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DISTANCE DRIVEN AND ECONOMIC ACTIVITY IN THE INDIVIDUAL U.S. STATES: 1997- 2011

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16. Abstract <p>During these times of heightened concern about energy and the environment, it is desirable to have relatively high economic activity per unit of driving. Thus, this study examined the current variations among the U.S. states and the District of Columbia in GDP per distance driven and the recent changes in this parameter.</p> <p>In 2011, the highest GDP per distance driven was in the District of Columbia (\$30.04/mile, followed by Alaska, New York, Connecticut, and Delaware. The lowest GDP per distance driven was in Mississippi (\$2.51/mile), followed by Alabama, New Mexico, Arkansas, and Oklahoma. The median value was \$4.66/mile. In comparison, the standard federal reimbursement rate for fixed and variable costs of operating an automobile in 2011 was \$0.51/mile.</p> <p>From 1997 to 2011, the largest <i>absolute</i> increase in GDP per distance driven (with GDP measured in current dollars) was in the District of Columbia (+\$14.95/mile), followed by Alaska, New York, Delaware, and Oregon. The smallest increase was in Mississippi (+\$0.67/mile), followed by Alabama, Michigan, Florida, and New Mexico.</p> <p>The largest <i>percentage</i> increase from 1997 to 2011 in GDP per distance driven was in Wyoming (+115%), followed by the District of Columbia, North Dakota, Alaska, and Oregon. The smallest increase was in Michigan (+28%), followed by Florida, Ohio, Mississippi, and New Jersey. The increases in four states (Michigan, Florida, Ohio, and Mississippi) were smaller than the corresponding increases in inflation.</p>					
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Introduction

The nature of the relationship between distance driven and economic activity has been one of the favorite topics in transportation research. For example, Ecola and Wachs (2012), in their recent review of the literature, identified 28,534 (!) potentially relevant studies.

One of the main reasons for the interest in this topic is that in the U.S. from the mid 1930s until about 2003 these two parameters were very highly correlated (Ecola and Wachs, 2012). (Since 2003, these two parameters began to diverge, due primarily to the apparent plateauing of the amount of driving. However, whether this divergence is temporary or permanent is too early to tell.)

Ecola and Wachs (2012) set out to examine the evidence for four possible types of interactions between the two parameters in question:

- Amount of driving influences amount of economic activity
- Amount of economic activity influences amount of driving
- Amount of driving and amount of economic activity influence each other
- There is no influence of amount of driving on amount of economic activity and vice versa

However, Ecola and Wachs (2012) concluded that their study “does not resolve with certainty the nature of the relationship” (p. 2).

Despite the uncertainty about the nature of the relationship, it is clear (especially during these times of heightened concern about energy and the environment) that it is desirable to have relatively high economic activity per unit of driving. Consequently, this study was designed to examine the current variations among the U.S. states¹ in GDP per distance driven and recent changes in this parameter.

¹ Although the District of Columbia is not a state, for brevity of exposition I will refer to the fifty states and the District of Columbia as the U.S. states.

Method

Two sets of basic data were used for each state: GDP in current dollars (BEA, 2013) and distance driven (FHWA, 2013). Using these two sets of data, GDP per distance driven was calculated. Data for the years 2011 and 1997 were analyzed.

Results

Table 1 presents GDP (in current dollars), distance driven, and GDP per distance driven for the individual states in 2011. The entries are presented in decreasing order of GDP per distance driven.

In Table 1 and in Figure 1, the 50 states and the District of Columbia are divided into three groups of 17 each according to the magnitude of GDP per distance driven: high ($> \$5.40/\text{mile}$), medium ($> \$4.00/\text{mile}$ and $< \$5.40/\text{mile}$), and low ($< \$4.00/\text{mile}$). The District of Columbia had the highest GDP per distance driven ($\$30.04/\text{mile}$), followed by Alaska, New York, Connecticut, Delaware, Massachusetts, Hawaii, New Jersey, Illinois, and Washington; the ten lowest states (in increasing order) are Mississippi ($\$2.51/\text{mile}$), Alabama, New Mexico, Arkansas, Oklahoma, Montana, South Carolina, West Virginia, Kentucky, and Idaho. The median was in Wisconsin ($\$4.66/\text{mile}$).

