit to the program. Annual mileage will also assist the agency in determining the remaining useful life of the trade-in vehicle.

3.1 Survey Results

Of the consumer surveys submitted, 88 percent indicated the main incentive for purchasing a vehicle in the current month was the CARS program. This correlates to roughly 597,950

sales due to the CARS Act. Of those who indicated they would have sold, traded-in or disposed of their trade-in vehicle in a future period, the average time was 2.87 years with the most frequent time selected as 2 years. The distribution of responses to Question 1 is presented in Figure 2. The period indicated on the survey correlates to the length of time that the program may have accelerated future sales. For example, if the consumer indicated that the trade-in vehicle would not have been replaced for 5 years then the sale has drawn forward from 5 years in the future. This also represents the period for which fuel consumption and environmental benefits have advanced due to CARS.

Figure 2: Time that Vehicle Sale Advanced²⁷



Source: CARS Consumer Survey

In Question 2, 35 percent of consumers indicated that they would have purchased a used vehicle if the CARS incentive had not been offered. Another 35 percent indicated they would not have replaced their vehicle with another vehicle. The remaining 30 percent responded that they would have purchased a new vehicle without the CARS incentive in the time period consistent with the response in Question 1. Roughly, 23 percent would have chosen a larger vehicle in the absence of the program.²⁸ Twenty-nine (29) percent indicated they would have purchased the same vehicle type without the CARS incentive. The

²⁷ The first time period in which they could have indicated trading-in their vehicle in the absence of the program is 'Within the next year', where the agency has assumed a mid-point here of 6 months for the purpose of calculations to follow.

²⁸ This includes those who purchased passenger cars who would have otherwise purchased either larger passenger cars or large LTVs and those who purchased an LTV, but would have otherwise chosen a larger LTV.

comparison of the survey responses from Question 2 of the hypothetical baseline vehicle type to the vehicle actually purchased is summarized in Table 13.

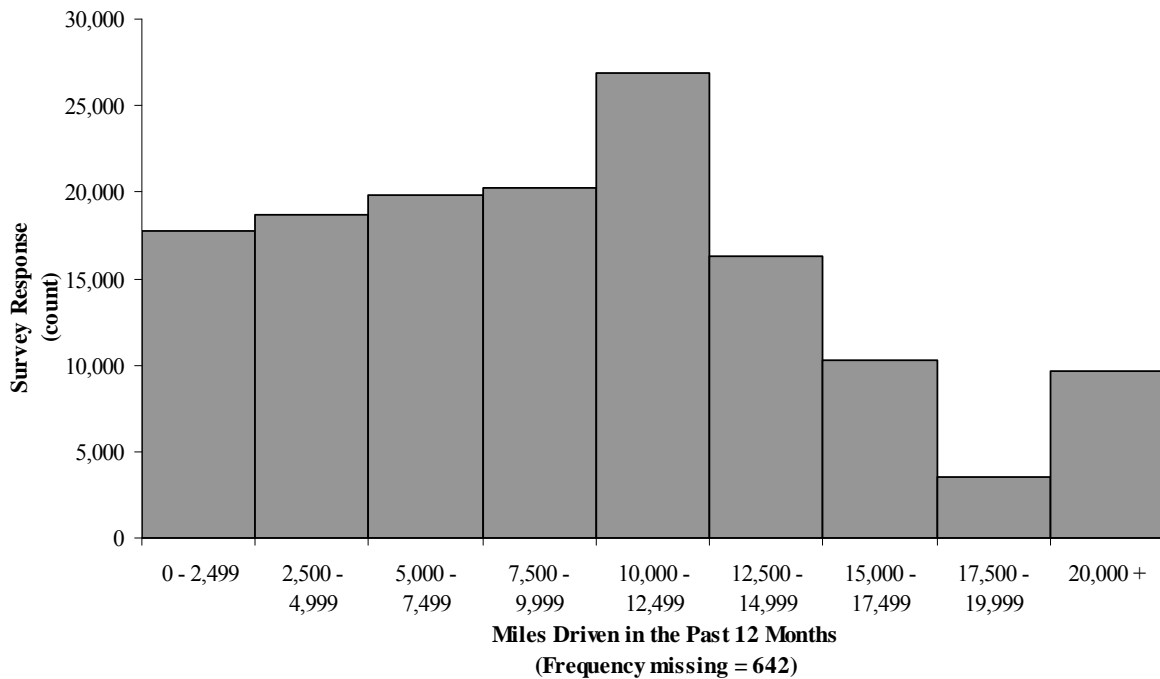
Table 13: Hypothetical Baseline Vehicle versus Purchased Vehicle

	<i>Hypothetical Baseline Vehicle</i>	<i>Vehicle Purchased with CARS incentive</i>
Subcompact car	5.40%	10.68%
Compact car	20.44%	23.05%
Mid-sized car	21.35%	21.64%
Large car	1.66%	4.14%
Small SUV	18.05%	20.53%
Mid-sized SUV	10.15%	4.52%
Large SUV	1.32%	2.05%
Small pickup	4.29%	2.25%
Mid-sized pickup	4.18%	2.83%
Large pickup	8.28%	5.16%
Full sized passenger van	0.47%	0.01%
Full sized cargo van	0.39%	0.09%
Minivan	4.01%	3.04%
<i>Total</i>	100.00%	100.00%

Source: CARS Consumer Survey

Question 3 asks the consumer to provide an estimate of the number of miles the trade-in vehicle was driven in the past year. The number of miles driven in the past twelve months is reported categorically thus, the median mileage of each category is used in the analysis. The mean value response to Question 3 was 9,412 miles. The most frequently selected range of vehicle miles traveled in the past 12 months is between 10,000 and 12,499. This would seem to indicate that many trade-in vehicles functioned as primary vehicles. The frequency of responses to Question 3, trade-in miles driven in the past twelve months, are shown in Figure 3.

Figure 3: Trade-in Vehicle Miles Driven in the Past 12 Months



Source: CARS Consumer Survey

Dealers that provided the consumer with the option to complete the survey probably felt more confident in the sale or had otherwise had a mutual, positive interaction with the consumer, and the survey respondents are likely to be more agreeable. The agency has analyzed the survey respondents compared to non-respondents on the basis of location, MSRP, odometer reading, trade-in vehicle age, rebate amount, and new vehicle mpg. The mean MSRP of a survey respondent: \$22,303 (non-respondent: \$22,493), the mean rebate of a respondent \$4,218 (non-respondent: \$4,207), mean combined EPA fuel economy rating of new vehicle, respondent: 24.9 mpg (non-respondent: 24.9 mpg), the mean odometer reading of the trade-in vehicles for a respondent 159,071 miles (non-respondent: 160,460 miles), and the mean age of trade-in vehicle 13.9 years (non-respondent: 13.8 years). The survey data did not appear to have any consistent regional patterns. The size of any potential sources of bias is indeterminable. However, from the comparison of survey respondents and non-respondents on the characteristics identified above, the survey data should provide reasonable indicators about the average CARS program participant.

4. Economic Effects

The CARS program most notably affected three industries: light vehicle manufacturing, new car dealers, and the salvage yard, auction and vehicle recycling industry. Business was also generated in industries related to the manufacturing and distribution of new vehicles such as steel, aluminum, rubber, plastic and part production, trucking, and numerous other sectors.

Economic indicators show improvement in part due to the program. Seasonally adjusted retail sales for all goods in August of 2009 increased by 2.8 percent over July, but only increased 1.0 percent when motor vehicles and parts are excluded. This indicates that a significant part of the August sales increase is attributable to the CARS program.²⁹ The U.S. Census Bureau reported an increase in motor vehicle and parts dealers' sales of 10.2 percent for August compared with July³⁰ (seasonally adjusted). IHS Global Insight estimated that the program helped to increase consumer spending up to 2.9 percent in the third quarter.³¹ Excluding new vehicle sales, Global Insight estimated that spending rose 1.8 percent for the quarter.

4.1 Micro-Economic Effects

Manufacturers

Vehicle sales during the program totaled 677,842 transactions with 15 percent of the sales occurring in July and 85 percent in August. Seasonally adjusted, vehicle sales in August 2009 increased by 43 percent over those in June, the last pre-CARS month. By contrast, in 2008 the seasonally adjusted annual rate of sales increased only 5 percent in August above the June level. In September, the auto industry experienced a 23 percent decline in vehicle sales volume from the previous year (unadjusted), but in October, sales rebounded to 2008 levels. Seasonally adjusted, sales fell 22 percent in September from the previous year, but increased by 3 percent in October. The sales volume (in number of vehicles) by month is presented in Table 14 and the corresponding seasonally adjusted annual rate (SAAR) in Table 15.

Table 14: U.S. Car and Light Truck Sales Volume (Vehicles)

	<i>May</i>	<i>June</i>	<i>July</i>	<i>August</i>	<i>Sept</i>	<i>Oct.</i>
2008	1,397,360	1,189,518	1,136,539	1,249,976	965,160	838,592
2009	926,130	860,101	998,062	1,262,189	746,206	838,233

Source: AutoNews.com

Table 15: Monthly Seasonally Adjusted Annual Rate of Sales (Vehicles)

	<i>May</i>	<i>June</i>	<i>July</i>	<i>August</i>	<i>Sept</i>	<i>Oct.</i>
2008	15,058,297	13,072,275	12,798,863	13,873,208	12,232,700	10,919,167
2009	9,905,134	9,546,071	11,114,276	13,689,685	9,505,809	11,236,367
Change (Year-over-Year)	-34%	-27%	-13%	-1%	-22%	3%

Source: AutoNews.com

²⁹ U.S. Department of Commerce, Available at: http://www.census.gov/retail/mrts/historic_releases.html

³⁰ Ibid.

³¹ IHS Global Insight, *U.S. Executive Summary* October 2009

Dealerships

The average participating dealership sold over 35 vehicles with an average base MSRP of \$22,450 (median: \$21,795) under the program.³² The total value of all CARS transactions calculated from base MSRP data is \$15.2 billion. The frequency of transactions and average MSRP by dealership location (State) are listed in Table 2. The available MSRP data does not include any optional accessories, optional equipment, or destination charges, and thus underestimates the actual value of the sale to the manufacturer and dealership. Due to the compensation structure at car dealerships, the employment effects are difficult to measure. Employment impacts at dealerships, if any, can only be viewed as positive. Some dealerships reported increased showroom traffic and even benefited from the increased attention to vehicle sales by having "clunker"-type promotions.

