

# **HAS MOTORIZATION IN THE U.S. PEAKED? PART 6: RELATIONSHIP BETWEEN ROAD TRANSPORTATION AND ECONOMIC ACTIVITY**

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HAS MOTORIZATION IN THE U.S. PEAKED?  
PART 6: RELATIONSHIP BETWEEN ROAD  
TRANSPORTATION AND ECONOMIC ACTIVITY

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16. Abstract <p>In the previous five reports in this series, I examined recent changes in the number of registered light-duty vehicles (cars, SUVs, pickups, and vans), and the corresponding changes in distance driven and fuel consumed. The units of the analyses were both the absolute numbers and the rates per person, per driver, per household, and (where appropriate) per vehicle. The main finding of those reports was that the respective rates all reached their maxima around 2004. I argued that, because the onsets of the reductions in these rates preceded the onset of the recession (in 2008), the reductions in these rates likely reflect fundamental, noneconomic changes in society. Therefore, these maxima have a reasonable chance of being long-term peaks as well.</p> <p>The present report examines the relationship between road transportation and economic activity since the end of the Second World War. The two measures of interest were <i>distance driven by all vehicles per inflation-adjusted GDP</i> and <i>fuel consumed by all vehicles per inflation-adjusted GDP</i>.</p> <p>The main finding is that distance driven per GDP reached its highest values in a broad plateau from the early 1970s through the early 1990s, and then decreased steadily. By 2012, the value of this measure decreased by 22% from its absolute maximum, which was reached in 1977. Some of the factors that likely contributed to the recent decline in the value of this measure are the decreased amount of personal transportation, decreased contribution to GDP of truck transportation, and the increased contribution to GDP of data services, information processing, and e-commerce.</p> <p>The amount of fuel consumed per GDP peaked in the early 1970s, and then decreased by 47% by 2012. The relatively steep decline in the value of this measure reflects the added contribution of the improvement in vehicle fuel economy from the 1970s on.</p>					
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## Introduction

In the first three parts in this series of reports, I examined the changes from 1984 through 2011 in the number of registered cars, SUVs, pickups, and vans (Sivak, 2013a), and the corresponding changes in distance driven (Sivak, 2013b) and fuel consumed (Sivak, 2013c). In the fifth part (Sivak, 2014b), the first three parts were summarized and the data were extended through 2012.<sup>1</sup>

The primary units of the analyses in these studies were the respective rates per person, per driver, per household, and (where appropriate) per vehicle. The main finding of those four reports was that these rates all reached their maxima around 2004. I argued that, because the onsets of the reductions in these rates preceded the onset of the recession (in 2008) by several years, the reductions in these rates likely reflect fundamental, noneconomic changes in society (such as increased telecommuting, increased use of public transportation, increased urbanization of the population, and changes in the age composition of drivers), with economic factors being contributing factors only. Therefore, these maxima have a reasonable chance of being long-term peaks as well.

The present report examines the relationship between road transportation and economic activity since the end of the Second World War.

## Method

The following two measures were of interest:

- *distance driven per inflation-adjusted GDP*, calculated by dividing miles driven by all vehicles (U.S. Department of Transportation, 2014) by GDP in chained (2009) dollars (U.S. Bureau of Economic Analysis, 2014), and
- *fuel consumed per inflation-adjusted GDP*, calculated by dividing the amount of fuel consumed by all vehicles (U.S. Department of Transportation, 2014) by GDP in chained (2009) dollars (U.S. Bureau of Economic Analysis, 2014).

The analysis was performed for 1946 through 2012 (the latest available year for distance driven and fuel consumed).

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<sup>1</sup> The fourth part in the series examined the changes in households without a light-duty vehicle from 2005 through 2012 (Sivak, 2014a).

## Results

The results are shown in Table 1 and Figure 1.