Table 1
GDP, distance driven, and GDP per distance driven in 2011.

State	GDP (million current dollars)	Distance driven (million miles)	GDP per distance driven (dollars/mile)
District of Columbia	107,201	3,568	30.04
Alaska	51,237	4,593	11.16
New York	1,169,436	127,726	9.16
Connecticut	225,409	31,197	7.23
Delaware	64,377	9,028	7.13
Massachusetts	388,575	54,792	7.09
Hawaii	70,006	10,066	6.95
New Jersey	493,175	73,094	6.75
Illinois	670,247	103,234	6.49
Washington	357,056	56,955	6.27
Rhode Island	49,423	7,901	6.25
California	1,908,985	320,784	5.95
Pennsylvania	581,256	99,204	5.86
Colorado	264,733	46,606	5.68
Oregon	188,981	33,373	5.66
Texas	1,321,005	237,440	5.56
Maryland	305,175	56,221	5.43
Virginia	433,611	80,974	5.35
Nevada	129,421	24,189	5.35
Louisiana	237,389	46,513	5.10
Nebraska	96,230	19,093	5.04
New Hampshire	63,333	12,720	4.98
Minnesota	279,987	56,685	4.94
Utah	124,454	26,222	4.75
Iowa	146,057	31,274	4.67
Wisconsin	253,349	54,402	4.66
South Dakota	41,667	9,002	4.63
Kansas	134,767	30,021	4.49
North Dakota	39,992	9,131	4.38
Ohio	490,265	111,990	4.38
Arizona	255,989	59,574	4.30
North Carolina	436,144	103,772	4.20
Wyoming	38,190	9,245	4.13
Michigan	385,123	94,754	4.06
Florida	746,439	191,855	3.89
Georgia	417,438	108,454	3.85
Tennessee	263,626	70,751	3.73
Indiana	284,344	76,485	3.72
Vermont	26,545	7,141	3.72
Maine	52,489	14,248	3.68
Missouri	249,546	68,789	3.63
Idaho	57,096	15,937	3.58
Kentucky	168,019	48,061	3.50
West Virginia	66,109	18,963	3.49
South Carolina	168,716	48,730	3.46
Montana	38,933	11,660	3.34
Oklahoma	156,058	47,464	3.29
Arkansas	106,557	32,953	3.23
New Mexico	79,555	25,533	3.12
Alabama	178,533	64,914	2.75
Mississippi	97,533	38,851	2.51