Salvage Yards/Auctions

The CARS Act allowed for the recycling and resale of parts from the trade-in vehicles with the exception of the engine and drive train, as those were required to be crushed within 180 days.³³ NHTSA estimates that salvage yards and auctions purchased the trade-in vehicles for negligible amounts ranging from \$50 to \$125, with an estimated total of \$34 to \$85 million in total transactions. Since salvage yards are willing to pay that amount for the vehicles, they foresee additional profits that exceed the stated range.

Information about each vehicle crushed by a salvage yard is required to be sent to the National Motor Vehicle Title Information System (NMVTIS) where the vehicle's title is branded in the database and cannot be resold. There is a \$1 fee for entering vehicle information into NMVTIS for salvage yards. There are also recordkeeping costs incurred by the salvage yards, as they are required to maintain records for five calendar years from the date when the vehicle was acquired by the facility. Salvage yards will also have some time expended due to the agency spot-checking salvage yards to confirm proper disposal of vehicles.

A vehicle's engine comprises 30 approximately percent of a vehicle's scrap value; thus, salvage yards experienced some loss in terms of the value of parts that would normally be available for resale when vehicles are scrapped. Although the engines from CARS program trade-in vehicles could be recycled as scrap metal once crushed, they would have had more value to scrap yards as an operable engine.

³² Based on 21,208 dealerships in the CARS database.

³³ At this writing, there is a proposed rule to extend this period by 90 days.

4.2 Macro-Economic Effects

4.2.1 Employment Impacts

The Council of Economic Advisers (CEA) estimates that \$92,000 of direct government spending creates one job-year.³⁴ Under this assumption, the \$2.85 billion direct expenditures from the CARS program would create an estimated 30,980 job-years. Thirty thousand nine hundred eighty (30,980) job-years annualized over just the third and fourth quarters of 2009 implies approximately 61,960 jobs created or saved during the second half of 2009.

According to CEA, sixty-four (64) percent of the job-years represent direct and indirect employment effects or 39,650 jobs. This includes jobs directly related to the production, assembly, distribution, and sale of the vehicles, including jobs at suppliers who make parts or materials that are used in the vehicle's production. Thirty-six (36) percent, or 22,300 jobs, of the job-years are induced effects, which result from increases in income resulting from direct government spending that stimulate further job creation. The estimate of 61,960 job-years created or saved is comparable to the Council of Economic Advisers (CEA) baseline estimate of 70,000 job-years created or saved by the CARS program during the second half of 2009.³⁵

In order to estimate potential job creation from increased sales, NHTSA examined recent U.S. employment (original equipment manufacturers and suppliers) and U.S. production. Total employment in 2000 reached a peak in the Motor Vehicle and Parts Manufacturing sector of the economy averaging 1,313,600 workers. Since then there has been a steady decline to 1,070,000 in 2006 and more rapid decreases in 2007, 2008, and 2009.

Employment in 2008 was about two-thirds of the 2000 level and in the first six months of 2009 employment was around 680,000, averaging about one-half of the peak in the year 2000. Table 16 shows how many vehicles are produced by the average worker in light vehicle production. Averaging the information shown for 2000-2008, the average U.S. domestic employee produces 11.3 vehicles (the same number as in 2008).

³⁴ This is the standard rule that agencies have been advised to use by the Council of Economic Advisers (CEA) due to its simplicity and conservatism when estimating employment effects of ARRA (American Recovery and Reinvestment Act) legislation. An alternate method follows this calculation in the text.

³⁵ Executive Office of the President Council of Economic Advisers, Economic Analysis of the Car Allowance Rebate System (CARS). September 10, 2009

Table 16: U.S. Light Vehicle Production and Employment

	<i>U.S. Light Vehicle Production</i>	<i>Motor Vehicles and Parts Manufacturing (U.S. employment)</i>	<i>Production per Employee</i>	<i>Change in Vehicles Produced/Change in Employment</i>
2000	12,773,714	1,313,600	9.7	
2002	13,568,385	1,151,200	11.8	-4.9
2004	13,527,309	1,112,800	12.2	1.1
2006	12,855,845	1,070,000	12.0	15.7
2008	9,870,473	876,900	11.3	15.5
<i>Total/Average</i>	62,595,726	5,524,500	11.3	

Source: NHTSA Calculation, U.S Bureau of Labor Statistics data

However, overall production per employee is not necessarily a good basis for estimating the employment impacts of shifts in vehicle sales. Many jobs are relatively insensitive to fluctuations in production. For example, production facilities must be managed and maintained regardless of production levels. A better estimate of the impact on jobs can be derived by examining the actual change in employment that accompanied recent shifts in production. Column 5 in Table 16 lists the ratio of the change in vehicle production to the change in employment. The dramatic sales loss of nearly 3 million vehicles that occurred in 2008 was accompanied by an employment loss of 193,000 jobs, or roughly one job loss for every 15.5 vehicles not produced.³⁶ A similar ratio occurred in 2006 when sales dropped by 670,000 vehicles. These recent data may be the best indicator of the current sensitivity of employment levels in the motor vehicle industry to large changes in production. Based on the number of vehicles attributed to CARS as indicated by the survey data (597,950), the direct employment impact is estimated to be 38,600 jobs created in the motor vehicle and parts manufacturing industry.³⁷ This does not include indirect jobs that may be impacted in supplier industries such as steel, glass, and rubber. As noted above CEA estimates that direct and indirect employment is 64 percent of the total employment impact while induced employment is 36 percent. Assuming that the induced employment ratio is similar for direct and indirect employment, total employment impacts associated with direct employment are estimated to be 60,300 jobs created including both direct employment and the induced employment associated with direct employment. The agency does not have data to indicate the portion of indirect jobs related to the auto industry. For highway construction, they tend to be about half as many as direct employment. If this ratio were applied to the CARS program, then this method would imply total job creation of roughly 90,000 jobs. Thus, it

³⁶ However, note that between 2000 and 2002 employment actually declined while production increased. Increased productivity may thus account for some of this decline.

³⁷ The Consumer Survey data indicates that roughly 600,000 vehicle sales were advanced to the present month due to the CARS Program incentive (677,842 times the 88 percent who indicated 'No, I would not have traded-in a vehicle this month without the incentive' is approximately 597,950 sales). 597,950 vehicle sales /15.5 sales per employee = 38,577 jobs created.

appears that, under either method of estimation, at least 60,000 jobs were created or saved by the CARS program.

The share of new vehicles purchased and leased during the CARS program manufactured domestically is 49 percent. Domestic production of durable goods aids in reducing the trade-deficit and maintaining or creating employment. Domestic production of CARS vehicles is summarized in Figure 1. The U.S. assembled the greatest share of vehicles sold under the CARS program. The fraction of CARS replacement vehicles manufactured in the U.S. was smaller than the corresponding share of vehicles traded-in under the program, due to vehicle manufacturing growth in Mexico, Korea and Japan.

The longevity of the program's employment impacts is uncertain. While hiring of both dealer sales personnel and manufacturer production staff would be likely responses to the sales spike that resulted from CARS, it is not clear whether added jobs created by this activity will be temporary or permanent. This will be a function of the ability of the economy to sustain or regain sales levels that would continue to support hiring of added personnel. Data indicate that sales dropped significantly in the month after the program ended (September 2009), but they returned to more normal levels the following month. It is uncertain whether the October pattern will hold, or whether it will be enough to sustain continued employment levels for employment increases attributable to the CARS stimulus. However, it should be remembered that current production levels have been greatly reduced by the recession, and that at some point, as the economy recovers, production is likely to return to the higher "natural" level, required to replace vehicles retired from the domestic fleet and to sustain normal growth in overall size. Employment created by the CARS program can thus be viewed as an accelerated restoration of jobs lost due to the recession.

4.2.2 Economic Impacts

Vehicles Sold and Contribution to GDP

Some share of new vehicles purchased under the CARS program represent trade-in sales that would have occurred normally during the respective period. The Consumer Survey indicated that 12 percent of new car purchases would have occurred during the same month even in the absence of the program, while another 20 percent or 60,000 sales represent accelerated sales that would otherwise have occurred within the next six months. Assuming that the normal rate of "clunker" type trade-ins occurs at 100,000 per month,³⁸ total sales over July and August are sales that would have occurred normally totals about 200,000. Additionally, there may have been sales held back from earlier months due to the consumers' anticipation of receiving sales incentives from the CARS program, which was signed into law on June 24.

The sales pulled forward from future months can be estimated directly from the survey data. About 20 percent of survey respondents indicated that they would have purchased a vehicle

³⁸ Executive Office of the President, Council of Economic Advisers. *Economic Analysis of the Car Allowance Rebate System (CARS)*. September 10, 2009.

within the next six months. This is about 60,000 sales pulled forward for the six months following the program (roughly September 2009 through February 2010). Netting out the resulting loss from the next six months, the CARS induced sales increase is approximately 346,000.³⁹ Within two years, more than half of the impacts of CARS pulled-forward sales will be experienced; the remaining impacts tapering off around six years.

The following impacts on GDP are estimated based on methods described by the Council for Economic Advisers, using updated figures from the CARS database.⁴⁰ The basic inputs for this estimate are:

- (1) The 329,143 vehicles sold under the CARS program that were assembled in the U.S. (48.6% of total sales) and the 348,669 imported vehicles sold under the program (51.4% of total sales).
- (2) The price of the typical vehicle purchased under the CARS program (domestic: \$23,453, foreign: \$21,510).
- (3) The domestic content of domestically assembled light motor vehicles (0.85, according to an estimate provided by the Bureau of Economic Analysis (BEA)).
- (4) The domestic value added associated with the distribution and sale in the United States of a foreign-produced light vehicle (about 0.16, according to estimates by the CEA).

The direct contribution to GDP is estimated as follows:

$$P_d * D_d * S_d + P_i * D_i * S_i$$

Where:

P_d = average price of domestic vehicles sold under CARS program

D_d = average domestic content of vehicles assembled in U.S.