### *Distance driven per GDP*

Distance driven per GDP increased from 1946 until 1958, and then declined through 1966. Thereafter, this measure increased until plateauing from the early 1970s through the early 1990s, and then decreased steadily.

The absolute maximum—247.1 miles per thousand dollars—was reached in 1977. This value was up 42% from 173.8 miles per thousand dollars in 1946. The 2012 value—193.2 miles per thousand dollars—is 22% lower than the maximum value and is comparable to the values in the late 1940s.

### *Fuel consumed per GDP*

From 1946 until the mid 1970s, fuel consumed per GDP showed a similar pattern to that of distance driven per GDP. However, from the late 1970s on, this measure decreased relatively rapidly throughout the rest of the examined time period.

The absolute maximum—20.5 gallons of fuel per thousand dollars—was reached in 1972. This value was up 56% from 13.1 gallons per thousand dollars in 1946. The 2012 value—11.0 gallons per thousand dollars—is 46% lower than the peak value in 1972, and is lower than the value for 1946 (the first year examined).

Table 1  
 Distance driven per inflation-adjusted GDP and fuel consumed per inflation-adjusted GDP, 1946-2012.  
 (The maxima are in red.)

Year	Miles per thousand dollars	Gallons per thousand dollars
1946	173.8	13.1
1947	191.2	14.5
1948	197.0	15.1
1949	211.3	16.1
1950	209.8	16.3
1951	208.1	16.2
1952	209.1	16.5
1953	211.7	16.6
1954	219.8	17.4
1955	221.1	17.4
1956	224.4	18.0
1957	225.8	18.2
1958	234.4	18.8
1959	231.1	18.6
1960	231.2	18.6
1961	231.3	18.6
1962	226.6	18.2
1963	228.1	18.3
1964	226.6	18.2
1965	223.3	17.9
1966	218.4	17.6
1967	221.3	17.8
1968	222.3	18.2
1969	225.3	18.7
1970	235.0	19.6
1971	241.7	20.0
1972	245.4	20.5
1973	242.1	20.4
1974	237.3	19.7
1975	246.5	20.2
1976	247.1	20.4
1977	247.1	20.1
1978	246.5	20.0
1979	236.5	18.9
1980	236.8	17.8
1981	235.0	17.3
1982	245.7	17.5
1983	243.3	17.1
1984	236.1	16.3
1985	233.7	16.0
1986	233.4	15.9
1987	236.2	15.7
1988	239.1	15.3
1989	238.6	15.0
1990	239.5	14.6
1991	242.7	14.4
1992	242.5	14.3
1993	241.2	14.4
1994	238.0	14.2
1995	238.1	14.1
1996	236.7	14.0
1997	232.8	13.6
1998	229.5	13.5
1999	224.4	13.4
2000	220.1	12.9
2001	221.8	12.9
2002	222.6	13.1
2003	219.2	12.8
2004	216.5	12.6
2005	211.4	12.3
2006	207.6	12.0
2007	205.0	11.8
2008	201.8	11.5
2009	206.4	11.7
2010	201.9	11.5
2011	197.4	11.2
2012	193.2	11.0

