policy brief



MICHAEL J. HICKS PH.D. Michael Hicks is currently the director of the Center for Business and Economic Research and an associate professor of economics at Ball State University.

Hicks earned doctoral and master's degrees in economics from the University of Tennessee and a bachelor's degree in economics from Virginia Military Institute. He has authored two books and more than 60 scholarly works focusing on state and local public policy, including an emphasis on tax and expenditure policy, environmental regulation, alternative and traditional energy and the economic impact of Wal-Mart on local economies.

For more information contact Dr. Michael J. Hicks at mhicks@bsu.edu.

© 2009 Center for Business and Economic Research, Ball State University

Some Preliminary Evaluation of the Cash for Clunkers Program

Michael Hicks, PhD

The Car Allowance Rebate System, more commonly known as CARS was a Federal program designed to stimulate new car purchases from July 1, 2009 to November 1, 2009. The program had the stated goals of stimulating the economy and reducing carbon emissions.¹

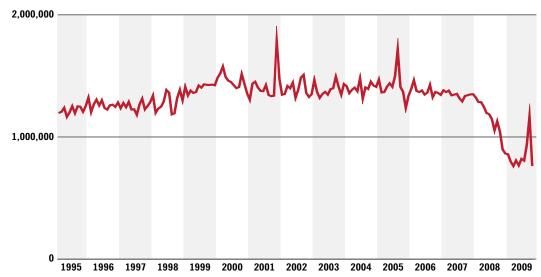
The program was enormously popular among automobile buyers, and despite additional resources added to the tax incentive, the program terminated almost six weeks early. It is far too early to ascertain the full impact of the program against its stated goals. It is not too early to assess the impact of the program on automobile sales.

CASH FOR CLUNKERS & AUTO SALES

The Department of Transportation reports a little more than 690,000 vehicles were exchanged under the program with associated rebates of \$2.877.² Secretary La-Hood labeled the program "wildly successful," which if measured by the yard stick of vehicle sales over its brief lifespan is hardly an exaggeration. (See Figure 1)

Several important issues have emerged regarding the programs benefits. First, it is important to understand how much the program spawned additional vehicle sales. Second, what are the environmental benefits of reduced emissions? Finally, what was the cost per vehicle of these effects?

Figure 1: Seasonally Adjusted Monthly Sales of Light Vehicles



At least two researcher groups have attempted to determine the environmental benefits, including the operation cost per vehicle. These are highly useful efforts, but since estimates of the cost of the primary greenhouse gas associated with vehicle use (carbon dioxide) ranges from zero to several hundred dollars per cubic ton, these estimates are unlikely to play an important role in the debate over the efficacy of the Cash for Clunkers program.

Recently, a report by Edmunds.com, an automobile consultancy, estimated that only 170,000 vehicles sold in July and August of 2009 were attributable to the Cash for

The Cash for Clunkers program had a significant effect on monthly car sales during July and August, and with more than 690,000 households participating represents a significant influence on the automobile market.

> Clunkers program. If substantially correct, this report seriously challenges both the efficacy of the program for its stimulus effects and for its environmental effects (which would have otherwise been achieved through normal replacement). The Edmunds.com study performed this estimate by comparing the forecasted level of auto sales with the actual number of auto's sold over this period. From a method standpoint this is not an uncommon approach to modeling policy intervention.³ One drawback is that this approach requires a great deal of confidence in the underlying forecasting model during this period. This Policy Brief will address this question employing an alternative model.

THE IMPACT OF CASH OR CLUNKERS ON VEHICLE SALES

As Figure 1 painfully illustrates, US automobile sales have languished miserably in this recession. The Cash for Clunkers program had a significant effect on monthly car sales during July and August, and with more than 690,000 households participating represents a significant influence on the

automobile market. What is not yet known is the incremental effect the program had on car sales. Clearly, some owners would have exchanged their cars for new vehicles, with or without the program. Also, it is likely there has been some compression of vehicle sales from later months as consumers decided to expedite their purchase of automobiles. The task before us is to decompose the effect of the Cash for Clunkers program now that data through September is available for variables that might affect automobile sales. In order to estimate the effect of Cash for Clunkers, we turn to a tried and true economic model of automobile demand.

In order to isolate the incremental effect of the Cash for Clunkers program, we propose a demand function:

LVS = f(Gas Price, Prime Rate, Unemployment Rate, Clunker, Quarter)

Where light vehicle sales is a function of a three month moving average of gasoline prices, the Federal Reserve Prime Rate, the unemployment rate, three quarterly binary variables to account for seasonality in auto sales and a three month autoregressive and moving average term.⁴ The Clunker variable takes three different forms. First, we combine both months, treating the entire active clunker period as a single dummy variable. Alternatively, we account for each month of the clunker program differently. There are benefits and drawbacks to both approaches, that are largely to be resolved when making comparisons across the results. These estimation results appear in Table 1.

These results confirm what the data in Figure 1 visually suggest. The Cash for Clunkers program significantly increased automobile sales during July and August 2009 over what they would have otherwise been. Importantly, the model also confirms other information about auto markets, lower interest rates, lower gas prices and lower unemployment rates all boost auto sales, when all else is held constant. These are important both because they confirm that this aggregate model of automobile demand provides an ad-

44

¹The original plan offered in an Op-Ed piece by Princeton Macroeconomist Alan Blinder included these goals as well as a wealth equalization as poorer Americans could upgrade their vehicle stock through the program. See Blinder, Alan. "A Modest Proposal: Eco-Friendly Stimulus". The New York Times. 27 July 2008.