S_d = number of domestically-assembled vehicles sold under CARS program

P_i = average price of imported vehicles sold under CARS program

D_i = average domestic content of imported vehicles

S_i = number of imported vehicles sold under CARS program

The estimated immediate gross impact on GDP of all transactions is thus $(\$23,453 * 0.85 * 329,173) + (\$21,510 * 0.16 * 348,669) = \$7,762,059,444$, or \$7.8 billion from the sales of the entire CARS fleet.

³⁹ Over the next full year, according to survey responses, the total sales pulled forward sales due to CARS amounts to roughly 176,000 vehicles.

⁴⁰ Ibid.

Responses from the consumer survey indicate that 88 percent of consumers would not have traded-in their vehicle until a later time period without the CARS incentive. The total immediate impact on GDP from CARS program transactions that would not have occurred without the program would thus be roughly \$6.8 billion.⁴¹ This includes the impacts of all sales that have been pulled forward from future years.

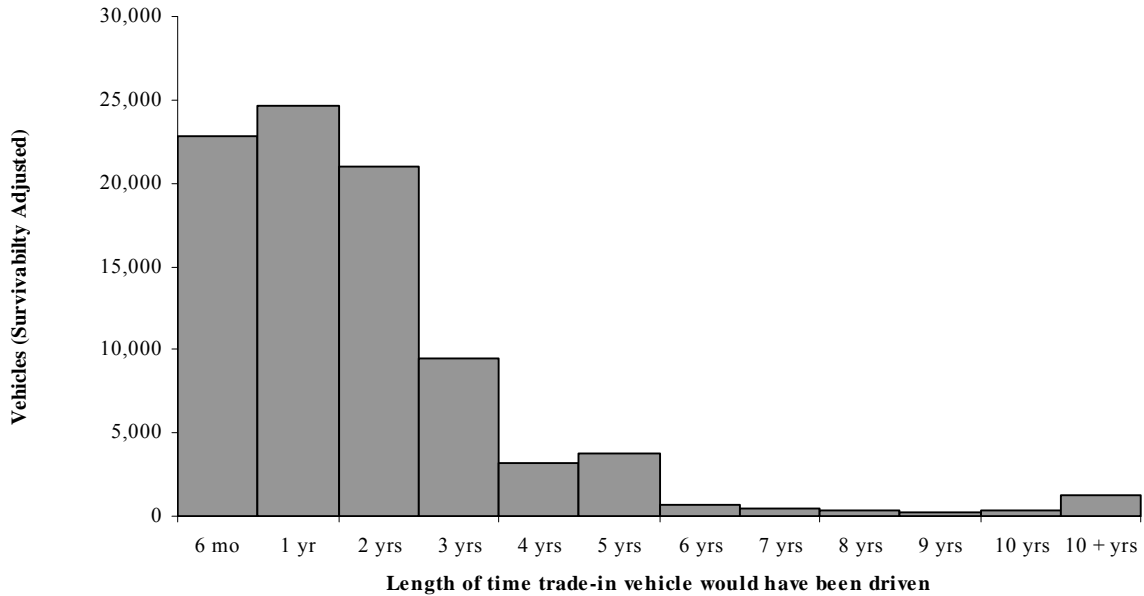
The schedule of consumer time preferences for trading in the vehicle in the absence of the program is shown below in Table 17. This, however, assumes that all trade-in vehicles would have remained in working condition for that period of time. Using the number of CARS sales, excluding vehicles which were advanced from the next six months, and accounting for the vehicles that would have been traded-in normally during July, August, and part of June, the total impact on GDP would be \$4,020,582,262 (345,928/667,842*7,762,059,444).

The responses shown in Table 17 reflect consumer preferences revealed by their survey responses. However, vehicles are subject to normal usage- and exposure-based attrition, which can affect their rate of survival. Wear to both mechanical and body parts associated with normal use, exposure to weather, damage in accidents, etc., can all affect vehicle longevity, and this in turn can alter their owners' intentions regarding their replacement. Thus, for example, a consumer with a 15-year-old vehicle might indicate that they would have been driven for 10 more years. However, the probability that such a vehicle will remain in use that long is significantly less than 100 percent. To determine the real impact of the CARS program, the consumer survey responses were adjusted to reflect the probabilities that vehicles would actually survive as long as their owners intended to keep them in service before replacing them. This adjustment was based on survival rates derived from tables in Appendix D of this report.

This analysis results in a "leftward" shift in the carry-forward patterns previously illustrated in Figure 2, that is, a general shift towards shorter carry-forward periods. The results are shown in Table 18 below, and are illustrated graphically in Figure 4. As noted previously, vehicle purchases in response to the CARS program were essentially carried forward from future years. Table 18 also illustrates the estimated time displacement for GDP impacts.

⁴¹ This assumes that on average, consumers would have purchased vehicles similar to those in the CARS program. Shifts in vehicle size, age (new vs. used) or domestic content could impact the net change in GDP. The survey indicates that consumers would have purchased, on average, larger vehicles, which generally tend to be more expensive. This would reduce the net impact on GDP. The survey also indicated a significant portion of drivers bought new rather than used vehicles. This would increase the impact on GDP. The survey did not provide information on domestic versus imported preferences. The agency does not have information to calculate the cost of the hypothetical vehicles that were indicated as survey preferences.

Figure 4: Time that Vehicle Sale Advanced Adjusted for the Survivability of the Vehicle



Source: CARS Consumer Survey

We note that 38 percent of survey respondents indicated they would not replace their traded in vehicle. This implies one of several scenarios - either that they would give up driving or that they would rely on some other vehicle, either one they already have or a different one they intend to purchase independent of the trade-in transaction. NHTSA analysts did not believe it likely that 38 percent of respondents were planning to give up driving (although a few would due age or lifestyle changes). We therefore assumed that transportation for this group under the non-CARS scenario would be accomplished by alternative vehicles that would be purchased outside of the CARS program, and that these vehicles would be similar to the average vehicle selected by those who did select a replacement vehicle in the survey. We note that if these respondents would, in fact, simply have given up driving, then the impact on GDP of the CARS program would be more permanent because it would have induced sales rather than pulled them forward from another time period. To the extent that consumers would actually not have replaced their traded-in vehicle at some point, these estimates exaggerate the carry-forward impacts on GDP for future years.

**Table 17: Impact of Vehicle Trade-ins in the Absence of the CARS Program
Based on Consumer Intentions⁴²**

<i>Length of Time until Vehicle Trade-in</i>	<i>Rate of Trade-in (Consumer Survey)</i>	<i>Distribution of Trade-in Vehicles</i>	<i>Estimated GDP Carry Forward (millions)</i>	<i>Cumulative GDP Carry Forward (millions)</i>
6 months	22.87%	136,751	\$1,566	\$1,566
1 year	24.77%	148,137	\$1,696	\$3,262
2 years	23.47%	140,341	\$1,607	\$4,869
3 years	11.56%	69,135	\$792	\$5,661
4 years	3.66%	21,884	\$251	\$5,912
5 years	6.28%	37,523	\$430	\$6,341
6 years	0.56%	3,364	\$39	\$6,380
7 years	0.40%	2,407	\$28	\$6,407
8 years	0.16%	935	\$11	\$6,418
9 years	0.03%	171	\$2	\$6,420
10 years	0.69%	4,151	\$48	\$6,468
10 + years	5.54%	33,154	\$380	\$6,847
<i>Total</i>	100.00%	597,952	\$6,847	

Source: CARS Consumer Survey

⁴² This assumes the consumer has reasonable expectations about the survivability of their vehicle. However, as shown in Appendix D the rate of vehicle survivability decreases as vehicles age.

**Table 18: Impact of Vehicle Trade-ins in the Absence of the CARS Program
Based on Consumer Intentions Adjusted for Survival Probability**

<i>Length of Time until Vehicle Trade-in</i>	<i>Rate of Trade-in Survival Adjusted</i>	<i>Distribution of Trade-in Vehicles</i>	<i>Estimated GDP Carry Forward (millions)</i>	<i>Cumulative GDP Carry Forward (millions)</i>
6 months	25.83%	154,441	\$1,769	\$1,769
1 year	27.89%	166,778	\$1,910	\$3,678
2 years	23.82%	142,413	\$1,631	\$5,309
3 years	10.70%	63,991	\$733	\$6,042
4 years	3.68%	22,001	\$252	\$6,294
5 years	4.31%	25,770	\$295	\$6,589
6 years	0.74%	4,422	\$51	\$6,640
7 years	0.54%	3,226	\$37	\$6,676
8 years	0.37%	2,206	\$25	\$6,702
9 years	0.28%	1,679	\$19	\$6,721
10 years	0.42%	2,533	\$29	\$6,750
10 + years	1.42%	8,491	\$97	\$6,847
<i>Total</i>	100.00%	597,952	\$6,847	

Source: CARS Consumer Survey Adjusted for Survival Probability

We note that CEA estimated that a net increase in sales of 330,000 vehicle sales would result from the program after accounting for sales pulled forward from the near future, which CEA defined as the remainder of 2009. Under this assumption, the total impact on GDP would be \$3,778,874,157 (calculates as 330,000/667,842*7,762,059,444).

CEA's original baseline calculation resulted in an estimate of \$3.6 billion, using preliminary data. Updating the estimated contribution to GDP, this number increases to \$3.8 billion, a difference of \$200 million due to updated inputs (items 1 through 4 above). However, the more complete data provided by the consumer survey indicates that roughly 80,000 of these transactions would have occurred without the CARS program, and that another 154,000 would have occurred within 6 months or less. The CEA analysis assumed that roughly half the CARS transactions would have occurred in the near future (i.e., within 5-6 months of the program). The survey thus revealed consumers' intent to keep their vehicles for a longer time span than envisioned in the CEA analysis.

Impact on Consumers and Consumer Behavior

In addition to savings in the initial prices for the vehicles they purchased, participants in CARS derive benefits from a decrease in the marginal cost of driving due to fuel savings, reduced maintenance costs and the utility gained from driving a new vehicle as well as some savings in the initial price of the vehicle. Evidence shows that as fuel economy increases,

consumers elect to take more frequent or longer trips, thus providing utility to the vehicle's driver and passengers.