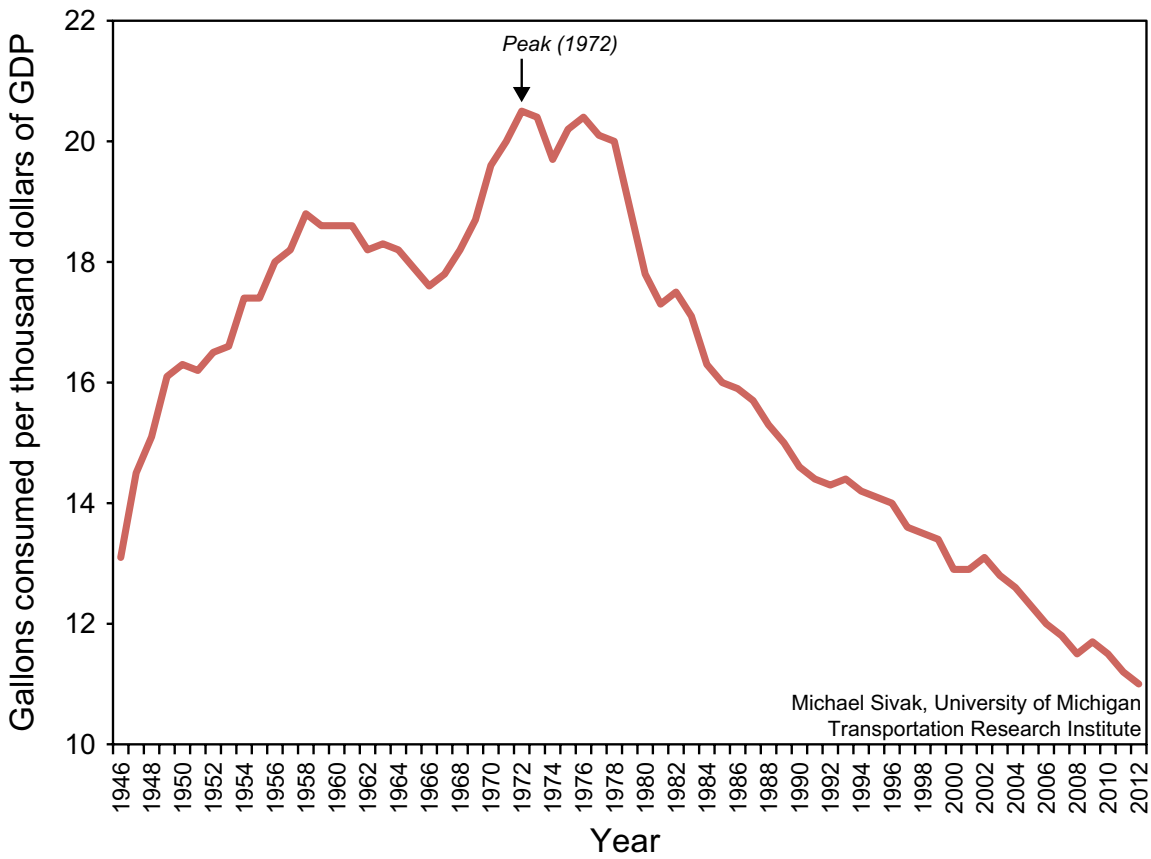
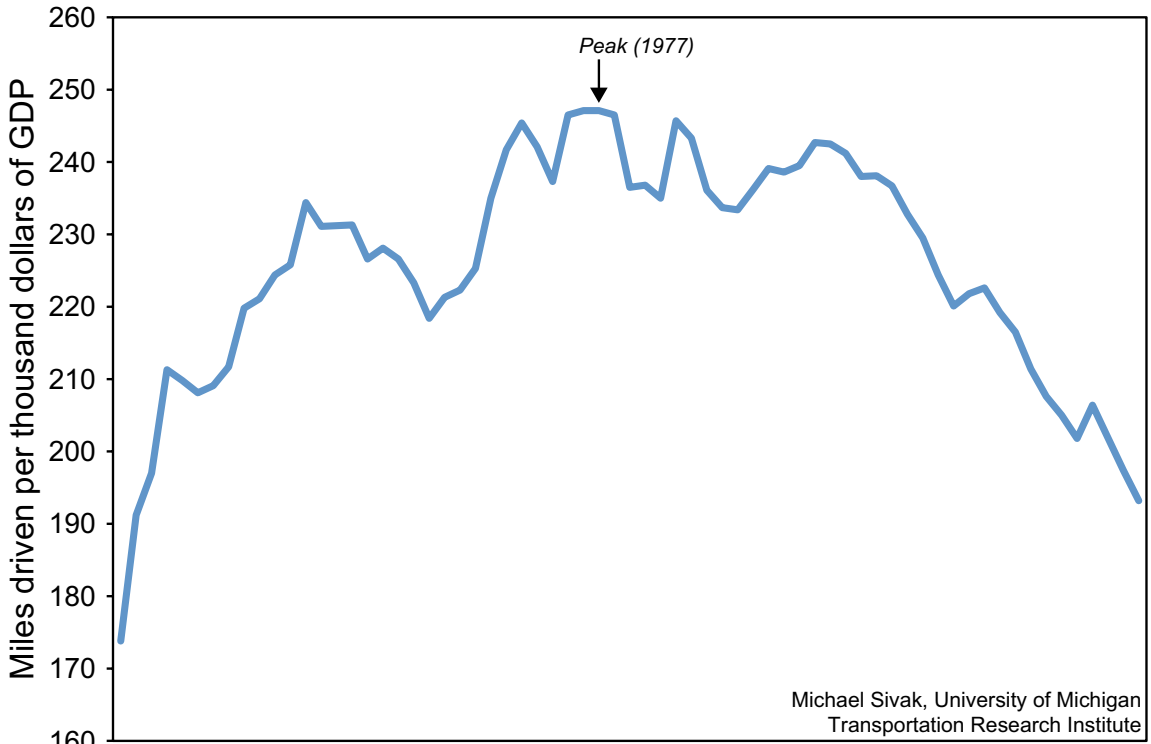