²"Cash for Clunkers Wraps up with Nearly 700,000 car sales and increased fuel efficiency, U.S. Transportation Secretary La-Hood declares program "wildly successful"." U.S. Department of Transportation Press Release. August 26, 2009, retrieved October 29, 2009.

Table 1: Estimation Results

	Model One	Model Two
Common Intercept	26.72039*** (11.58)	26.90792*** (11.76)
Gasoline Price (3 month moving average)	-0.748978** (-2.42)	-0.778460** (-2.52)
Prime Rate	-0.251543 [†] (-1.53)	-0.258918 [†] (-1.59)
Unemployment Rate	-1.554156*** (-6.75)	-1.569218*** (-6.86)
Quarter 2	0.159813 (1.15)	0.164390 (1.17)
Quarter 3	0.347938 (1.85)	0.356407* (1.87)
Quarter 4	0.193514 (0.92)	0.197335 (0.94)
Clunker (July & August)	4.119236*** (3.68)	-
Clunker (July)	-	2.686270*** (6.56)
Clunker (August)	-	5.563992*** (13.24)
Autoregression (3)	0.914247*** (19.46)	0.913085*** (19.28)
Moving Average (3)	-0.581090*** (-5.33)	-0.588316*** (-5.44)
Adjusted R-squared	0.73	0.74
Log likelihood	-240.4932	-238.3574
F-statistic	52.29652***	48.36239***

Note: *** denotes statistical significance at the 0.01 level, ** denotes statistical significance at the 0.05 level, * denotes statistical significance at the 0.10 level, and †denotes statistical significance at the 0.15 level. Traditional t-statistics are in parenthesis.

equate basis for controlling for other variables that might influence the sales of automobiles. For the purposes of this Brief, the effect of the Clunkers program is the variable of interest. This requires more detailed discussion.

The estimates of sales provided above reflect changes to annualized sales rates reported to the Bureau of Economic Analysis. Monthly sales are roughly 1/12 of this amount, which includes a seasonal adjustment. To control for these effects, we adjust the coefficients in Table 1 from the two models to provide estimates of the Cash for Clunkers program on total automobile sales.

Estimates from Model 1 (with a clunkers that treats July and August as one common

period) we estimate the incremental change in light vehicle sales attributable to the cash for clunker program as roughly 685,000 while in Model 2 (which treats July and August as separate periods) we estimate the impact to be roughly 687,000 vehicles. These estimates are unusually close to the 690,000 vehicles sold under the program and reported to the Department of Transportation. Both estimates are far higher than the Edmunds. com. It is also worth noting that the standard errors for both estimates are 185,000 and 135,000 vehicles each, suggesting a modest range of impacts should be considered.

Replicating the Edmunds.com method by comparing forecasted to actual sales for

³To see an example from my own research see Hicks, Michael J. "A Quasi-experimental Analysis of the Impact of Casino Gambling on Regional Economic Performance" Proceedings of the National Tax Association, 2003. pp181-188.

⁴The variables employed are nominal (affecting gasoline prices) and are all stationary over the common period of January 1995 through September 2009. We treated the standard errors with White's heteroscedasticity invariant, variance covariance matrix.

July and August provide point estimates within the standard error of both models reported here.

FURTHER DISCUSSION

Critical analysis of the fiscal stimulus plan and ancillary public policy designed to mitigate the effects of this recession will no doubt be long in the making. The fullness of this discussion will include the traditional concerns over the timing of fiscal stimulus, the policy tools employed and the speed as well as diffusion of effects. I have substantial reservations regarding the efficacy of the stimulus in both size and scope. I also have doubts regarding the appropriateness of the Cash for Clunkers in destroying the capital stock of cars and providing general fund support to individuals to buy automobiles. Further, some analysts have expressed concern that the automobiles purchased under the program (which were not primarily Ford, GM and Chrysler) will ultimately lead American consumers away from domestic producers. This might generate an unintended effect of lowering market share for the very firms the program was apparently designed to benefit. That said, one criticism of the program - that Cash for Clunkers actually led to few additional automobiles

sold – does not survive the scrutiny of empirics. By my estimates virtually all the automobiles sold under the Cash for Clunkers program can be attributed to the effects of this policy. Judged by that prism, the program must be viewed as a success.

CENTER FOR BUSINESS AND ECONOMIC RESEARCH POLICY BRIEF

About the Center:

The Center for Business and Economic Research is a premier economic policy and forecasting research center housed within the Miller College of Business at Ball State University. The Center publishes the American Journal of Business—a peer-reviewed scholarly journal—and the Indiana Business Bulletin—a Web site with weekly commentary, analysis and data on economic, business and demographic trends in Indiana. Research in the Center encompasses health care, public finance, regional economics, transportation and energy sector studies. In addition to research, the Center hosts the Executive Economic Exchange in Indianapolis four times a year, and also serves as the forecasting element in the Muncie area—hosting five state and federal economic forecasting roundtables.

Center for Business and Economic Research
Miller College of Business, Ball State University
Whitinger Business Building, room 149 • Muncie, IN 47306
Phone: 765-285-5926 • Fax: 765-285-8024