Used Vehicle Market

Used vehicle prices increased for the six-month period prior to the start of the program.⁴³ This trend in price increase has been sustained since. While the CARS program further restricted the supply of secondary market vehicles, the majority of vehicles traded-in were older and had higher mileage than the average vehicle in the secondary market.⁴⁴ In the case that the trade-in vehicle was not high mileage, they were likely to have been in poor condition or in need of repairs exceeding their value, indicating that their net worth was less likely less than the maximum \$4,500 credit allowed under the CARS program. Overall, used vehicle prices have increased over the past 9 months while used vehicle pricing in the lower price tiers (\$5,000 and below) has remained steady in September 2009.⁴⁵

Tax Losses

One of the goals of the CARS legislation was to increase the fuel efficiency of the vehicle fleet. However, less fuel consumption results in a corresponding decrease in fuel tax revenues to both federal and State governments. Federal fuel taxes are 18.4 cents per gallon while State and local taxes average 23.6 cents per gallon for a total tax burden of 42 cents per gallon. The estimated fuel tax revenue loss including State, federal, and local are estimated to total \$345 million including changes in consumer behavior and the rebound effect.⁴⁶ Countering the effect of lower fuel tax revenue is the State sales tax revenue earned on CARS purchases, is estimated to total \$897 million (2008\$) over the next 25 years. State sales tax revenue estimated includes only State sales tax rates and does not include any other taxes (see Table 2). We note that, while these impacts do affect Federal and State revenues, from a societal perspective they are considered a transfer payment rather than a real impact, i.e., they are a transference of value from one part of society to another rather than a net gain or loss to society.

4.3 Fuel Consumption

The CARS program requires that participating consumers acquire vehicles that are more fuel-efficient than their trade-in. Improving vehicle fuel economy will help reduce dependence on foreign oil and lower carbon emissions. The focus of the CARS program is light passenger vehicles, which account for the majority of travel on our nation's roadways (household travel accounts for over 80 percent of miles traveled on roadways.)⁴⁷ However, substituting a new

⁴³ Manheim Used Vehicle Value Index., <http://www.autonews.com/article/20090807/ANA05/908079966>

⁴⁴ Average age of model year vehicle in secondary market and average mileage, respectively

⁴⁵ Manheim Used Vehicle Value Index. Available at:
http://www.manheimconsulting.com/Used_Vehicle_Value_Index/Current_Monthly_Index.html

⁴⁶ The rebound effect is the tendency to drive more fuel-efficient vehicles more miles because the cost of driving is lower. This is based on the estimated reduction in fuel consumption from section 4.3 and the estimated Federal and State fuel taxes from Energy Information Administration's *Annual Energy Outlook 2009* for a 25-year period.

⁴⁷ U.S Federal Highway Administration. The 'Carbon Footprint' of Daily Travel. March 2009.

vehicle for a used one can impact driving behavior in ways that complicate direct comparisons of fuel consumption. These changes potentially can include:

- 1) Increased driving with a new vehicle. Data indicate that new vehicles are driven more miles than older vehicles (see Appendix D). Mileage schedules that record VMT by vehicle age indicate that, on average, mileage steadily decreases as vehicles age. This response is probably attributable to a combination of the reduction in operating maintenance expenses that typically results when a new vehicle substitutes for an older model and the greater utility and reliability afforded by the new vehicles.
- 2) Changes in VMT due to a shift in vehicle function. On average, light trucks (SUVs, pickups, and vans), tend to have longer useful lives and to be driven more at each vehicle age than passenger cars. Differences in use, maintenance, quality, design, and regional location may all contribute to these differences in lifetime VMT. For the CARS program, where large numbers of light trucks are traded in for passenger cars, the practical impact is that light trucks that are driven more VMT each year over a potential 36-year life span are replaced by passenger cars that are driven over a 25-year lifespan.
- 3) The rebound effect. There is a tendency for consumers to drive more when the cost of driving decreases. This is known as the “rebound effect”, and it basically reflects the price elasticity of demand for driving. Within the CARS program, this occurs because the fuel economy of the purchased vehicle was required to be higher than the fuel economy of the trade-in.⁴⁸ This makes the cost of driving less expensive. Studies indicate that the rebound effect can be on an order of a 10 to 25 percent increase in vehicle use for each 1.0 percentage decrease in fuel costs. Estimates of the rebound effect have tended to decline over time as real income levels have risen. However, the CARS program took place during a recession when real incomes have at least temporarily declined. It is unclear how changes in real income will be impacted during the course of time influenced by the CARS program. For this study, we assumed a rebound effect of 10 percent, which is consistent with the rate used in NHTSA's analysis of CAFE standards for 2012 – 2016 model years.

Each of these behavioral factors will complicate direct comparisons of fuel efficiency in vehicles. Because these factors are potentially very real, the resulting shift in VMT can cloud the impact of fuel efficiency.

The agency considered a number of ways to calculate fuel consumption impacts of the CARS program. These included:

- 1) Calculating savings over the remaining useful lifetime of the trade-in,
- 2) Calculating savings over the full lifetime of the newly purchased vehicle, and
- 3) Calculating savings over a limited number of years.

⁴⁸ With exception to Category 3 Trucks, which do not have an EPA fuel economy rating; but were required to be of equal or lesser gross vehicle weight rating (GVWR).

Within each of these options, there were several possible approaches to dealing with the 3 behavioral issues discussed above:

- a) Reflect the behavioral issues, and
- b) Ignore the behavioral issues and base the calculation on a common mileage schedule.

The act that established the CARS program directs the agency to estimate overall increase in fuel efficiency in terms of miles per gallon and total annual oil savings. We interpret this to mean the actual fuel and petroleum savings and economic impacts that may result from the program. This implies recognition of the behavioral changes that may result from the shift in the vehicle fleet. However, we are also concerned that reflecting these changes will cloud the potential savings from substituting more fuel-efficient vehicles into the fleet. An additional concern is that the behavioral changes described above may not apply in some cases. For example, if the vehicle traded in was already the primary vehicle, then the annual mileage might not change significantly due to age or shift in vehicle type.

The mean combined EPA fuel economy rating was 15.7 mpg for the traded-in fleet and 24.9 for the replacement fleet, a 58 percent increase in fuel economy rating. However, consistent with Corporate Average Fuel Economy (CAFE) standards, a VMT-weighted harmonic mean based on gallons per mile is the appropriate measure of fuel economy for calculating fuel savings. The harmonic mean was 15.6 mpg for the traded-in fleet and 23.7 mpg for the replacement vehicle fleet, which corresponds to about a 34 percent reduction in fuel consumption.⁴⁹

However, neither of these measures reflects changes in consumer buying behavior that resulted from the CARS program. To account for these changes, calculations were made based on consumer preferences revealed in responses to the consumer survey, adjusted for survival probability as discussed in section 4.2. For the fleet that consumers' responses to the survey indicated they would have purchased in the absence of the CARS program, the simple mean mpg is 22.5 and the harmonic mean mpg is 21.5. Comparing these figures to the corresponding values for the replacement vehicles (24.9 and 23.7 mpg, as reported above) indicates that, the CARS program reduced fuel consumption for the typical CARS participant by approximately 10 percent.

⁴⁹ The arithmetic mean is calculated:

$$(MPG_1 + MPG_2 + \dots + MPG_n)/n \text{ for } n \text{ vehicles.}$$

The harmonic mean is calculated:

$$\sum(VMT_1 + VMT_2 + \dots + VMT_n)/\sum(VMT_1/MPG_1) + (VMT_2/MPG_2) + \dots + (VMT_n/MPG_n)$$

The harmonic mean accounts for the non-linear relationship between fuel economy and fuel consumption, and captures the fuel economy of driving each car in the fleet for 1 mile, while the arithmetic mean captures the fuel economy of driving each car using one gallon of gas.

Both the fuel economy increases and the resulting changes in consumer behavior are accounted for in following calculations. Changes in the Vehicle Miles Traveled (VMT) are estimated using the agency's vehicle survivability and travel mileage schedule from 2006, the most recent year available. The change in VMT, fuel economy, the number of years the vehicle sale was advanced and the estimated life of the new vehicle were used in the calculation to produce fuel consumption estimates.⁵⁰

The survey data is used in the estimation of fuel consumption, carbon dioxide and other green house gas emissions.

Figure 5 illustrates the estimation of VMT under the hypothetical baseline scenario and the CARS program. The VMT and fuel economy ratings are then used to estimate fuel consumption as follows:

Hypothetical Baseline Scenario:

$$\text{gallons}_{\text{SH}} = (\text{VMT}_{t(t)}/\text{MPG}_t) + (\text{VMT}_{h(25-t)}/\text{MPG}_h)$$

CARS Scenario:

$$\text{gallons}_{\text{SCARS}} = (\text{VMT}_{n(25)}/\text{MPG}_n)$$

Where:

$\text{VMT}_{t(t)}$ = the VMT for the number of years, t , the consumer would have driven the trade-in vehicle in the absence of the CARS program

MPG_t = the combined EPA fuel economy rating of the trade-in vehicle

$\text{VMT}_{h(25-t)}$ = the VMT for the number of years the hypothetical baseline vehicle would have been driven, where the travel mileage schedule is truncated at 25 years to simplify the calculation⁵¹

MPG_h = the combined EPA fuel economy rating of the hypothetical baseline vehicle the consumer would have purchased in the absence of the CARS program⁵²

$\text{VMT}_{n(25)}$ = the lifetime VMT of the new vehicle, truncated to 25 years

