Monthly Variations in Car Sales Relative to Light-Truck Sales and in the Consequent Fuel Economy of All Vehicles Sold

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SUSTAINABLE WORLDWIDE TRANSPORTATION

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1. Report No. SWT-2017-16	2. Government Accession No.	3. Recipient's Catalog No.	
4. Title and Subtitle Monthly Variations in Car Sales Relative to Light-Truck Sales and in the Consequent Fuel Economy of All Vehicles Sold		5. Report Date October 2017	
		6. Performing Organization Code 383818	
7. Author(s) Michael Sivak and Brandon Schoettle		8. Performing Organization Report No. SWT-2017-16	
9. Performing Organization Name and Address The University of Michigan Sustainable Worldwide Transportation 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 http://www.umich.edu/~umtriswt		13. Type of Report and Period Covered	
		14. Sponsoring Agency Code	
15. Supplementary Notes			

16. Abstract

This study was designed to examine monthly variations in the relative sales of cars and light trucks among all light-duty vehicles sold in the United States during the past 10 years, and the monthly variations of fuel economy of all light-duty vehicles sold (cars and light trucks). Because cars tend to have better fuel economy than light trucks, the expectation was that there would be a positive correlation between the share of car sales and the average fuel economy of all light-duty vehicles sold.

The monthly vehicle-sales data for this analysis came from the Bureau of Economic Analysis, while the fuel economy data came from our ongoing monthly monitoring of the fuel economy of new vehicles sold.

The main findings are as follows: (1) car sales (relative to light-truck sales) were lowest during fall and early winter, and highest during spring and early summer, (2) fuel economy of all light-duty vehicles sold was lowest during late fall and early winter, and highest during spring and summer, and (3) these two measures were positively correlated, with the correlation coefficient being statistically significant.

17. Key Words Monthly variations, car sales, light-truck sales, fuel economy		18. Distribution Statement Unlimited	
19. Security Classification (of this report) None	20. Security Classification (of this page) None	21. No. of Pages 7	22. Price

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Introduction

This study was designed to examine monthly variations in the relative sales of cars and light trucks in the United States during the past 10 years, and the consequent monthly variations of fuel economy of all light-duty vehicles sold (cars and light trucks). Because cars tend to have better fuel economy than light trucks (EPA, 2016), the expectation was that there would be a positive correlation between the share of cars and the average fuel economy of all light-duty vehicles.

Method

Raw data

The monthly vehicle-sales data for this analysis came from the Bureau of Economic Analysis (BEA, 2017; Table 6, "Light Vehicle and Total Vehicle Sales") and involved the *not seasonally adjusted* sales of cars ("autos") and light trucks. The raw data were used to calculate the percentages of cars and light trucks out of all light-duty vehicles sold.

The average monthly sales-weighted window-sticker fuel-economy values came from Sivak and Schoettle (2017).

Both sets of data covered a 10-year period from October 2007 through September 2017, coinciding with the period of available fuel-economy data (Sivak and Schoettle, 2017).

Approach

Of interest in this study were the monthly variations in the relative sales of cars and light-trucks and in the average fuel economy of all light-duty vehicles sold, and the correlations between these measures. The average monthly percentages of car sales (and light-truck sales) and the average monthly window-sticker fuel-economy values for all new vehicles sold were calculated. These calculations were performed for each month of the year over the examined 10-year period, with each monthly value being the average of 10 values. Correlation coefficients between these sets of values were then derived.

Results

Table 1 presents the average monthly shares of cars and light trucks, and the average fuel economy of all light-duty vehicles sold.

Table 1.
Average monthly shares of cars and light trucks sold, and average monthly
fuel economy of all light-duty vehicles (October 2007 through September 2017).

Month	Share of cars (%)	Share of light trucks (%)	Fuel economy of all light-duty vehicles (mpg)
January	46.3	53.7	23.4
February	46.9	53.1	23.4
March	48.4	51.6	23.6
April	48.1	51.9	23.6
May	48.2	51.8	23.7
June	47.6	52.4	23.6
July	46.8	53.2	23.7
August	46.7	53.3	23.7
September	45.6	54.4	23.4
October	45.9	54.1	23.2
November	45.3	54.7	23.3
December	44.1	55.9	23.1

