

**EXECUTIVE OFFICE OF THE PRESIDENT
COUNCIL OF ECONOMIC ADVISERS**



**ECONOMIC ANALYSIS OF THE CAR ALLOWANCE REBATE SYSTEM
("CASH FOR CLUNKERS")**

September 10, 2009

I. INTRODUCTION

The Car Allowance Rebate System (CARS)¹ is one of several stimulus programs whose purpose is to shift expenditures by households, businesses, and governments from the future to the present. (Other programs with the same motivation include support for bringing forward future infrastructure investments, and accelerated depreciation to bring forward business investment.) Such time-shifting is valuable in a recession, when the economy has an abundance of unemployed resources that can be put to work at low net economic cost; even conservative economists such as Martin Feldstein, Chairman of the Council of Economic Advisers (CEA) under President Reagan, have endorsed this logic for stimulus spending. The benefits of such expenditure-shifting programs are particularly clear when the induced spending is in an industry (like the automotive industry) with a disproportionately large amount of unemployed resources. An additional benefit specific to the CARS program is that bringing forward the replacement of dirty (high-polluting) “clunker” motor vehicles by cleaner, high-efficiency vehicles means there will be less pollution over some time period.

The CARS program was signed into law by President Obama on June 24; in principle, the program went into operation on the first day of July 2009, but in practice few sales were completed under CARS until final details of the program were specified by the Department of Transportation on July 24.

The program provided \$3,500 or \$4,500 bonuses to buyers who traded in light motor vehicles with mileage ratings of 18 miles per gallon or less, who purchased a new car or truck with an improved mileage rating, and whose trade-ins and new purchases met certain other criteria. In order to get the maximum amount of \$4,500, the mileage had to improve by 10 mpg for new cars and 5 mpg for new light trucks. (There were separate criteria for medium trucks.)

This report provides our current estimates of the economic impact of the CARS program on motor vehicle sales, Gross Domestic Product (GDP), and employment. We should note that

¹ Created by the “Consumer Assistance to Recycle and Save (CARS) Act” of 2009.

these estimates will likely change in coming weeks and months as we receive further data on the pace of motor vehicle sales, automaker production schedules, and other information important for our calculations.

II. IMPACT OF THE CARS PROGRAM ON SALES

The first step in our analysis is to estimate the effect of the CARS program on motor vehicle sales, because sales are the ultimate driver of production and employment. But in calculating the effect of the program, we must know not just how many sales occurred, but how many sales *would have* occurred anyway (even without the program); the CARS program can be credited with an effect on sales only for those sales that would not have taken place in its absence. We need, further, to make assumptions about the extent to which the CARS-induced sales were “borrowed” from sales that would have occurred in the near future. These exercises are somewhat speculative, so we examine the sensitivity of our conclusions to what we view as reasonable alternative assumptions.

A. The Current Situation

The CARS program ended on August 24, far earlier than originally anticipated. As a result of the program, the increase in sales over the July-August period will have been one of the largest two-month spikes on record. According to the Department of Transportation, there were 690,114 applications for vouchers under the program (slightly less than the original projection of 750,000, mainly because purchases were skewed toward more fuel-efficient vehicles that earn higher voucher payments). This strong effect on the level of sales is consistent with the experiences of other countries around the world, many of whom have introduced programs similar to CARS in the past year (see text box). In most cases, there has been a very substantial effect on the pace of sales.

What Are Other Countries Doing?

Eleven European countries have initiated motor vehicle sales incentive plans since last December, with minimum rebates ranging from 750 to 2500 Euros (about \$1000 to a high of \$3500 in Germany). According to *Time*,² Germany's incentives may result in auto sales there reaching a 10-year high of 3.5 million new vehicles. Sales in other countries also have been substantially boosted. Russia plans to launch an incentive plan in early 2010, including a \$1550 rebate for a new Russian-made car when a trade-in more than ten years old is scrapped; China had an incentive plan that involved cuts in hefty taxes on motor vehicle sales, and sales there have increased very sharply over the past year; and South Korea has instituted a plan that is due to expire at the end of 2009.

Details of the plans have varied across countries; the British and Korean plans do not impose fuel efficiency requirements, and in Germany the lack of an enforcement mechanism to keep the traded-in clunkers off the road has led to many of the trade-ins being shipped to other countries (where they will continue to pollute, undermining the environmental rationale for the program).