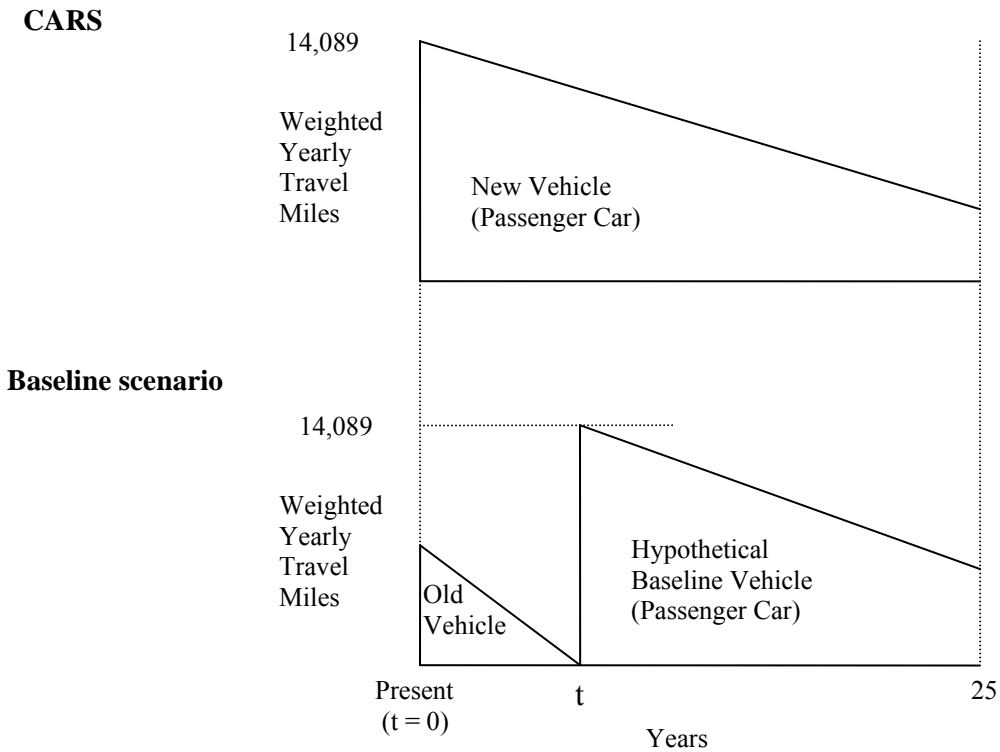
MPG_n = the combined EPA fuel economy rating of the new vehicle

⁵⁰ Estimates are based on 677,842 transactions.

⁵¹ This also ensures a realistic comparison of passenger cars to light trucks, which have an estimated lifespan of 25 years and 36 years, respectively, according to NHTSA's *Vehicle Survivability and Travel Mileage Schedules (2006)*.

⁵² Since the agency did not expect that consumers would be able to identify an exact make and model that they might purchase several years in the future, respondents were asked to indicate a specific size and type of vehicle. For fuel consumption calculations, the average combined EPA fuel economy rating of vehicles in one these type/size categories was assumed for the hypothetical baseline vehicle. The latest model year for which actual make/model data were available for the type/size categories was 2009. For hypothetical baseline vehicles that would have been purchased in a later model year, the 2009 type/size category value was marked up to reflect projections for the entire vehicle fleet derived from NHTSA's recent CAFE NPRM for model years 2012-2016, and from internal analysis for mode years 2010-2011.

Figure 5: Example based on a passenger car driven according to the Vehicle Miles Traveled Schedule⁵³



Source: NHTSA

Taking the difference of gallons_H and gallons_{SCARS}, and summing across all the survey transactions provides an estimate of the reduction in fuel consumption over 25 years. The sum of the gallons saved for all vehicles in the analysis (88,286 vehicles) is then applied to the number of CARS transactions for which CARS was the primary reason for purchase (597,952).

⁵³ *Vehicle Survivability and Travel Mileage Schedules*, NHTSA 2006. Available at: <http://www-nrd.nhtsa.dot.gov/Pubs/809952.PDF>

Under these assumptions, the total oil savings attributable to the CARS program are 20 million barrels of petroleum (equivalent to 823 million gallons) over twenty-five years, which represents about 2 days worth of U.S. motor gasoline consumption.⁵⁴ For an average year, the estimated number of gallons saved is 33 million as seen in Table 19.

Table 19: Estimated Reduction in Fuel Consumption

	<i>Motor fuel (gallons)</i>	<i>Petroleum (barrels)</i>	<i>Undiscounted Present Value (2008\$)</i>	<i>Present Discounted Value @ 3% (2008\$)</i>	<i>Present Discounted Value @ 7% (2008\$)</i>
Total reduction in fuel consumption over 25 years	823,697,145	19,611,837	\$2,693,138,558	\$1,927,722,070	\$1305,818,549
Average reduction in fuel consumption per year	32,947,886	784,473	\$107,725,542	\$77,108,883	\$52,232,742

Source: NHTSA Calculation

Fifty-seven (57) percent of oil in the U.S. is imported.⁵⁵ Assuming a direct decrease, the CARS program reduced oil imports by 11 million barrels (470 million gallons) over 25 years.

The economic value of fuel savings resulting from the CARS program is estimated by applying the Reference Case forecast of future fuel prices from the Energy Information Administration's *Annual Energy Outlook 2009* to each future year's estimated fuel savings. While the retail price of fuel is the proper measure for valuing fuel savings from the perspective of vehicle owners, an adjustment to the retail prices are necessary in order to accurately reflect the economic value of fuel savings to the U.S. economy. Federal, State, and local taxes are excluded from the social value of fuel savings because these do not reflect costs of resources used in fuel production, and thus do not reflect resource savings that would result from reducing fuel consumption. Using the retail price of fuel less taxes, the value of fuel savings due the CARS program is \$2.7 billion dollars in 2008 dollars (\$1.9 billion assuming the present value of these benefits is discounted at a rate of 3 percent, \$1.3 billion when discounted at 7 percent).

⁵⁴ U.S. Department of Energy. Available at: http://tonto.eia.doe.gov/energyexplained/index.cfm?page=oil_home#tab2

⁵⁵ U.S. Department of Energy. Available at: <http://www.eia.doe.gov/emeu/aer/pdf/aer.pdf>

5. Non-Market Effects

5.1 Environmental Effects

Carbon dioxide (CO₂) accounts for over 80 percent of total greenhouse gas (GHG) emissions in the United States, and transportation sources account for nearly one-third of that total. Methods used to decrease toxic pollutant emissions, such as requiring unleaded gasoline and catalytic converters, have no effect on the amount of CO₂ produced by vehicle travel. The growth in on-road transportation carbon dioxide emissions from on-road motor vehicles between 1995 and 2006 is attributable mostly to sales of light duty trucks increasing 27 percent and medium- and heavy-duty trucks increasing 48 percent. Passenger cars CO₂ emissions also increased over this same period, but at a much slower rate: 4.9 percent.⁵⁶ Fossil fuel combustion also generates emissions of CH₄ and N₂O, as well as secondary greenhouse gases such as nitrogen oxides (NO_x), carbon monoxide (CO), and non-CH₄ volatile organic compounds (NMVOCs).⁵⁷ It is assumed that CO₂ comprises 95 percent of total GHG emissions accounted for by motor vehicles, while emissions of these other gases are estimated to represent the remaining 5 percent.⁵⁸

The difference in fuel consumption and CO₂e emissions between the hypothetical baseline scenario and the CARS program are the estimated fuel and environmental benefits attributed to the program. The carbon dioxide and related green house gas (GHG) emissions are estimated as a function of fuel consumption. Decreases in carbon dioxide and GHG emissions are estimated using the same methodology as fuel consumption but require additional calculation to estimate the carbon dioxide equivalent.⁵⁹

Hypothetical Baseline Scenario:

$$\text{Metric tons of CO}_2\text{e}_H = \text{gallons}_H * 8.87 * (100/95)/1,000$$

CARS Scenario:

$$\text{Metric tons of CO}_2\text{e}_{\text{CARS}} = \text{gallons}_{\text{CARS}} * 8.87 * (100/95)/1,000$$

Where:

⁵⁶ U.S. Environmental Protection Agency, Greenhouse Gas Emissions from the U.S. Transportation Sector: 1990-2003, Washington, D.C.: March 2006, p. 4, available at <http://www.epa.gov/oms/climate/420r06003.pdf> as of July 30, 2008.

⁵⁷ U.S. Environmental Protection Agency. Greenhouse Gas Inventory Report 1990 - 2007. Available at: <http://www.epa.gov/climatechange/emissions/downloads06/07Energy.pdf>

⁵⁸ Multiplying by (100/95) in the calculation of CO₂e accounts for the 5 percent of GHG emitted other than CO₂ which accounts for the other 95 percent.

⁵⁹ U.S. Environmental Protection Agency. Available at: <http://www.epa.gov/OMS/climate/420f05004.pdf>

gallons = VMT (in total miles) divided by the fuel economy (in MPG) yields the gallons of gasoline consumed

8.87 = kilograms of CO₂ emitted from one gallon of gasoline (or 19.6 pounds)

(100/95) = CO₂ contributes around 95 percent of the GHG emissions related to VMT, thus CO₂ emissions are multiplied by 100/95 to account for the 5 percent of other emissions including methane, nitrous oxide and hydrofluorocarbons (HFC), expressed as carbon dioxide equivalent (CO₂e).

There are additional carbon dioxide emissions associated with the production and distribution of fuel, known as upstream costs, emitted at a rate of 2.07 kg per gallon of fuel consumed. These costs are included in Table 20 below.

Both the fuel economy increases and the changes in consumer behavior are accounted for in following calculations. Changes in the Vehicle Miles Traveled (VMT) are estimated using the agency's vehicle survivability and travel mileage schedule from 2006, the most recent year available. The change in VMT, fuel economy, the number of years the vehicle sale was advanced and the estimated life of the new vehicle were used in the calculation to produce fuel consumption estimates.⁶⁰ Total reduction in CO₂ emissions based on the estimated reduction in fuel consumption as a result of the CARS program is roughly 9 million metric tons of CO₂ and related GHG over the next twenty-five years, which represents 0.15 percent of annual U.S. carbon emissions (see Table 20). This is equivalent to the annual greenhouse gas emissions from 1.8 million typical passenger vehicles during 1 year.⁶¹

Table 20: Estimated Reduction in Carbon Dioxide and GHG Emissions

	<i>Total reduction in CO₂e emissions over 25 years</i>	<i>Average annual reduction in CO₂e</i>
CO ₂ - Vehicle Use	8,415,197	336,608
CO ₂ - Fuel Production and Distribution	1,072,060	42,882
Total	9,487,257	379,490

Source: NHTSA Calculation

Consistent with prior analysis, the agency has elected to use a rate of 3 percent to discount the future economic benefits from reduced emissions of CO₂ that are projected to result from decreased fuel production and consumption.⁶² These benefits which include reductions in the expected future economic damages caused by increased global temperatures, a rise in sea levels, and other projected impacts of climate change, are anticipated to extend over the life

⁶⁰ Estimates are based on 677,842 transactions.