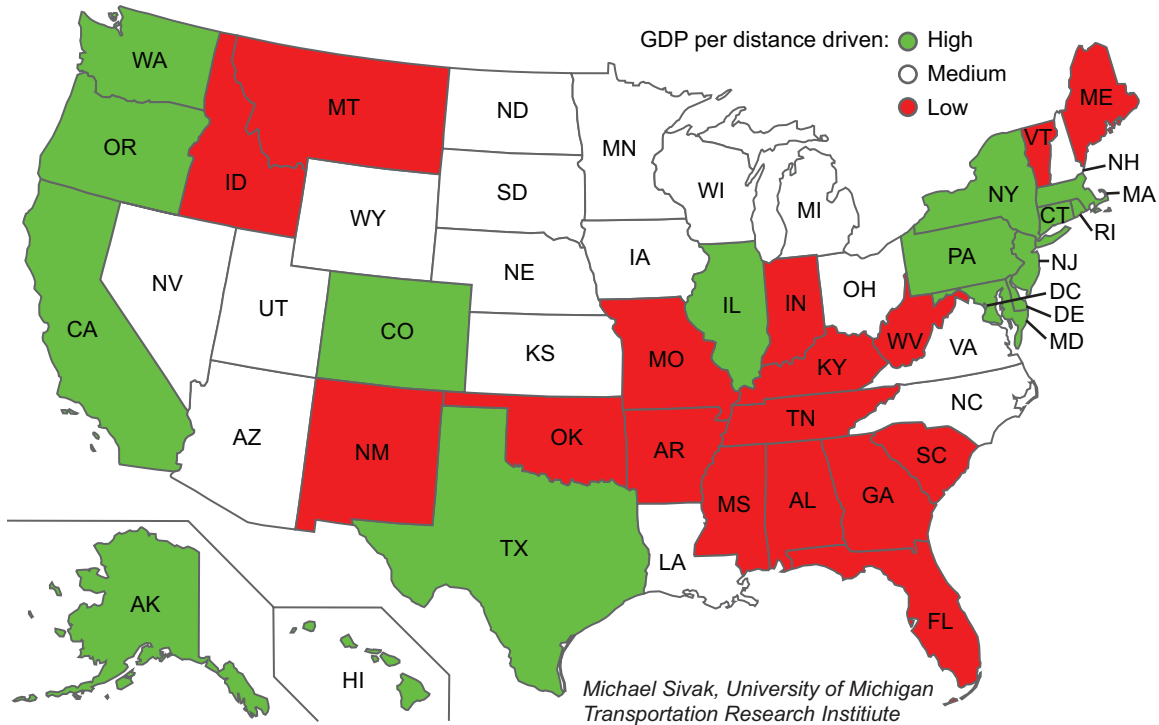


Figure 1. GDP per distance driven in 2011.

Table 2 lists the *absolute* changes in GDP per distance driven from 1997 to 2011, with the states divided into three groups of 17 each according to the magnitude of the change. The ten states with the largest absolute increases (in decreasing order) are the District of Columbia (+\$14.95/mile), Alaska, New York, Delaware, Oregon, Massachusetts, Washington, Texas, Connecticut, and Illinois; the ten states with the smallest increases (in increasing order) are Mississippi (+\$0.67/mile), Alabama, Michigan, Florida, New Mexico, Arkansas, South Carolina, Missouri, Ohio, and Kentucky. The median increase was in Minnesota, Nevada, and Iowa (+\$1.75/mile).

Table 3 presents the *percentage* changes in GDP per distance driven from 1997 to 2011, with the states divided into three groups of 17 each according to the magnitude of the change. The ten states with the largest percentage increase (in decreasing order) are Wyoming (+115%), the District of Columbia, North Dakota, Alaska, Oregon, South Dakota, Texas, Virginia, Washington, and Oklahoma; the ten states with the smallest increase (in increasing order) are Michigan (+28%), Florida, Ohio, Mississippi, New Jersey, New Mexico, Alabama, Missouri, Hawaii, and Arizona. The median increase was in Massachusetts and Iowa (+60%).

Table 2
 Absolute change in GDP per distance driven from 1997 to 2011.

State	Absolute change in GDP per distance driven (dollar/mile)
District of Columbia	14.95
Alaska	5.42
New York	3.68
Delaware	2.89
Oregon	2.66
Massachusetts	2.66
Washington	2.65
Texas	2.53
Connecticut	2.42
Illinois	2.38
Virginia	2.35
Pennsylvania	2.35
California	2.31
Rhode Island	2.27
Wyoming	2.21
Hawaii	2.17
Colorado	2.16
South Dakota	2.16
Maryland	2.15
North Dakota	2.13
Louisiana	2.12
Nebraska	2.06
New Jersey	1.99
Utah	1.98
Wisconsin	1.88
Minnesota	1.75
Nevada	1.75
Iowa	1.75
New Hampshire	1.74
Kansas	1.72
West Virginia	1.42
North Carolina	1.41
Maine	1.39
Idaho	1.39
Oklahoma	1.39
Vermont	1.37
Arizona	1.35
Georgia	1.31
Montana	1.30
Indiana	1.27
Tennessee	1.20
Kentucky	1.18
Ohio	1.16
Missouri	1.13
South Carolina	1.11
Arkansas	1.10
New Mexico	0.95
Florida	0.94
Michigan	0.89
Alabama	0.84
Mississippi	0.67

Table 3
 Percentage change in GDP per distance driven from 1997 to 2011.