B. Estimated Net CARS-Induced Sales

Because the clunkers traded in were much older than the average vehicle, and older vehicles are often owned by people who might replace their vehicle by buying a less-old used car rather than a brand new car, it seems likely that a relatively high proportion of the direct sales of new cars to clunker owners under CARS would not have occurred in the absence of the program. A rough calculation based on data from Klier (2009) on the stock of outstanding vehicles that were eligible as clunker trade-ins yields a ballpark estimate that the pace of new car sales associated with the replacement of clunkers might be about 105,000 a month.³ This matches well with a figure reported by J.P.Morgan as having been produced internally by Ford, of 90,000 a month, for normal clunker-replacement-demand.⁴ Ford reportedly also had measured this

² Boston (2009).

³ According to Klier (2009), about a quarter of the registered and insured vehicle stock was made up of vehicles that would have been eligible as CARS trade-ins. If clunker owners were just as likely as anybody else to buy a new car upon the retirement of their existing car, this might suggest that clunker owners would normally account for a quarter of the sales of new cars. Supposing that clunker owners were only half as likely as other car owners to buy a new vehicle, and using the fact that the pace of sales in the months leading up to the CARS program was about 10 million units (at an annual rate), one obtains the estimate that the pace of sales of new cars to clunker owners might have been in the neighborhood of $(1/4) \cdot (1/2) \cdot 10 = 1.25$ million units a year, or about 104,000 sales a month.

⁴ Patel and Brinkman (2009).

figure at 70,000 a month in the months leading up to the CARS program, consistent with the intuition that clunker owners might be more likely than the typical car owner to hesitate to buy a new car in times of heightened economic uncertainty.⁵

Given this range of estimates, we use 100,000 vehicles per month as our baseline estimate of clunker-replacement-induced demand. Since lower clunker-replacement demand means that any given amount of CARS sales constitutes a larger net increment to sales, we use a figure of 35,000 (half of Ford's estimate) as our "optimistic" scenario for the evaluation of the program. Our "pessimistic" scenario assumes that the pace is 150,000. The wide range of values (and our choice of round numbers) indicates the extent to which this number is difficult to calibrate.

Under the assumption that the normal pace of clunker-replacement demand is 100,000 vehicles per month, a rough guess is that the CARS boost to vehicle sales was about 490,000 in July and August – 690,000 minus underlying clunker-replacement demand of 100,000 per month for two months.

One reason the 490,000 figure is likely an overestimate of the overall effect of the program is that it is probable that some sales that would have occurred in June were postponed into July to obtain the subsidy. But since the CARS program does not seem to have gained widespread public attention until sometime around mid-June, it seems unlikely that much more than half of the assumed 100,000 normal monthly clunker-replacement sales were postponed to take advantage of the program.⁶ Our baseline analysis below will assume 50,000 postponed June sales, which yields an estimate of 440,000 net CARS-induced sales over the June-July-August time frame.⁷ (Henceforth we call the net number of sales that happened as a

⁵ Patel and Brinkman (2009), and personal communication with Ryan Brinkman at J.P.Morgan.

⁶ Whatever the June postponement effect may have been, actual June sales exceeded the pace that J.D. Power, a leading auto sector forecaster, had anticipated in its May forecast. (Information provided to CEA by J.D. Power). We also attempted to estimate the size of the postponement effect ourselves by examining how the actual pace of sales differed from alternative trend lines, using daily data provided to us by an industry source. Although many of our results indicated that there may have been a postponement effect, some specifications showed a positive rather than a negative effect; in the end we concluded that the results were not robust enough to be conclusive.

⁷ We also assume a 50,000 postponement in the pessimistic scenario, but only about 20,000 in the optimistic scenario.

consequence of the program “CARS-induced” sales.)

C. Are CARS Sales Borrowed from the Future?

For evaluating the stimulative effect of CARS, the most important question is the extent to which CARS-induced sales are “borrowed” from sales that would have occurred anyway in the near future (referred to in the industry as the “pull-forward” effect). Almost all CARS-induced sales reflect borrowing from *some* future date, since every automobile in use – like the clunkers being traded in – will eventually wear out and almost all will be replaced. A sale that is pulled forward from the distant future (say, two years in the future or later) probably can be assumed to have produced a genuine and substantial net stimulus.

We present three types of evidence about the nature and extent of the payback: commentary by analysts and industry sources, facts about automakers’ production schedules, and our own analysis of comparable past episodes in the United States

We are not aware of any explicit analysis by the automakers of the proportion of sales that will not be swiftly paid back. But, according to an August 28 interview with the Associated Press, Ford Motor Company President of the Americas Mark Fields “estimated about 30 percent to 40 percent of its clunkers sales were ‘truly incremental,’ meaning that they came from consumers who had no plans previously to buy a car. The rest, he said, came from people who were going to buy a car later on.”⁸ Moody’s Investors Service is even more optimistic, estimating “that about 60 percent of the vehicles sold with clunker rebates were purchased by consumers who were not otherwise intending to buy,” according to the *Wall Street Journal*.⁹ General Motors appears to have a similar view: a September 1, 2009 story in *BusinessWeek* quoted Michael DiGiovanni, GM’s executive director of global market and industry analysis, as estimating that only “about 200,000 of the 700,000 cars sold under the clunkers program were pulled ahead from future months.”¹⁰

⁸ Strumpf and Fowler (2009).