⁶¹ U.S Environmental Protection Agency, <http://www.epa.gov/RDEE/energy-resources/calculator.html>

⁶² NHTSA, Corporate Average Fuel Economy (CAFE) for MY 2011 Passenger Cars and Light Trucks

of the new vehicle.⁶³ The 3 percent rate is consistent with OMB guidance on appropriate discount rates for benefits experienced by future generations, as well as with those used to develop many of the estimates of the economic costs of future climate change that form the basis for NHTSA’s estimate of the economic value of reducing CO₂ emissions. Moreover, the 3 percent rate is consistent with widely-used estimates in economic analysis of climate change of the appropriate rate of time preference for current versus distant future consumption, expected future growth in real incomes, and the rate at which the additional utility provided by increased consumption declines as income increases. Present value calculations at 7 percent are also included.

The estimate of the social benefit of carbon emission abatement is from the agency's analysis of the CAFE standards for 2012 – 2016.⁶⁴ The outcomes of NHTSA's process to develop interim values for social benefit of carbon emissions are judgments in favor of a) global rather than domestic values, b) an annual growth rate of 3 percent, and c) interim global social benefit of carbon abatement estimates for 2009 (in 2008 dollars) of \$58, \$35, \$20, \$11, and \$5 per ton of CO₂.⁶⁵ Notably, the agency has centered on a value of \$20, with an annual growth rate of 3 percent as the social benefit of reducing carbon emissions is expected to increase over time. We note that this is a preliminary estimate used in our most recent rulemaking proposal. The final values have not been determined. These assumptions result in approximately \$278 million in social benefit due to carbon dioxide and related emission abatement over 25 years (or about \$11 million each year). A sensitivity analysis including the social cost of carbon valued at \$5/metric ton and \$58/metric ton is also included in Table 21.

Table 21: Estimated Social Benefit of CO₂e Emission Abatement due to the CARS program

	<i>Social Benefit of Reducing CO₂ Emissions (2008\$)</i>		
	<i>\$20 per metric ton</i>	<i>\$5 per metric ton</i>	<i>\$58 per metric ton</i>
Undiscounted present value	\$278,341,199	\$73,247,684	\$805,724,524
Present discounted value @ 3%	\$199,233,891	\$52,429,971	\$576,729,683
Present discounted value @ 7%	\$162,753,945	\$42,829,986	\$471,129,842

Source: NHTSA Calculation

⁶³ The current Vehicle Survivability and Travel Mileage Schedules estimates the lifetime of passenger cars and light trucks to be 25 years and 36 years, respectively. The light truck schedule has been truncated to 25 years for simplicity in comparing associated benefits over the lifetime of different vehicles.

⁶⁴ National Highway Traffic Safety Administration, Corporate Average Fuel Economy (CAFE) for MY 2012 – MY 2016. Sept 28, 2009. Available at: <http://www.nhtsa.dot.gov/portal/fueleconomy.jsp>

⁶⁵ The social benefit from a ton of CO₂ abated is equivalent to the value of the social cost of carbon (SCC) emitted from the Corporate Average Fuel Economy (CAFE) for MY 2012 – MY 2016. Values have been adjusted from 2006 dollars to 2008 dollars.

Criteria Pollutants

Car and light truck use, fuel refining, fuel distribution and retailing generate emissions of certain criteria air pollutants, including carbon monoxide (CO), hydrocarbon compounds (including “volatile organic compounds,” or VOC), nitrogen oxides (NO_x), fine particulate matter (PM_{2.5}), and sulfur dioxide (SO₂).

Three factors influence the criteria emissions impacts of the CARS program.

- Newer vehicles have lower per-mile criteria emission rates, due to their more effective emission control systems, the increased likelihood that new vehicles’ emission control systems will be functioning properly, and increases in the stringency of EPA emissions regulations that apply to vehicles produced during recent model years.
- Newer vehicles consume less fuel to travel the same distance because of their higher fuel efficiency, resulting in reductions in emissions that occur during fuel production and distribution (upstream emissions)
- Counteracting these two factors, newer vehicles are likely to be driven slightly more than the vehicles that they replace, resulting in an increase in criteria emissions.

The net effect of these factors depends on their relative magnitudes, on the relative age and fuel efficiency of retired vehicles and those purchased to replace them, and on the amount of additional driving attributable to the new vehicles.

NHTSA estimated both the downstream (vehicle use) and upstream (fuel production and distribution) impacts of the CARS program by analyzing each of these sources of changes in criteria emissions resulting from the CARS program over a period of 25 years

EPA’s Motor Vehicle Emission Simulator (MOVES) model estimates location- and scenario-specific emissions from motor vehicles, and is the appropriate tool for estimating criteria emissions from motor vehicles. Due to time constraints, NHTSA was unable to run MOVES, and estimated the impacts of the CARS program on criteria emissions using emission factors derived from MOVES in a spreadsheet-based analysis.

The downstream emission rates used in this report were identical to those used in developing NHTSA’s preliminary regulatory analysis of MY 2012-2016 CAFE. The emission rates for model year 2011 and following were developed by U.S. EPA using Draft MOVES 2009. Emission rates for earlier model years were calculated by NHTSA using EPA’s MOBILE motor vehicle emission factor model. The mixture of emission rate sources may introduce some inconsistencies into the results shown here.

To calculate emission factors beyond model year 2010 for use in NHTSA’s calculations, Draft MOVES 2009 was run for the year 2050, and was programmed to report aggregate emissions from vehicle starting and operation. EPA analysts selected the year 2050 in order to generate emission factors that were representative of lifetime average emission rates for vehicles meeting the agency’s Tier 2 emission

standard.⁶⁶ These estimates were then aggregated in order to create emission rates by vehicle age.

To create the emission factors used for the model years before 2011, NHTSA analysts used EPA's MOBILE6.2 motor vehicle emission factor model, in conjunction with nationally representative inputs describing fuel properties, weather conditions, travel speeds, and vehicle inspection and maintenance programs. Outputs produced by MOBILE6.2 for different roadway types and sub-classes of light-duty vehicles were then combined to develop representative emission factors for automobiles and light-duty trucks.

Emission rates for the criteria pollutant SO₂ were calculated by NHTSA using estimates of average fuel sulfur content supplied by EPA, together with the assumption that the entire sulfur content of fuel is emitted in the form of SO₂. These calculations assumed that future national average gasoline and diesel sulfur levels would remain at their current levels.⁶⁷

NHTSA estimates the increase in emissions of each criteria air pollutant by multiplying the total miles driven by cars and light trucks of each model year and age by their estimated emission rates per vehicle-mile of each pollutant. These emission rates differ between cars and light trucks as well as between gasoline and diesel vehicles, and both their values for new vehicles and the rates at which they increase with age and accumulated mileage can vary among model years. NHTSA calculated the increase in emissions of these criteria pollutants from the CARS program by multiplying the estimated vehicles' use during each year over their expected lifetimes by per-mile emission rates appropriate to each vehicle type, fuel used, model year, and age as of that future year. Unlike tailpipe emissions, upstream emissions are estimated as a direct function of fuel consumption. Table 22 lists the unit emissions values used in this analysis for upstream emissions.

⁶⁶ Because all light-duty emission rates in Draft MOVES 2009 are assumed to be invariant after MY 2010, a calendar-year 2050 run produced a full set of emission rates that reflect anticipated deterioration in the effectiveness of vehicles' emission control systems with increasing age and accumulated mileage for post-MY 2010 vehicles.

⁶⁷ These are 30 and 15 parts per million (ppm, measured on a mass basis) for gasoline and diesel respectively, which produces emission rates of 0.17 grams of SO₂ per gallon of gasoline and 0.10 grams per gallon of diesel.

Table 22: Upstream Emissions from Criteria Pollutants

Pollutant	Upstream Emissions (grams/gallon)		
	<i>Gasoline</i>	<i>Diesel</i>	<i>Weighted Average</i> ⁶⁸
VOC	5.1451	0.5992	5.0865
CO	0.4921	0.9289	0.4977
NOx	1.5405	2.7099	1.5556
PM2.5	0.2097	0.4068	0.2123
SO ₂	0.9419	1.8534	0.9536

Source: VOLPE Center

The changes in emissions of criteria pollutants that result from substituting a newer model year, younger age vehicle for an older model year, older age is captured in the report. In addition, shifts that result from replacing a light truck with a passenger car can be reflected in a gross way because there are separate schedules for cars and light trucks. However, discrete differences between individual vehicles are not reflected in this data, which means shifts resulting from replacing more polluting vehicles with less polluting vehicles within a given vehicle type are not captured. However, since all vehicles must meet identical maximum tailpipe emission standards, and since catalytic converters are sized to specific engine performance, the spread in emissions among common vehicle types may be minimized.

Table 23 lists the impacts of the CARS program on criteria pollutant emissions. The benefit of reducing criteria pollutants over the next twenty-five years, in undiscounted 2008 dollars, is \$345 million.