The correlation between monthly shares of cars and the average fuel economy of all light-duty vehicles was positive and statistically significant ($r = 0.85$, $p < .01$). Conversely, the correlation between monthly shares of light trucks and the average fuel economy was negative ($r = -0.85$, $p < .01$). The relationship between monthly shares of cars and the average fuel economy of all light-duty vehicles is graphically demonstrated in Figure 1, showing the monthly trends for each measure.
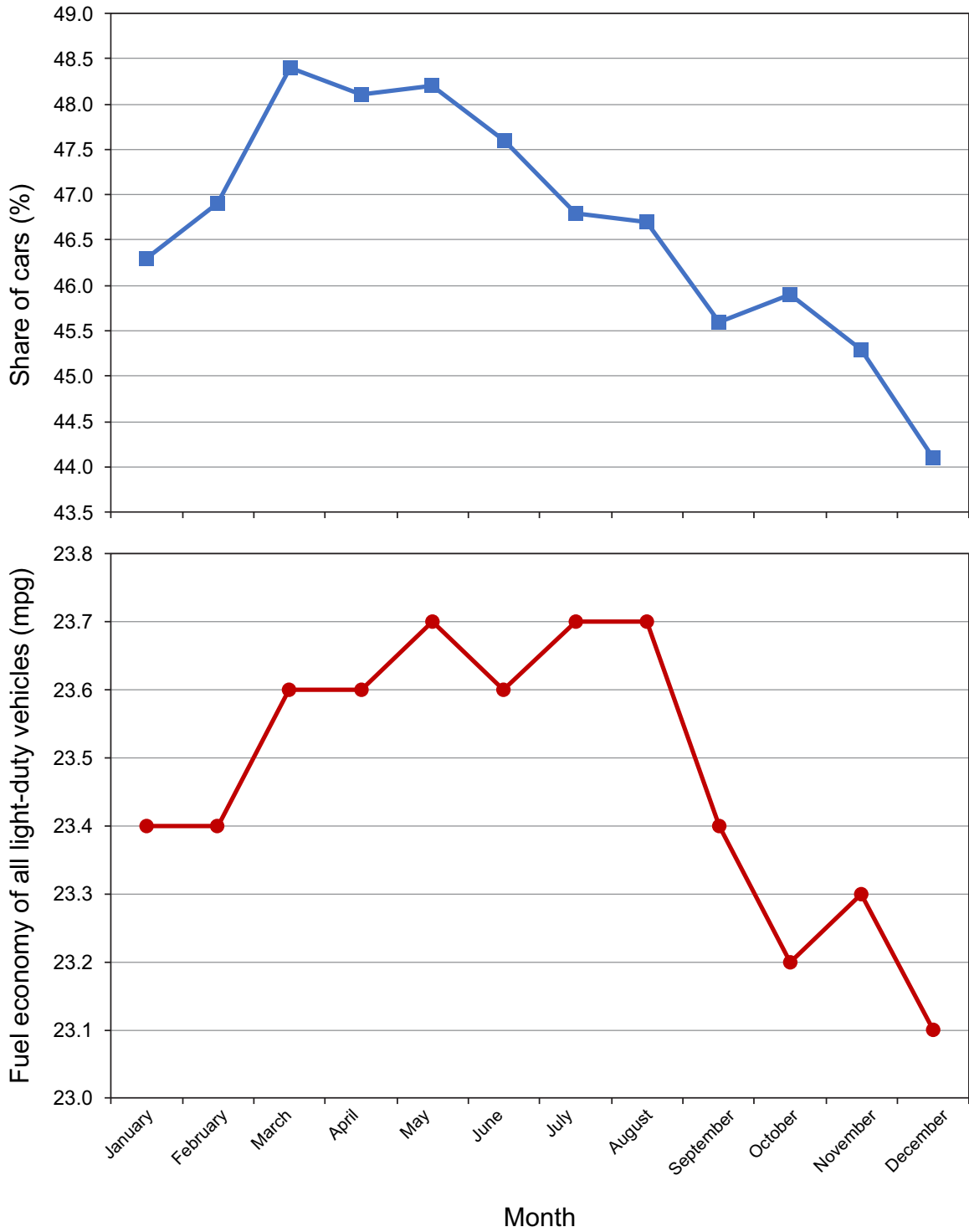
Figure 1. Average monthly shares of car sales (top panel) and average monthly fuel economy of all light-duty vehicles sold (bottom panel).

Discussion

Shares of cars among all light-duty vehicles sold

Car sales were lowest during fall and early winter (September through December), corresponding to less than 46% of sales in each month. The minimum was in December at 44.1%.

Cars sales were highest during spring and early summer (March through June), exceeding 47% of sales each month. The maximum was in March at 48.4%.

Average fuel economy of all light-duty vehicles sold

Vehicle fuel economy was lowest during late fall and early winter (October through December), at 23.3 mpg or lower in each month. The minimum was in December at 23.1 mpg.

Vehicle fuel economy peaked during spring and summer (March through August), at either 23.6 mpg or 23.7 mpg in each month.[1] The maximum (to the second decimal point) was in May at 23.71 mpg.

Relationship between car sales and fuel economy of all vehicles sold

As is evident from the discussion above and from Figure 1, the general trends of car sales and fuel economy of all light-duty vehicles were similar.[2] The correlation between these two measures was $r = 0.85$, indicating that 72% of variance in fuel economy ($r^2 = 0.72$) can be accounted for by the percentage of car sales.

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[1] The average July and August values were elevated, in part, due to the federal Car Allowance Rebate System—informally referred to as the "Cash for Clunkers" program—in which buyers received a rebate when they traded in an older vehicle for the purchase or lease of a new one with substantially better fuel economy. This program was in effect from July 27 through August 24, 2009, resulting in unusually high fuel economy for vehicles sold during those two months (Sivak and Schoettle, 2009).

[2] This is especially the case given the increase in fuel economy in July and August of 2009 due to a one-of-a-kind event—the Cash-for-Clunkers program. (See Footnote 1.)

Key findings

The following are the key findings of this study:

(1) Car sales (relative to truck sales) were lowest during fall and early winter, and highest during spring and early summer.

(2) Fuel economy of all light-duty vehicles sold was lowest during late fall and early winter, and highest during spring and summer.

(3) These two measures were positively correlated, with the correlation coefficient being statistically significant.

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