⁹ Bennett (2009).

¹⁰ Welch and Kiley (2009).

Automakers' actions seem to correspond to their statements: they have increased their production schedules for this year in the fourth quarter relative to the third quarter,¹¹ perhaps in response to strong sales under the CARS program, and all of the Detroit 3 automakers have recently announced upward revisions to their fourth quarter production schedules for high-fuel-efficiency vehicles that sold well under the CARS program. Foreign carmakers with domestic production facilities, who accounted for the bulk of the remainder of the sales under the CARS program, have not made any public announcements about changes in their production schedules, but such revisions would not be surprising.¹²

To gain an independent perspective on the likely size and timing of the “payback” effect, we have examined two previous episodes in which a temporary boost to motor vehicle sales was achieved by temporary but substantial financial incentives: the zero-percent financing and other incentive programs that the automakers introduced following the September 11 attacks, and the expiration of “employee discount pricing” incentives in 2005. Figure 1 shows the level of light motor vehicle sales since January of 1998, along with the average level of sales over the period from January 1998 to December 2007.

The clearest conclusion that can be reached from a careful examination of these data is that they do not provide much reliable evidence on the key question we want to address: the timing and magnitude of the payback effect. While the direct effect of the incentives is clear enough (and highly statistically significant), no statistically robust pattern appears to characterize the aftermath of incentive programs. In fact, the data do not clearly reject the theory that sales simply return to normal after an unusually generous incentive scheme ends.

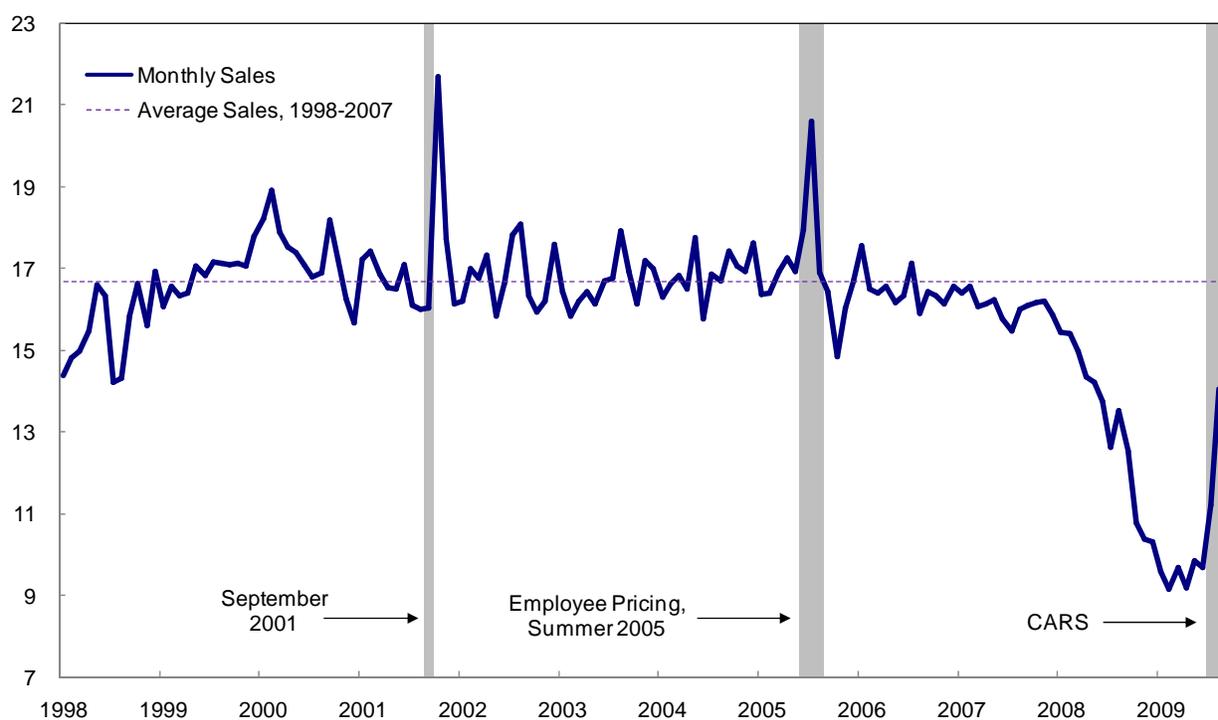
The assumption that no payback exists, however, is not plausible, and is not consistent with economic theory. Our approach is therefore simply to use some patterns in the data to calibrate what we view as a plausible (though not statistically reliable) pattern for the payback.