⁶⁸ Calculated using Energy Information Administration (EIA) estimate of gasoline and diesel use by light-duty vehicles (automobiles plus light-duty trucks). Source: EIA, Annual Energy Outlook 2010 Early Release, Supplemental Table 47, http://www.eia.doe.gov/oiaf/aeo/supplement/suptab_47.xls

Table 23: Estimated Impact on Criteria Pollutants of CARS Program (Over 25 Years)

<i>Societal Effect (25 year total)</i>	<i>Economic Benefit of Criteria Pollutant Abatement (2008\$/ton)</i>	<i>Physical Units (tons)</i>	<i>Undiscounted Present Value (2008\$)</i>	<i>Present Discounted Value @3% (2008\$)</i>	<i>Present Discounted Value @7% (2008\$)</i>
<i>Tailpipe</i>					
VOC	\$1,343	27,457	\$36,861,934	\$26,385,409	\$17,873,197
CO	\$0	220,044	\$0	\$0	\$0
NOx	\$5,473	28,809	\$157,680,380	\$112,866,064	\$76,454,279
PM	\$299,484	190	\$56,960,358	\$40,771,664	\$27,618,294
SO2	\$32,014	124	\$3,962,559	\$2,836,361	\$1,921,321
<i>Subtotal</i>			<i>\$255,465,232</i>	<i>\$182,859,498</i>	<i>\$123,867,091</i>
<i>Upstream</i>					
VOC	\$1,343	4,614	\$6,194,692	\$4,434,100	\$3,003,612
CO	\$0	451	\$0	\$0	\$0
NOx	\$5,267	1,411	\$7,432,338	\$5,319,994	\$3,603,708
PM	\$247,849	193	\$47,732,980	\$34,166,797	\$23,144,227
SO2	\$32,014	865	\$27,693,972	\$19,823,073	\$13,427,940
<i>Subtotal</i>			<i>\$89,053,981</i>	<i>\$63,743,963</i>	<i>\$43,179,487</i>
<i>Total</i>			<i>\$344,519,213</i>	<i>\$246,603,462</i>	<i>\$167,046,578</i>

Source: NHTSA Calculation

5.2 Social Cost

There are a number of unquantified social costs that will result due to removing vehicles from use prior to the end of their useful lives. On average, the mean remaining useful life of the vehicles traded-in under the program is 10 years for light trucks and 9 years for passenger cars traded-in under the program. The value of these destroyed vehicles could be as high as the \$2.85 billion, the amount consumers received in rebate incentives through the CARS program, minus the salvage value of their vehicles. However, it is likely that consumers, on average, valued their trade-ins at less than the exact amount of rebate they received. The agency does not have data regarding the actual value of these vehicles, nor does it have aggregate information on the scrap value of these vehicles. The value of these prematurely scrapped vehicles is thus less than \$2.85 billion, but we cannot determine a more precise estimate. We also note that advancing vehicle sales, while providing a temporary boost to

the economy, may be advancing sales that potentially would have had even higher fuel economy in the future all else held constant.

Other costs to society may exist for those who cannot afford to purchase new vehicles. Although the current used vehicle market may not reflect it, some vehicles, which probably would have been traded-in or sold into the secondary market, will not be. Those seeking replacement parts for their older vehicle may find fewer of them on the market but many of the trade-in vehicles had usable parts removed prior to crushing or shredding. The supply of replacement engines for vehicles may be reduced. However, the intent of the program was to remove inefficient engines from the vehicle fleet.

The CEA report anticipated that the CARS program might result in a temporary reduction in donations of used vehicles to charities, and there have been some media reports of this occurring. While the CARS program may inadvertently affect the donations of used vehicles to some charities, this impact will be temporary.

5.3 Safety Impacts

The sales of new vehicles under the CARS program will accelerate the penetration of advanced safety equipment present in many recently manufactured vehicles into the on-road vehicle fleet. These improved safety features, some of which can significantly reduce the likelihood of fatal crashes and/or the likelihood of injuries in crashes, include Electronic Stability Control (ESC), braking improvements, advanced air bags, side air bags and other modern safety innovations. The average age of a vehicle traded-in under the program was 14 years, meaning that most of the trade-ins likely did not have some of these important safety features added in recent years. Any safety improvements added to the fleet since the model year of the trade-in vehicle are benefits attributable to the program.

To the extent that consumers replace older vehicles with new vehicles containing these safety improvements, this will likely improve the safety of the fleet for the accelerated period. On balance, the CARS program resulted in the replacement of many larger SUVs and light trucks with passenger cars. Although modern vehicles of all sizes are much safer than older vehicles, occupants of smaller vehicles tend to be more vulnerable in certain crash situations, which could offset some of the increase in the safety of the on-road fleet. On the other hand, certain categories of SUVs are more likely to be involved in rollover crashes than are passenger cars.

Changes in the incidence of crashes and injuries have economic implications as well. Crashes cause expenditures for emergency services, medical care, legal costs, insurance administrative costs, property damage, travel delay, and lost productivity. The overall cost of crashes in the U.S. was estimated to be \$230 billion in 2000. The potential impacts of the CARS program are not expected to significantly affect the overall cost of crashes.

6. Administrative Cost

The CARS Act provided that “up to” \$50 million of the \$1 billion appropriation was available for administrative costs. The subsequent law (Pub. L. No. 11-47) that appropriated an additional \$2 billion “to carry out” the program did not have a specific ceiling on the amount that could be expended on administrative costs. NHTSA has estimated that it will expend approximately \$100 million to administer the CARS program. Table 24 provides a breakdown of the administrative costs for the CARS program showing subtotals for categories of costs incurred through December 15, 2009, and estimated costs for the completion of the program.⁶⁹ Costs include the amounts paid to the system developer and various organizations that worked to review dealer submissions, as well as to contractors retained to scan consumer surveys and disposal facility forms and convert them to usable databases. The agency also hired contractors to develop its new CARS website and operate the CARS hotline. The costs also include salaries and expenses (e.g., travel, car rental) for the NHTSA staff working as part of the CARS program. The total amount needed to cover all administrative costs will not be known until NHTSA has completed the various activities described under “Remaining Tasks” in section 1.10.

⁶⁹ The House Appropriations Committee Report for the Fiscal Year 2010 DOT appropriations bill, House Report No. 111-218 (July 22, 2009), directs NHTSA to provide to the House and Senate Committees on Appropriations by January 4, 2010, a report that details how the agency spent the administrative funding and that describes results of the program. In addition to fulfilling the CARS Act reporting requirement, this report also fulfills this requirement.

Table 24: CARS Administrative Costs⁷⁰

<i>Category</i>	<i>Subtotal</i>
CARS Space Rental & Infrastructure	\$100,000.00
CARS Outreach/Education ⁷¹	\$3,013,217.17
CARS Internal Controls/ A-123 Program & Audit Support	\$398,258.20
CARS Transaction/Voucher Processing	\$39,607,012.00
CARS Information Services – IT Support, Hosting, Infrastructure	\$30,091,359.02
CARS Staffing, Travel, General Administration	\$4,642,913.00
Defined Requirements as of December 15, 2009	<i>Subtotal</i> \$77,852,759.39
Contingencies ⁷²	\$22,147,240.61
	<i>Total</i> \$100,000,000.00

Source: NHTSA

7. Conclusion

In enacting the CARS Act, Congress had two primary goals: (1) stimulate the economy by providing incentives to purchase or lease new vehicles, and (2) aid the environment by ensuring that the new vehicles were more fuel-efficient than the trade-ins and that the trade-ins were never used again as automobiles. The CARS program succeeded on both scores.

Sales and leases of new vehicles under the program totaled 677,842, all of which occurred between July 1 and August 24, 2009, and the consumer survey indicates that as many as 88 percent occurred because of the incentives offered under the program. The agency estimates that these transactions resulted in a \$3.8 billion to \$6.8 billion increase in GDP, contributing significantly to GDP growth in the third quarter, and created or saved over 60,000 jobs. Analysts attributed increases in retail sales in July and consumer spending and consumer confidence in the third quarter to the program. The timing of these benefits was especially important, coming as they did when the economy was in dire need of a significant stimulus.

⁷⁰ As of Dec. 15, 2009

⁷¹ Because of the popularity of the program these funds were largely devoted to webinar training sessions with the dealerships and transaction processing centers plus a hotline devoted to consumers, dealers, and vehicle salvage/disposal facilities. Although NHTSA originally allocated \$10 million for media buys as part of the marketing/public awareness campaign required by the CARS Act, the media buys were cancelled due to the program's instant and overwhelming popularity.

⁷² Contingencies for ongoing costs include voucher exception payments, enforcement, compliance, FOIA activity, data storage, and correction of erroneous data.

The CARS program also had positive environmental benefits. The average new vehicle acquired under the program had an EPA fuel economy rating of 9.2 mpg more than the average vehicle traded in. Based on current information, NHTSA believes that the measures it put in place to deter continued use of the trade-in vehicles as automobiles have been very effective. Operation of the new vehicles in place of the trade-ins will reduce fuel consumption by 20 million barrels over the 25-year period and oil imports by 11 million barrels of oil over 25 years. Emissions of carbon dioxide and related greenhouse gases will be reduced by an estimated 9 million metric tons over that same period.

NHTSA established the CARS program in the 30 days allotted by Congress. And even with a tripling of the expected volume of the transactions due to the additional appropriation of \$2 billion on the program's twelfth day, NHTSA completed its review of 99 percent of dealer submissions within 30 days of closing the system to new transactions (which was just 60 days from the system's inauguration and 90 days from the enactment of the CARS Act). NHTSA's efforts both stimulated the economy and aided the environment. NHTSA achieved these goals while at the same time carrying out its important duties with regard to highway safety, vehicle safety, and fuel economy.

Appendix A: Consumer Survey for the CARS Act
The questionnaire is as follows:



Survey of Consumer Response to CARS Initiative



(Commonly known as 'Cash for Clunkers')

Please answer the following 3 questions regarding your trade-in transaction. Your answers are for program evaluation purposes only and will not influence your eligibility in any way. Please put an X in the box by the appropriate answer.

Question #1: If you were not offered the CARS program trade-in incentive, would you still have traded in your current vehicle to purchase a new or used vehicle this month?

- a) Yes
 b) No

If no, when were you planning to trade-in, sell or dispose of your vehicle?

- | | | |
|---|----------------------------------|---|
| <input type="checkbox"/> Within the next year | <input type="checkbox"/> 4 years | <input type="checkbox"/> 8 years |
| <input type="checkbox"/> In about 1 year | <input type="checkbox"/> 5 years | <input type="checkbox"/> 9 years |
| <input type="checkbox"/> 2 years | <input type="checkbox"/> 6 years | <input type="checkbox"/> 10 years |
| <input type="checkbox"/> 3 years | <input type="checkbox"/> 7 years | <input type="checkbox"/> More than 10 years |

Question #2: If you were not offered the CARS program trade-in incentive, when you disposed of this vehicle, would you have purchased another vehicle?

