

UMTRI-2009-34

SEPTEMBER 2009

THE EFFECT OF THE “CASH FOR CLUNKERS” PROGRAM ON THE OVERALL FUEL ECONOMY OF PURCHASED NEW VEHICLES

**MICHAEL SIVAK
BRANDON SCHOETTLE**



THE EFFECT OF THE “CASH FOR CLUNKERS” PROGRAM ON
THE OVERALL FUEL ECONOMY OF PURCHASED NEW VEHICLES

Michael Sivak
Brandon Schoettle

The University of Michigan
Transportation Research Institute
Ann Arbor, Michigan 48109-2150
U.S.A.

Report No. UMTRI-2009-34
September 2009

Technical Report Documentation Page

1. Report No. UMTRI-2009-34		2. Government Accession No.		3. Recipient's Catalog No.	
4. Title and Subtitle The Effect of the "Cash for Clunkers" Program on the Overall Fuel Economy of Purchased New Vehicles				5. Report Date September 2009	
				6. Performing Organization Code 383818	
7. Author(s) Michael Sivak and Brandon Schoettle				8. Performing Organization Report No. UMTRI-2009-34	
9. Performing Organization Name and Address The University of Michigan Transportation Research Institute 2901 Baxter Road Ann Arbor, Michigan 48109-2150 U.S.A.				10. Work Unit no. (TRAIS)	
				11. Contract or Grant No.	
12. Sponsoring Agency Name and Address The University of Michigan Sustainable Worldwide Transportation				13. Type of Report and Period Covered	
				14. Sponsoring Agency Code	
15. Supplementary Notes The current members of Sustainable Worldwide Transportation include Bendix, Bosch, Continental Automotive Systems, FIA Foundation for the Automobile and Society, Ford Motor Company, General Motors, Nissan Technical Center North America, and Toyota Motor Engineering and Manufacturing North America. Information about Sustainable Worldwide Transportation is available at: http://www.umich.edu/~umtriswt					
16. Abstract <p>This study evaluated the effects of the U.S vehicle-scrappage program ("Cash for Clunkers") on the average fuel economy of new vehicles purchased in July and August 2009. The predicted, baseline fuel economy, without the existence of the program, was derived using a model obtained from a regression analysis performed on the data from October 2007 through June 2009. The regression used the unemployment rate and the price of gasoline as the predictors of the fuel economy. The results indicate that the program improved the average fuel economy of all vehicles purchased by 0.6 mpg in July 2009 and 0.7 mpg in August 2009.</p>					
17. Key Words Vehicle fuel economy, vehicle scrappage program, CARS program, "Cash-for-Clunkers" program				18. Distribution Statement Unlimited	
19. Security Classification (of this report) None		20. Security Classification (of this page) None		21. No. of Pages 8	22. Price

Acknowledgment

This research was supported by Sustainable Worldwide Transportation (<http://www.umich.edu/~umtriswt>). The current members of this research consortium are Bendix, Bosch, Continental Automotive Systems, FIA Foundation for the Automobile and Society, Ford Motor Company, General Motors, Nissan Technical Center North America, and Toyota Motor Engineering and Manufacturing North America.

Contents

Acknowledgments.....	ii
Introduction.....	1
Approach.....	1
Results.....	2
Summary.....	4
References.....	5

Introduction

From July 27 through August 24, 2009, the U.S. government sponsored a vehicle-scrappage program (Department of Transportation, 2009). The program—officially called the Car Allowance Rebate System (CARS)—was informally referred to as the “Cash for Clunkers” program. The program gave buyers a rebate when they traded in a vehicle while purchasing a new one. Generally, the trade-in vehicles must have had fuel economy of 18 mpg or less and be less than 25 years old. The rebate was either \$3,500 or \$4,500, depending on the difference between the fuel economy of the new and the trade-in vehicles.

Overall, about 690,000 vehicles were purchased (and traded in) under the program (Department of Transportation, 2009). This compares to a total of about 2,260,000 vehicles sold in July and August 2009 (Automotive News, 2009). This study evaluated the effect of the program on the average fuel economy of all vehicles purchased in July and August 2009.

Approach

To estimate the benefits of the program on the overall fuel economy of light-duty vehicles purchased, the expected fuel economy of purchased new vehicles *without* the program was calculated. To do this, we used the relationships between economic indicators and the fuel economy of purchased vehicles that we obtained in a recent study (Sivak and Schoettle, 2009). In that study, the fuel economy of purchased new vehicles in a given month was reasonably well predicted by knowing the corresponding unemployment rate and the price of gasoline. In the present study, we used the same approach to predict the fuel economy for July and August of 2009 without the program, and compared this baseline prediction with actual fuel economy observed for the same months.