¹¹ Production schedules from the automakers, seasonally adjusted by the Federal Reserve.

¹² Visnic (2009).

Figure 1. U.S. Light Motor Vehicle Sales, 1998-2009

Millions of units, seasonally adjusted annual rate



Source: Department of Commerce (Bureau of Economic Analysis).

The post-September-11 incentives succeeded in stimulating a very large spike in motor vehicle sales in October and November of 2001. However, the pace of sales in the months following the expiration of the incentives was not notably lower than would have been predicted in the absence of the programs. This episode does, at least, seem to rule out the proposition that after a generous incentive scheme, the payback is inevitably strong, swift, and complete within a few months. Instead, the data suggest that the payback period extended far beyond a year following the expiration of the incentives (because the pace of sales in the first year following the expiration of the incentives was not significantly depressed).

A more complex story is presented by the expiration of “employee discount pricing,” an incentive program that many of the automakers participated in to varying extents, over a period that ended (for different automakers) between July and October of 2005. While there was no unambiguous effect on sales at the time the program was introduced, news that the program was

about to end did spur a rush of last-minute sales in June and July. Indeed, not only did automakers end the employee discount pricing incentives, in October they even scaled back the availability of their normal incentives to unusually low levels. In that month, the deficit of sales (relative to normal levels) amounted to about 34 percent of the surplus of sales over the June-July period. A simple interpretation would hold that the “payback” in October was 34 percent of the “excess” sales from June and July. (One reason it may be problematic to interpret this episode in this way is that the period of employee discount pricing extended much longer than the two months at the end with a notable sales spike; so the magnitude of the net “pull-forward” effect may have been considerably greater than the June-July spike. If so, our 34 percent figure probably exaggerates the size of the payback by underestimating the size of the “pulled-forward” debt to be paid back).

Based on the experiences in these two episodes, we have made a two-part assumption about the payback effect: The first-month payback after the expiration of the September 11 incentives was statistically insignificant and economically small, but a raw estimate is that the deficit in sales in the first month after the full end of the program was about 8 percent of the net boost in sales over the incentive period. In contrast, the first-month payback after the expiration of employee discount pricing was statistically significant, and appears to have been about 34 percent of the “excess” sales of the prior two months. We average the two experiences and assume that September of 2009 will see a payback of about $(0.08+0.34)/2=0.21$ of the net CARS-induced sales through August. Under our baseline assumption that such sales amounted to about 440,000, we obtain an estimated payback figure of about 21 percent of 440,000 or around 90,000 for September. Given the large range of uncertainty surrounding this figure, we also consider a “pessimistic” case with a September payback figure of about 115,000, and an “optimistic” scenario in which the payback rate is about 20,000 (which is still triple the payback rate assumed for subsequent months in the optimistic scenario).

Since we were unable to find any evidence of a payback effect in the three months or the year following either the post-September-11 episode or (after October) for the post-employee-pricing episode, we assume that the remainder of the payback occurs over a span of several years (long enough that the payback effect, while real, would be too small to be statistically

detectable). Our “pessimistic” assumption is that everyone who bought a car under the CARS program would have replaced their clunker anyway within three years of the end of the program; our “baseline” assumption is that the time span for full replacement would have been five years and our “optimistic” assumption is of a seven year payback period. Of course, it is not plausible that every single CARS-induced sale would have been paid back by the end of any fixed period; we make these assumptions in order to keep the analysis as simple and transparent as possible. To the extent that some CARS-induced vehicles outlast even our most pessimistic assumption, our calculations of the economic effects of the CARS program will overstate the payback and underestimate the economic effect.

Evidence on Payback Effects from Past Experience in Other Countries

France, Spain, and Italy all experimented with motor vehicle scrappage incentive programs (without an environmental component) in the 1990s, and in each case the programs resulted in a substantial boost in sales during the incentive period. And in all three countries, the period immediately following the end of the program saw a decline in sales.

However, data from these countries do not tell a straightforward story about the size and timing of “payback” effects beyond the month or two after the ending of the incentive programs. The chief difficulty in making estimates of the size of payback effects is that, even in normal times, the volatility of the pace of motor vehicle sales is so large that unless payback reliably occurred immediately and completely within a few months of the ending of the program, it would not be expected to be statistically measurable.