- a) No
 b) Yes, a new vehicle (Please select one type below)
 c) Yes, a used vehicle (Please select one type below)
- a) **a subcompact car** (for example a Honda Fit, or a Toyota Yaris, etc.)
 - b) **a compact car** (ex. Ford Focus, Nissan Sentra, Toyota Corolla, Honda Civic, etc.)
 - c) **a mid-sized car** (ex. Chevrolet Malibu, Nissan Altima, Toyota Camry, etc.)
 - d) **a large car** (ex. Chrysler 300, Ford Crown Victoria, etc.)
 - e) **a small SUV** (ex. Honda CR-V, Ford Escape, etc.)
 - f) **a mid-sized SUV** (ex. Ford Explorer, Honda Pilot, etc.)
 - g) **a large SUV** (ex. Chevrolet Suburban, Ford Expedition, etc.)
 - h) **a small pickup** (ex. Ford Ranger, etc.)
 - i) **a mid-sized pickup** (ex. Dodge Dakota, Toyota Tacoma, etc.)
 - j) **a large pickup** (ex. Chevrolet Silverado, Ford F-150, etc.)
 - k) **a full sized passenger van** (ex. Ford E-Series, Chevrolet Express, etc.)
 - l) **a full sized cargo van** (ex. Chevrolet Express, Dodge Sprinter, etc.)
 - m) **a mini-van** (ex. Toyota Sienna, Dodge Caravan, etc.)
 - n) **other type** (specify) _____

Question #3: What is your best estimate of the number of miles you drove the traded-in vehicle during the past 12 months?

- | | | |
|--|--|--|
| <input type="checkbox"/> 0 – 2,499 | <input type="checkbox"/> 7,500 – 9,999 | <input type="checkbox"/> 15,000 – 17,499 |
| <input type="checkbox"/> 2,500 – 4,999 | <input type="checkbox"/> 10,000 – 12,499 | <input type="checkbox"/> 17,500 – 19,999 |
| <input type="checkbox"/> 5,000 – 7,499 | <input type="checkbox"/> 12,500 – 14,999 | <input type="checkbox"/> 20,000 or more |

*Thank you for participating in the CARS Initiative Consumer Response Survey!
Please contact the CARS Hotline at (866)-CAR-7891 or TTY at (800)-424-9153 if you wish to provide any comments*

Appendix B: Frequency of trade-in vehicles by make

Trade-in Make	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Ford	195,644	28.86	195,644	28.86
Chevrolet	118,711	17.51	314,355	46.38
Dodge	74,114	10.93	388,469	57.31
Jeep	63,421	9.36	451,890	66.67
GMC	34,537	5.1	486,427	71.76
Mercury	24,206	3.57	510,633	75.33
Nissan	23,010	3.39	533,643	78.73
Toyota	17,672	2.61	551,315	81.33
Cadillac	17,307	2.55	568,622	83.89
Isuzu	13,207	1.95	581,829	85.84
Lincoln	11,774	1.74	593,603	87.57
Chrysler	11,238	1.66	604,841	89.23
Plymouth	10,734	1.58	615,575	90.81
Mazda	7,961	1.17	623,536	91.99
Oldsmobile	7,284	1.07	630,820	93.06
Mercedes-Benz	5,220	0.77	636,040	93.83
Mitsubishi	5,036	0.74	641,076	94.58
Lexus	4,454	0.66	645,530	95.23
BMW	3,521	0.52	649,051	95.75
Pontiac	3,461	0.51	652,512	96.26
Honda	3,287	0.48	655,799	96.75
Kia	3,183	0.47	658,982	97.22
Buick	3,034	0.45	662,016	97.67
Infiniti	2,974	0.44	664,990	98.1
Acura	2,454	0.36	667,444	98.47
Volvo	2,236	0.33	669,680	98.8
Land Rover	2,163	0.32	671,843	99.11
Suzuki	1,305	0.19	673,148	99.31
Audi	1,136	0.17	674,284	99.48
Jaguar	1,012	0.15	675,296	99.62
Volkswagen	810	0.12	676,106	99.74
Saab	589	0.09	676,695	99.83
Hyundai	566	0.08	677,261	99.91
Subaru	169	0.02	677,430	99.94
Eagle	157	0.02	677,587	99.96
Trade-in Make	Frequency	Percent	Cumulative	Cumulative

			Frequency	Percent
American Motors	68	0.01	677,655	99.97
Merkur	42	0.01	677,697	99.98
Alfa Romeo	26	0	677,723	99.98
Peugeot	21	0	677,744	99.99
Import Trade Services	15	0	677,759	99.99
Sterling	14	0	677,773	99.99
AM General	12	0	677,785	99.99
Porsche	11	0	677,796	99.99
J.K. Motors	8	0	677,804	99.99
Austin Rover	7	0	677,811	100
Maserati	6	0	677,817	100
ASC Incorporate	4	0	677,821	100
Excalibur Autos	3	0	677,824	100
Laforza Automobiles	3	0	677,827	100
Lambda Control	3	0	677,830	100
General Motors	2	0	677,832	100
Roush Performance	2	0	677,834	100
Aston Martin	1	0	677,835	100
Aurora Cars Ltd	1	0	677,836	100
CCC Engineering	1	0	677,837	100
Federal Coach	1	0	677,838	100
PAS, Inc/GMC	1	0	677,839	100
Saturn	1	0	677,840	100
TVR Engineering	1	0	677,841	100
Wallace Environmental	1	0	677,842	100

Appendix C: Frequency of new vehicles by make

New Vehicle Make	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Toyota	120,507	17.78	120,507	17.78
Ford	90,135	13.30	210,642	31.08
Honda	87,585	12.92	298,227	44.00
Chevrolet	86,354	12.74	384,581	56.74
Nissan	58,700	8.66	443,281	65.40
Hyundai	48,780	7.20	492,061	72.59
Kia	28,974	4.27	521,035	76.87
Dodge	24,119	3.56	545,154	80.42
Subaru	16,816	2.48	561,970	82.91
Pontiac	16,644	2.46	578,614	85.36
Mazda	16,144	2.38	594,758	87.74
Volkswagen	12,418	1.83	607,176	89.57
Jeep	11,211	1.65	618,387	91.23
GMC	9,704	1.43	628,091	92.66
Chrysler	9,033	1.33	637,124	93.99
Scion	7,851	1.16	644,975	95.15
Mercury	6,626	0.98	651,601	96.13
Saturn	5,334	0.79	656,935	96.92
Suzuki	3,707	0.55	660,642	97.46
Lexus	3,663	0.54	664,305	98.00
Mitsubishi	3,549	0.52	667,854	98.53
MINI	2,790	0.41	670,644	98.94
Audi	1,305	0.19	671,949	99.13
Buick	1,138	0.17	673,087	99.30
smart	1,127	0.17	674,214	99.46
Acura	996	0.15	675,210	99.61
Volvo	949	0.14	676,159	99.75
BMW	770	0.11	676,929	99.87
Lincoln	606	0.09	677,535	99.95
Mercedes-Be	156	0.02	677,691	99.98
Saab	68	0.01	677,759	99.99
Cadillac	44	0.01	677,803	99.99
Infiniti	20	0.00	677,823	100.00
Hummer	15	0.00	677,838	100.00
Isuzu	4	0.00	677,842	100.00

Appendix D: Vehicle Survivability and Travel Mileage Schedule

Vehicle Age (Passenger Car)	Estimated Survivability (1977 to 2002 NVPP)	Estimated VMT (2001 NHTS)	Weighted Yearly Travel Miles
1	0.99	14,231	14,089
2	0.9831	13,961	13,725
3	0.9731	13,669	13,300
4	0.9593	13,357	12,813
5	0.9413	13,028	12,262
6	0.9188	12,683	11,652
7	0.8918	12,325	10,991
8	0.8604	11,956	10,287
9	0.8252	11,578	9,554
10	0.7866	11,193	8,804
11	0.717	10,804	7,746
12	0.6125	10,413	6,378
13	0.5094	10,022	5,105
14	0.4142	9,633	3,990
15	0.3308	9,249	3,060
16	0.2604	8,871	2,310
17	0.2028	8,502	1,724
18	0.1565	8,144	1,275
19	0.12	7,799	936
20	0.0916	7,469	684
21	0.0696	7,157	498
22	0.0527	6,866	362
23	0.0399	6,596	263
24	0.0301	6,350	191
25	0.0227	6,131	139
Estimated Passenger Car Lifetime VMT			152,137

Source: NHTSA, Vehicle Survivability and Travel Mileage Schedule, 2006

Vehicle Age (Light Truck)	Estimated Survivability	Estimated VMT (2001 NHTS)	Weighted Yearly Travel Miles
--------------------------------------	------------------------------------	--------------------------------------	---

	(1977 to 2002 NVPP)		
1	0.9741	16,085	15,668
2	0.9603	15,782	15,155
3	0.942	15,442	14,547
4	0.919	15,069	13,849
5	0.8913	14,667	13,072
6	0.859	14,239	12,230
7	0.8226	13,790	11,343
8	0.7827	13,323	10,428
9	0.7401	12,844	9,506
10	0.6956	12,356	8,595
11	0.6501	11,863	7,712
12	0.604	11,369	6,867
13	0.5517	10,879	6,002
14	0.5009	10,396	5,207
15	0.4522	9,924	4,488
16	0.4062	9,468	3,846
17	0.3633	9,032	3,281
18	0.3236	8,619	2,790
19	0.2873	8,234	2,366
20	0.2542	7,881	2,004
21	0.2244	7,565	1,697
22	0.1975	7,288	1,440
23	0.1735	7,055	1,224
24	0.1522	6,871	1,046
25	0.1332	6,739	898
26	0.1165	6,663	776
27	0.1017	6,648	676
28	0.0887	6,648	590
29	0.0773	6,648	514
30	0.0673	6,648	448
31	0.0586	6,648	389
32	0.0509	6,648	339
33	0.0443	6,648	294
34	0.0385	6,648	256
35	0.0334	6,648	222
36	0.029	6,648	193
Estimated Light Truck Lifetime VMT			179,954

Source: NHTSA, Vehicle Survivability and Travel Mileage Schedule, 2006