Figure 1. Distance driven per inflation-adjusted GDP (top panel) and fuel consumed per inflation-adjusted GDP (bottom panel), 1946-2012.



## Discussion

### Relationship between distance driven and economic activity

The data presented in this report indicate the following:

- Distance driven per unit of economic activity reached its *highest* values from the early 1970s through the early 1990s and decreased thereafter (see the top panel of Figure 1).
- Economic activity per unit of distance driven reached its *lowest* values from the early 1970s through the early 1990s and increased thereafter (the inverse of the relationship in the top panel of Figure 1).

What are the implications of these relationships? One possibility that would account for the recent trends would be if distance driven by heavy trucks per unit of economic activity attributed to trucking has decreased recently. However, that is not the case, at least not for the time period from 2000 to 2012 (see Table 2). Indeed, during this period, this measure *increased* by about 24%, while the overall distance driven per unit of economic activity (calculated from Table 1) *decreased* by 12%.

Table 2  
Truck transportation: distance driven (U.S. Department of Transportation, 2014)  
and economic activity (ProQuest, 2014).

Measure	Year	
	2000	2012
Miles driven by heavy trucks (billions)	206	268
Chained dollars of GDP attributed to truck transportation (billions)	121	130
Miles driven per dollar of GDP	1.7	2.1

Another possible explanation for the pattern observed in the top panel of Figure 1 would be an increased proportional contribution to GDP from activities that do not require any road transportation (either by personal vehicle or heavy trucks). Indeed, there are several lines of supporting evidence for this hypothesis:

- Distance driven per person in a light-duty vehicle decreased by about 5% from 2000 to 2012 (Sivak, 2014b).
- GDP attributed to truck transportation as a percentage of the total GDP from private industry decreased from 1.12% in 2000 to 0.98% in 2012 (ProQuest, 2014).
- GDP attributed to data processing, internet publishing, and related services increased by a factor of 3.5 from 2000 to 2012 (ProQuest, 2014).
- The value of e-commerce increased by a factor of 8.2 from 2000 to 2012, while the value of traditional commerce increased by a factor of only 1.4 during the same period (Statista, 2014).

### **Relationship between fuel consumed and economic activity**

The main finding concerning fuel consumed per economic activity is that the value of this measure peaked in the 1970s (see the bottom panel of Figure 1). However, since the 1970s it decreased more rapidly than did distance driven per economic activity, reflecting the added contribution of the improvement in vehicle fuel economy from the 1970s on (Sivak and Schoettle, 2012).

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