

SYS 660
Midterm Project
Spring 2019

Distribute on March 12, 2019
Due on April 2, 2019

Overview: This project is intended to showcase the skills you have learned in the course to date. The text below is sufficient information as inputs to your models to get started. See the supplemental resources below for more detailed background information (you likely need all of them). Of course you can look for other resources as well, but that is **not required**.

Deliverable: A well-written and formatted **pdf report** (it should read like a single document, not a series of questions and their answers), no more than 10 pages in length, discussing your analysis of the case below. Keep in mind this a report you are generating to help your client with decision making. You may use software tools to make cash flow diagrams, sensitivity analysis, etc. Please only submit printouts (pdf/screenshots) of your models, including items like cell formulas for spreadsheets or other model assumptions as needed.

This is an open ended assignment. There is no right or wrong answer. Instead you will be evaluated by the quality of your analysis. Quality of your analysis will not be clear to me unless you communicate and write coherently and thoroughly. There will most likely not be sufficient data to develop objective probability distributions. You may generate your own subjective probability distributions based on your interpretation of what you uncover during your research. Likewise you will need to develop your own utility functions to reflect your interpretation of the situation. Just ensure that you justify your assumptions. This is an individual, take-home exam. You may use any generally available research sources such as news articles and journal papers, but you may not discuss the exam with your peers.

Grading criteria (equally weighted):

- Completeness of analysis
- Coherency of analysis
- Correct application of decision analysis tools
- Justification of decision model and assumptions
- Clarity of exposition

**SYS 660 Managing Director
Policy Analysis, Inc.
1 Castle Point
Hoboken, NJ 07030**

March 12, 2019

RE: Cash for Clunkers Program Evaluation

Dear SYS 660 Managing Director:

The U.S. government ran a program known as “Cash for Clunkers” in 2009. We would like to use your services to help investigate the program and the feasibility of re-establishing it for 2019. Details of the project and what we are asking you to help us with is as follows:

Key Assumptions: Discount rate is 5%; New cars bought are 2009 models.

This project pertains to the Cash for Clunkers (C4C) program run by the federal government in the summer of 2009. C4C had among its many goals a \$3 billion stimulus to the economy to spur new vehicle sales while at the same time ensuring those vehicles were more fuel-efficient than those currently being used. Proponents of the program said it would help people save money over the long run and would help to reduce our dependency on foreign energy sources.

In short, with relatively few restrictions the program paid consumers to trade in old, fuel-inefficient vehicles in exchange for newer, fuel-efficient cars. The important restrictions were:

- Vehicles traded in had to have been drivable and usable in the previous year, specifically that they had been registered for use and had paid insurance for the previous 12 months (this ensured that people did not simply trade in cars that were useless and not valuable enough to use or insure).
- Traded-in vehicles had to have fuel economy of 18 miles per gallon or less, and be less than 25 years old.
- The government gave a credit of \$3,500 if the difference in fuel economy was between 4-10 miles per gallon, and \$4,500 if the difference was 10 or more miles per gallon.¹

Tasks: Using the information provided in the list of Resources, documenting your assumptions, and thinking carefully of how to display your results, answer the following points in your report:

1. Assuming the Top 10 lists of trade-in (old) and purchased (new) vehicles provided by cars.gov website are representative of ALL of the old cars exchanged for ALL new cars, estimate a range of fuel saved from the C4C program – for the year 2019 and over 12-year lifetimes of the new cars. Assume all trade-in cars are 10 years old. Please put this answer into context, e.g., as a ratio of gasoline consumed in the US for all passenger vehicle transportation (you should find this value).

¹ There were some complicated rules about and classes of vehicles, just ignore these since the available data does not give much help with this from specific trades, just overall.

2. Estimate the fuel savings of C4C compared to what might have been “business as usual” with people trading in old cars for new cars.
3. If we had a goal of saving 10%-50% of gasoline from all passenger vehicles, how would we have to change the original C4C program to accomplish those goals for 2019?
4. Again assume all of the Top 10 traded-in cars are 10 years old. For each of these cars, assume you, a person, are the owner and, given the costs of purchase, fuel and insurance, consider which of the following options is best over 1, 5, and 10 year periods and over a range of mileage driven (think about utility functions):
 - a. Keeping your old car
 - b. Trading your old car for any of the Top 10 new cars and paying with cash
 - c. Trading your old car for any of the Top 10 new cars and borrowing the purchase price at 5% annual interest rate with 60 monthly payments.
5. Repeat question 4, except assuming you are a company and thus have tax implications (again think how utility function might be different from an individual to a company).
6. Estimate the net cost (or savings) to consumers from C4C, and the total cost (or savings) to society (consumers plus government spending). Do these on a per-car as well as per-gallon of gasoline saved basis.
7. Prepare a one-half page summary for what you might say if you met the head of the US Department of Energy based on your findings, including how the program could be improved, and how your model could be improved if you had better data.

Hint: The hard way of doing this project is to make hundreds of spreadsheets, one for each combination of traded-in car and new car. You should first build a few “generic” spreadsheets to answer all of the questions above to include in your report.

Thanks in advance for your support on this project.

Sincerely,
Shawn Quain

Liaison between the U.S. Department of Energy and the U.S. Department of Transportation

Resources:

- A) Cash for Clunkers Wiki Page:
https://en.wikipedia.org/wiki/Car_Allowance_Rebate_System
- B) Press release on final program highlights, including data on top 10 traded in and sold vehicles -
<https://web.archive.org/web/20091007021106/http://www.cars.gov:80/files/08.26%20Press%20Release.pdf>
- C) Prices and fuel economy of cars and trucks over time: <http://www.fueleconomy.gov> (see the advanced search feature)
- D) <http://www-cta.ornl.gov/data/chapter8.shtml> - Table 8.11 shows average mileage as a function of age of vehicle
- E) Purchase and insurance costs for vehicles, from Edmunds.com

2009 Purchased Vehicles	Purchase Cost	Yearly Insurance Cost
Toyota Corolla	\$17,250	\$1,523
Honda Civic	\$17,055	\$1,528
Toyota Camry	\$25,575	\$1,632
Ford Focus FWD	\$16,400	\$1,507
Hyundai Elantra	\$15,120	\$1,594
Nissan Versa	\$16,100	\$1,519
Toyota Prius	\$23,375	\$1,627
Honda Accord	\$23,705	\$1,544
Honda Fit	\$17,110	\$1,433
Ford Escape FWD	\$24,465	\$1,346

Traded-In Vehicles	Insurance
Ford Explorer 4WD	\$1,050
Ford F150 Pickup 2WD	\$1,200
Jeep Grand Cherokee 4WD	\$1,050
Ford Explorer 2WD	\$1,100
Dodge Caravan 2WD	\$980
Jeep Cherokee 4WD	\$1,050
Chevrolet Blazer 4WD	\$1,050
Chevrolet C1500 Pickup 2WD	\$950
Ford F150 Pickup 4WD	\$980
Ford Windstar FWD Van	\$990