Further difficulties are posed by the fact that it is not clear what assumption to make about the trend rate of motor vehicle sales. Different assumptions about the trend give different conclusions about the pattern of the payback.

None of these difficulties should be taken to suggest that payback does not eventually occur – only that it is difficult to use these experiences to calculate a reliable measure of the exact timing or dynamic pattern of the payback effect. For example, one simple method of calculating the size of the payback suggests that about 4 percent of the sales that occurred under France’s incentive program were “paid back” in the following year. But the same method actually produces an estimate that the pace of sales in Spain and Italy was higher than it would have been in the absence of their schemes.

Table 1 summarizes the implications of our three scenarios for the path of vehicle sales. In our baseline scenario, the program will increase car sales in 2009 by about 330,000. In our pessimistic scenario, the increase will be about 210,000, and in the optimistic one, it will be about 560,000.

Table 1. Effect of CARS on Light Motor Vehicle Sales

Payback Time	2009		2010		Annual	
	Q3	Q4	Q1	Remaining Quarters	2009	2010
	Millions of Vehicles (quarterly figures are not at an annual rate)					
Pessimistic (3 years)	0.28	-0.02	-0.02	-0.02	0.21	-0.08
Baseline (5 years)	0.40	-0.02	-0.02	-0.02	0.33	-0.07
Optimistic (7 years)	0.60	-0.02	-0.02	-0.02	0.56	-0.08

Source: CEA calculations.

Notes: These are our estimates of the change in light motor vehicle sales as a result of the CARS program, taking account of both payback effects and the fact that some sales that occurred under the CARS program would have occurred even in the absence of the program. Estimated reductions in June 2009 are not shown in the table, but account for the slight discrepancy between the sum of the quarterly numbers for 2009 and the annual number for that year.

III. EFFECTS ON GDP

Once we have an estimate of the portion of sales that are not near-term time-shifting, we can translate those sales into an estimate of the impact on GDP, using estimates of 1) the portion of the extra cars that reflect domestic production; 2) the domestic value added of a domestically-produced car; 3) the amount of domestic value added associated with each domestic sale of a foreign-produced car; and 4) the time frame over which an extra unit sold translates into an extra unit produced (which will depend on the dynamics of inventories). Although there are ranges of views concerning items (1), (2), and (3), those ranges are relatively narrow, and reasonable variations have little impact on the bottom-line estimates. To address issue (4), we assumed that production will be boosted equally in 2009:Q3 and 2009:Q4 by the amounts necessary to produce enough vehicles to satisfy the increase in sales.¹³ From 2010:Q1 onward we assume

¹³ The contribution to GDP from the value added by dealers who executed the sales and other suppliers of intermediary services will accrue mostly in 2009:Q3, while we assume that the GDP associated with the

that the pace of production matches the pace of sales.

The elements that go into our calculation of the effect of motor vehicle production on GDP are estimates of:

1. The proportion of the vehicles sold under the CARS program that were domestically produced (0.53, according to data provided to us by the Department of Transportation).
2. The price of the typical vehicle purchased under the CARS program (\$22,000, according to a report by Goldman Sachs).¹⁴
3. The average ratio of the price of a foreign-produced motor vehicle to the price of a domestically produced motor vehicle, 1.16.¹⁵
4. The domestic content of domestically assembled light motor vehicles (0.85, according to an estimate provided to us by the Bureau of Economic Analysis (BEA)).
5. The domestic value added associated with the distribution and sale in the United States of a foreign-produced light motor vehicle (about 0.16, according to calculations using data provided by BEA and a CEA estimate of the proportion of the value added that accrues to foreign shippers and other foreign providers).

Using these estimates we can calculate that, if the average ratio of the prices of foreign to domestic vehicles sold under CARS was the same as in the usual data, then the typical foreign vehicle sold under the program had a sale price of about \$23,700 while the typical domestic vehicle sold under the program had a sale price of about \$20,500. In this case, the domestic value added of each domestically produced vehicle sold under CARS should have been about \$17,400 (from $0.85 * \$20,500$), while the domestic value added of each foreign vehicle sold under

manufacturing of the extra vehicles will likely accrue mostly in 2009:Q4 as depleted inventories are replenished. For simplicity, we assume that the overall contribution to GDP is equal in the two quarters.

¹⁴ Goldman Sachs (2009).

¹⁵ United States Department of Commerce (2009), obtained from the HAVER database, variables APFU@USNA and APDU@USNA.

the program would have been about \$3800 (from $0.16 * \$23,700$). Of the 0.33 million units sold under our baseline scenario, therefore, the contribution to GDP from the domestically produced vehicles will have been \$3.04 billion (from $0.33 \text{ million} * 0.53 * \$17,425$), while the contribution from the foreign sales will have been about \$590 million (from $0.33 \text{ million} * 0.47 * \3800), for a total contribution to GDP of about \$3.6 billion under our baseline scenario during 2009.