In Sivak and Schoettle (2009), the relationship between economic indices and fuel economy was modeled on the data from October 2007 (the conventional first month of the 2008 model year) through May 2009. In the present study, the time period for the derivation of the model was extended through June 2009 (the last month before the start of the program).

The relationship was modeled in a regression analysis in which the dependent variable was the average sales-weighted fuel economy of purchased vehicles. This average was calculated from the monthly sales of individual models (Automotive News, 2009) and the official combined fuel-economy ratings for the respective models (Environmental Protection Agency, 2008; 2009). All vehicles purchased in October 2007 through September 2008 were assumed to be model year 2008, while all those purchased in or after October 2008 were assumed to be model year 2009. (The fuel-economy information was available for 99.9% of vehicles purchased.) The predictor variables were the unemployment rate (Bureau of Labor Statistics, 2009) and the average retail price of regular gasoline (Energy Information Administration, 2009).

Results

The average fuel economy of purchased new light-duty vehicles is shown in Figure 1, as are the unemployment rate and the price of gasoline. The regression model was highly significant, $F(2, 20) = 12.38, p < .001$. Both the unemployment rate and the price of gasoline had significant effects on the average fuel economy of purchased vehicles in the expected (positive) direction ($t = 4.93$ and 3.64 , respectively). These two variables accounted for 58% of the variance in the average fuel economy.

The best-fitting regression equation was as follows:

$$\text{mpg} = 17.92 + (0.272 * \text{unemployment rate}) + (0.424 * \text{price of gasoline}) \quad (1)$$

where the unemployment rate is in percentages and the price of gasoline is in dollars.

Equation 1 (derived from the data for October 2007 through June 2009) was then used to predict what the fuel economy for July and August 2009 would have been without the program. To do that, we used the July and August 2009 unemployment rates (9.4 and 9.7%) and the prices of gasoline (\$2.527 and \$2.616). The predicted, baseline fuel economy is shown in Figure 1 in red.