Our assumptions about inventory and production dynamics and about payback imply that the *level* of GDP is boosted in both 2009:Q3 and 2009:Q4, but the *growth rate* of GDP is boosted only in 2009:Q3. (This is because we make the approximation that changes in GDP, for a given amount of sales, mirror changes in production, since a sales change that is not matched by a change in production mainly affects inventories.) From 2010 forward, the level of GDP is modestly lower than it would have been (in the absence of CARS) until the end of the payback period (implying that there is a negative impact on GDP growth in 2010:Q1 that slightly more than reverses the boost in 2009:Q3). There is a final positive fillip to GDP growth at the end of the payback period, returning it to the level that it would have attained in the absence of CARS.

Table 2 presents our detailed projections of the first-round effects of the CARS program on GDP growth and employment (we discuss the employment estimates below). Under the pessimistic scenario, the program raises GDP growth by about 0.1 percentage points in 2009:Q3; under the baseline scenario, it raises growth by 0.2 percentage points; and under the optimistic one, it increases growth by almost 0.4 percentage points. To put it another way, the estimates imply that the \$3 billion program will increase output in the automobile sector in the second half of the year by between about \$2.5 billion and \$6 billion – a substantial direct effect. It is important to note, however, that the boost to the level of GDP is temporary, and is followed by a drop that slightly more than reverses the increase, reflecting the slightly lower level of sales in the “payback” period.

Table 2. Contribution of CARS to GDP Growth and Employment, 2009 and 2010

	2009		2010		Annual (Q4/Q4)	
	Q3	Q4	Q1	Remaining Quarters	2009	2010
Payback Time						
	Contribution to GDP Growth (Percentage Points at an Annual Rate)					
Pessimistic (3 years)	0.13	0.00	-0.15	0.00	0.03	-0.04
Baseline (5 years)	0.21	0.00	-0.23	0.00	0.05	-0.06
Optimistic (7 years)	0.35	0.00	-0.38	0.00	0.09	-0.09
	Job-Years Created or Saved (Thousands of Job-Years)					
Pessimistic (3 years)	10.8	10.8	-2.0	-2.0	21.6	-7.9
Baseline (5 years)	17.4	17.4	-1.8	-1.8	34.8	-7.3
Optimistic (7 years)	29.2	29.2	-2.2	-2.2	58.5	-8.7

Source: CEA calculations.

Notes: Job-years created or saved are measured in levels, not at an annual rate. For example, our baseline projection is that about 35,000 job-years will be created in 2009 (that is, hours of employment will be created that correspond to the hours associated with about 35,000 full-time year-round jobs; since all of these jobs are concentrated in the second half of the year, the actual number of jobs would be about 70,000 during that half year). For details of the method of calculating contributions to GDP growth and employment, see the main text.

IV. EFFECTS ON EMPLOYMENT

To obtain estimates of the jobs effects of the program, we need estimates of the assembly jobs required to produce an extra car and of the relationship between assembly jobs and the other jobs associated with automobile production and sales. We use standard estimates of these parameters; we confess, however, to more uncertainty about the resulting jobs estimates than about the GDP estimates.

We start with a calculation based on the state of the auto industry in 2006, the last year of relatively normal conditions in that industry. According to the BEA, there were 10,880,000 light motor vehicles assembled domestically in that year, and there were 267,000 assembly workers who made these vehicles.¹⁶ This means that each light-vehicle assembly worker was associated with the production of about 41 light vehicles. We then use the Bureau of Economic Analysis's input-output tables for the United States to calculate that assembly hours represent one-eighth of the total hours involved in the production, distribution, and sales of a domestically produced light

¹⁶ This figure excludes assembly workers involved in the production of medium and heavy motor vehicles.

motor vehicle (recall that assembly workers are using already-constructed components like engines, transmissions, and frames which, themselves, require a great deal of labor input to build). Thus, taking account of all the workers required for the production of a vehicle, the number of vehicles per year of work is about $4\frac{1}{8}$, or a bit over 5. Thus, under our baseline scenario in which the CARS program causes the production of about 175,000 extra light motor vehicles in 2009, we find that the number of job-years is about 35,000.