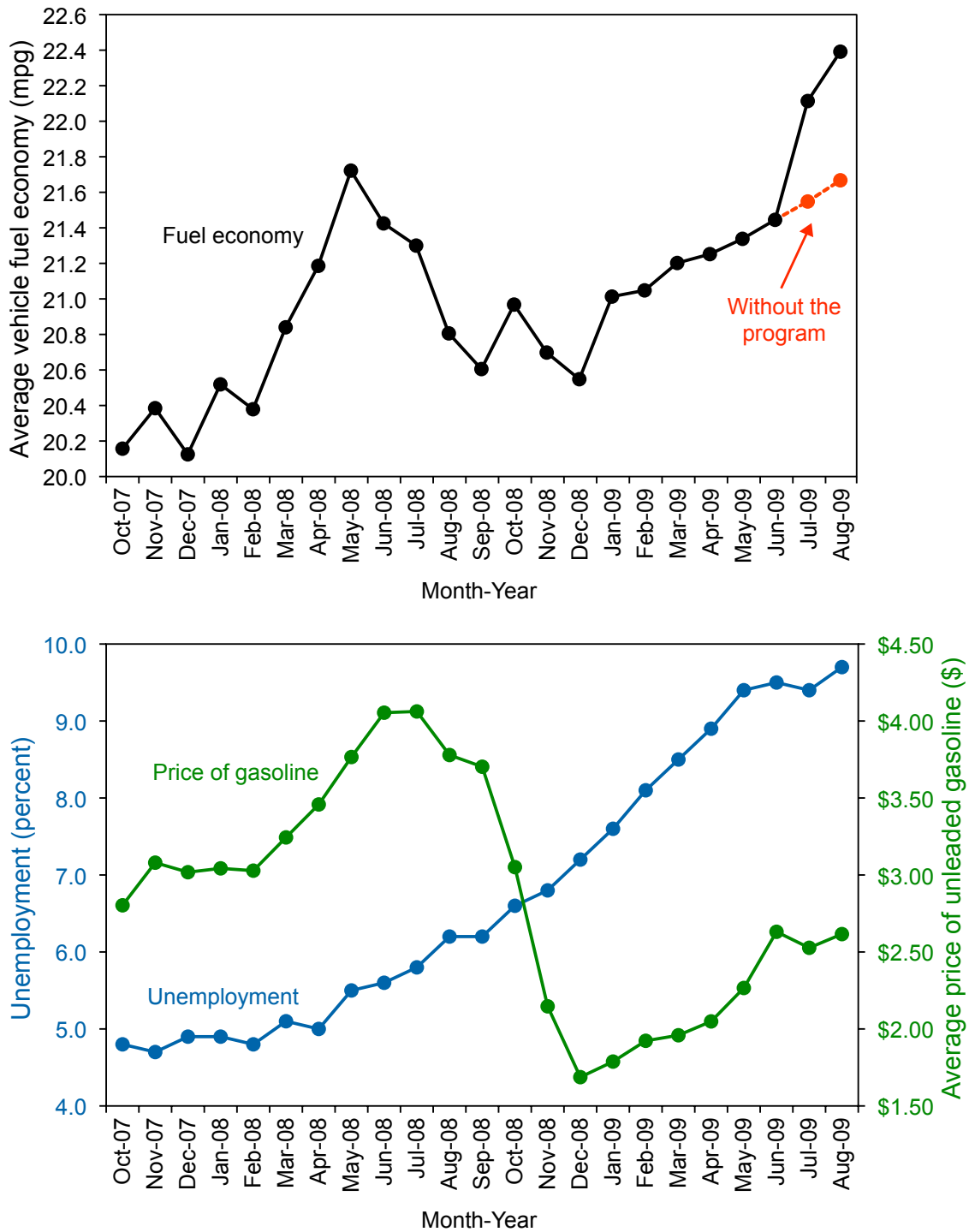


Figure 1. Average fuel economy of purchased new light-duty vehicles (top panel), and the unemployment rate and the price of regular gasoline (bottom panel). The data through June 2009 were included in the regression analysis that formed the basis for predicting the fuel economy *without the program* for July and August 2009 (shown in red).

The predicted, baseline fuel economy and the actual fuel economy for July and August 2009 are compared in Table 1. The results show that the program increased the fuel economy of all purchased vehicles by 0.6 mpg in July 2009 and by 0.7 mpg in August 2009.

Table 1
 Predicted fuel economy of all purchased new light-duty vehicles without the program and the actual fuel economy in July and August 2009.

Month	Predicted, baseline fuel economy without the program (mpg)	Actual fuel economy (mpg)	Overall improvement in fuel economy due to the program (Δ mpg)
July 2009	21.55	22.11	0.6
August 2009	21.67	22.39	0.7

Summary

This study evaluated the effects of the U.S. vehicle-scrappage program (“Cash for Clunkers”) on the average fuel economy of new vehicles purchased in July and August 2009. The predicted, baseline fuel economy, without the existence of the program, was derived using a model obtained from a regression analysis performed on the data from October 2007 through June 2009. The regression used the unemployment rate and the price of gasoline as the predictors of the fuel economy. The results indicate that the program improved the average fuel economy of all vehicles purchased by 0.6 mpg in July 2009 and 0.7 mpg in August 2009.

References

- Automotive News. (2009). *Automotive News data center*. Retrieved September 8, 2009 from <http://www.autonews.com/section/DATA>.
- Bureau of Labor Statistics. (2009). *Labor force statistics from the current population survey: Unemployment rate*. Retrieved September 8, 2009 from http://data.bls.gov/PDQ/servlet/SurveyOutputServlet?series_id=LNS14000000.
- Department of Transportation. (2009). *CARS: Car allowance rebate system*. Retrieved September 8, 2009 from <http://www.cars.gov>.
- Energy Information Administration. (2009). *U.S. gasoline and diesel retail prices*. Retrieved September 8, 2009 from http://tonto.eia.doe.gov/dnav/pet/pet_pri_gnd_dcus_nus_m.htm.
- Environmental Protection Agency. (2008). *EPA fuel economy datafile, 2008*. Retrieved May 20, 2009 from <http://www.fueleconomy.gov/feg/epadata/08data.zip>.
- Environmental Protection Agency. (2009). *EPA fuel economy datafile, 2009*. Retrieved May 20, 2009 from <http://www.fueleconomy.gov/feg/epadata/09data.zip>.
- Sivak, M. and Schoettle, B. (2009). *Economic indicators as predictors of the number and fuel economy of purchased new vehicles* (Technical Report No. UMTRI-2009-27). Ann Arbor, MI: The University of Michigan Transportation Research Institute.