The bottom part of Table 2 shows our detailed estimates, presented in terms of “job-years” (that is, an additional job for a full year). As noted above, the baseline scenario suggests that CARS will create about 35,000 job-years in the second half of 2009, followed by small offsetting decrements when the “payback” period arrives (for production) in 2010. In the pessimistic scenario, the figure is a bit over 20,000, and in the optimistic one, it is about 60,000. Thus, these estimates imply that employment in the second half of 2009 will be between about 40,000 (double the pessimistic 20,000 job-years) and 120,000 (double the optimistic 60,000) higher than it otherwise would have been. Our “baseline” estimate is that, because of the CARS program, employment in the second half of 2009 will be roughly 70,000 higher than it otherwise would have been.

V. COMPARISON TO OTHER ESTIMATES

As a check on the plausibility of our analysis, we present here a compilation of the other quantitative analyses of the effects of the CARS program that we are aware of.

Most private forecasts seem to have taken the approach of mentioning the CARS program as an important factor that will boost personal consumption expenditures and GDP growth in the third (and possibly fourth) quarter, but without giving a specific quantitative analysis of how PCE growth or GDP growth would have been different in the absence of the program. However, several forecasters have produced estimates of various different pieces of the puzzle.

The one other specific estimate of the GDP effects of the program that we are aware of comes from Goldman Sachs.¹⁷ Goldman Sachs estimates that CARS will add 0.8 percentage points to GDP growth at an annual rate in the third quarter of 2009. Like us, they assume that the effect on the level of GDP in the fourth quarter would be the same as the effect in the third quarter, and thus that the program will have little effect on GDP growth in the fourth quarter. The key reason for their higher estimate of the program's effects is that they assume that very few of the sales under the program would have occurred without the program either during the period the program was in effect or in the months immediately following. Thus, in their view, almost all of the sales under the program represented a net addition to sales. In addition, they assume that almost all of the sales would be of domestically produced vehicles. We view this as a best-case scenario, but not as the most likely one.

On the other hand, Macroeconomic Advisers argues that "almost all the sales under this program just moved forward transactions that would otherwise have taken place over the next several months."¹⁸ They therefore expect only a very small effect on the path of GDP. This is clearly a worst-case scenario, and appears to require extreme assumptions about both usual clunker-replacement demand and the payback effect.

In contrast, IHS Global Insight has estimated the CARS program will add about 600,000 net sales to the market this year, more than in even our most optimistic scenario, which puts the figure at 560,000. If their forecast turns out to be correct, the impact on GDP and employment will be larger than we have projected.¹⁹

A final point of comparison is a mid-August assessment by J.D. Power,²⁰ a leading auto industry forecaster, that the net boost to auto sales for all of 2009 from the CARS program will have been 300,000. This compares with our baseline scenario of a 2009 boost of about 330,000.

¹⁷ Goldman Sachs (2009).

¹⁸ Macroeconomic Advisers (2009).

¹⁹ IHS Global Insight (2009).

²⁰ J.D. Power (2009).

VI. CAVEATS

Our analysis leaves out a variety of effects that might modify the conclusions somewhat. For example, even for an auto sale that is borrowed from the distant future, the net effect on the consumer's total spending may be less than the direct effect on auto spending, because a consumer who purchases a new vehicle under the CARS program will likely need to trim spending in other areas to make up for the extra automotive outlay. However, standard economic theory suggests that the reduction in nonauto spending should be spread out smoothly over time, and will thus mostly occur after the economy has returned to normal.

It is important to stress that we focus mainly on the direct effects of the additional purchases under CARS. In particular, we do not provide a detailed analysis of conventional multiplier effects—that is, the fact that the higher income of auto workers and manufacturers as a result of the program will lead to higher spending, thereby stimulating the economy further.

The appropriate assumption about the size of the “induced” or additional multiplier effect of the increase in motor vehicle sales is unavoidably speculative; we are not aware of any studies that have attempted to measure this quantity precisely. A simple approach would be to treat the first-round automotive spending as analogous to the consequences of a corresponding amount of government spending, and compute the “induced” effects as the government spending multiplier minus 1 (because we have already accounted for the first-round effects). One objection to this approach is that the usual government spending multipliers are assumed to correspond to a permanent increase in government spending, while the CARS-induced spending is transitory. Nonetheless, one could reasonably take a first-quarter “induced” effect to be about 0.05 ($=1.05-1.00$, where 1.05 is the first-quarter effect of a boost to government spending from the CEA's May 2009 report, while the second-quarter induced effect might be about 0.24 ($=1.24-1.00$, also from our May report).

The consequences of the induced spending could take considerable time to percolate through the economy. And, when the boost to employment from the program ends, the multiplier effects could be expected to reverse themselves. Given these complexities, it is

difficult to determine with much precision what the time pattern of induced effects might be. But a conservative estimate might be that they would further boost the growth rate of GDP in the fourth quarter of 2009 by, say, 0.24×0.2 or a bit less than a twentieth of a percent at an annual rate (where the 0.2 is our estimate of the “first round” effect in our baseline scenario).

There are other even more difficult-to-measure effects of the program. For example, a perception that the program has helped the economy turn the corner out of recession could have had a real effect on consumer sentiment, market risk spreads, and other determinants of demand. And news reports have suggested that increasing showroom traffic associated with the program has generated some extra sales to buyers who were not eligible to participate. A number of other possible impacts would be even more problematic to quantify, such as any consequences from the reduction in charitable donations of used automobiles, any increase in the price of the remaining not-traded-in clunkers caused by a reduced supply of such vehicles, and the effects on demand for the services of the auto salvage and auto repair industries.

Further effects that we have left out could undoubtedly be imagined. Some of them might even be substantial. But none seem likely to rival the size of the first-round effects that we believe should serve as the starting point for understanding the economic impact of the program.

VII. CONCLUSION

The analysis contained here is necessarily speculative, because little can be said with confidence about two key questions: what is the time frame over which the “payback” effect will occur, and what would the pace of clunker-replacement-induced demand for new cars have been in the absence of the program? The pace of motor vehicle sales and production in coming months will help narrow the range of plausible interpretations of the effects of the program, as will data from the Department of Transportation on the results of a survey of CARS participants who were asked about what their car-buying plans would have been. There may also have been important but harder to measure economic benefits of the CARS program that are not captured in our analysis, for example on consumer confidence. And of course, the program’s environmental

benefits are not accounted for in our analysis.

We nevertheless believe that our analysis offers a reasonable starting point for assessing the program's economic impact. At a minimum, it shows that if the sales payback is not immediate and complete, the program can be expected to have produced a noticeable impact on GDP growth.

REFERENCES

- Bennett, Jeff, "Car Makers Upbeat as Sales Rebound," *Wall Street Journal*, September 2, 2009, p. B1.
- Boston, William, "Germany's Cash-for-Clunkers Black-Market Scandal," *Time*, August 7, 2009, <http://www.time.com/time/world/article/0,8599,1915250,00.html> accessed September 8, 2009.
- Executive Office of the President, Council of Economic Advisers, "Estimates of Job Creation from the American Recovery and Reinvestment Act of 2009," May 2009.
- Goldman Sachs, "U.S. Daily: Some Economic Effects of Cash-for-Clunkers," August 26, 2009, Andrew Tilton, Goldman Sachs Global ECS US Research.
- IHS Global Insight, "Forecast and Analysis: Industry and Production Outlook – Light Vehicles: Outlook for Light Vehicle Production," August 31, 2009.
- J.D. Power and Associates, "Strong Consumer Response to CARS Program Expected to Lift August New-Vehicle Retail Sales to Highest Level in the Past Year," Press Release by J.D. Power and Associates, August 20, 2009.
- Klier, Thomas, "'Clunkers for Cash' Sells Cars, Hikes Fuel Economy," http://midwest.chicagofedblogs.org/archives/2009/07/cash_for_clunke.html, July 10 2009, accessed September 1, 2009.
- Macroeconomic Advisers, "Outlook Commentary," September 3, 2009.
- Patel, Himanshu and Ryan Brinkman. "Monthly Auto Sales: Aug. 2009, Clunkers Pushes SAAR to 14.1MM; Thoughts on 'Payback,' True Underlying Rate of Demand," J.P.Morgan North American Equity Research, September 2, 2009.
- Strumpf, Dan and Bree Fowler, "Ford Exec Sees U.S. Auto Sales Rising in August," *Associated Press*, August 28, 2009.
- United States Department of Commerce. Bureau of Economic Analysis, "Table 7.2.5S: Auto and Truck Unit Sales, Production, Inventories, Expenditures, and Prices," National Income and Product Accounts, August, 2009. http://www.bea.gov/national/nipaweb/NIPA_Underlying/TableView.asp?SelectedTable=55&FirstYear=2009&LastYear=2009&Freq=Month&ViewSeries=N , accessed September 8, 2009.
- Visnic, Bill, "Post 'Clunkers,' Automakers Raising Production – Carefully," Edmunds AutoObserver, <http://www.autoobserver.com/2009/08/post-clunkers-automakers-raising-production---carefully.html>, posted August 27, 2009, accessed September 7, 2009.

Welch, David and David Kiley, "After the Clunker Party, an Auto Sales Hangover," *Business Week*, posted on September 1 2009, 6:00 PM, accessed September 2 2009 at, http://www.businessweek.com/print/bwdaily/dnflash/content/sep2009/db2009091_796652.htm.