State	Percentage change in GDP per distance driven
Wyoming	115
District of Columbia	99
North Dakota	95
Alaska	94
Oregon	89
South Dakota	87
Texas	84
Virginia	78
Washington	73
Oklahoma	73
Utah	72
Louisiana	71
Nebraska	69
West Virginia	69
Delaware	68
Wisconsin	67
New York	67
Pennsylvania	67
Maryland	65
California	64
Montana	63
Idaho	63
Kansas	62
Colorado	61
Maine	61
Massachusetts	60
Iowa	60
Vermont	58
Illinois	58
Rhode Island	57
Minnesota	55
New Hampshire	54
Arkansas	52
Indiana	52
Georgia	51
Kentucky	51
North Carolina	50
Connecticut	50
Nevada	49
Tennessee	47
South Carolina	47
Arizona	46
Hawaii	45
Missouri	45
Alabama	44
New Mexico	44
New Jersey	42
Mississippi	37
Ohio	36
Florida	32
Michigan	28

Discussion

Current GDP per distance driven

According to the most recent data, the maximum, median, and minimum values of GDP per distance driven among the 51 states in 2011 were \$30.04/mile, \$4.66/mile, and \$2.51/mile, respectively. In comparison, the standard federal reimbursement rate for fixed and variable costs of operating an automobile in 2011 was \$0.51/mile (IRS, 2010).

GDP per distance driven varies greatly among the states, with the highest (in the District of Columbia) being 12 times the lowest (in Mississippi). Even if the outlier—the District of Columbia—is removed from the analysis because of its special status, the ratio of the maximum and the minimum is still large—4.4.

A high GDP per mile driven can be the result of either a high GDP and/or a low distance driven. In turn, GDP is influenced by a range of factors, such as natural resources, local tax policies, availability of skilled work force, presence of tourist attractions, etc.² Analogously, distance driven is influenced by factors such as geographical layout, urban planning, location of large employers, etc.

Although a thorough examination of the factors that influence GDP per distance driven in the U.S. states was outside of the scope of this study, a regression analysis was performed to provide an indication of the possible relationships between the state's land area and its population density (U.S. Census Bureau, 2013) on GDP per distance driven. Land area is of potential relevance because large area (keeping all else constant) might be associated with a high driving demand (and thus a *low* level of GDP per distance driven). Analogously, high density of population might be associated with low driving demand (and thus *high* level of GDP per distance driven). The results of this analysis indicate that each factor (when controlling for the effect of the other factor) was associated with GDP per distance driven ($F_{(2, 48)} = 232.6, p < .001$). However, while the direction of the effect of density of population was in the expected direction (high population density was associated with high level of GDP per distance driven), the effect of land area was the opposite of what was expected (large land area was associated with high level of GDP per distance driven).

² GDP in a given state is strongly influenced by the number of people. However, the same applies to distance driven. Thus, the influence of the size of the population might be effectively cancelled when considering GDP per distance driven.

Recent changes in GDP per distance driven

From 1997 to 2011, the magnitude of the absolute changes in GDP per distance driven varied substantially among the states. The largest increase was in the District of Columbia (+\$14.95/mile), while the smallest increase was in Mississippi (+\$0.67/mile). The median increase was in Minnesota, Nevada, and Iowa (+\$1.75/mile).

The corresponding percentage changes from 1997 to 2011 in GDP per distance driven also varied greatly among the states. The largest increase was in Wyoming (+115%), while the smallest increase was in Michigan (+28%). The median increase was in Massachusetts and Iowa (+60%). Inflation from 1997 to 2011 increased by 40% (U.S. Bureau of Labor Statistics, 2013). Therefore, the increases in GDP per distance driven (with GDP measured in current dollars) that were smaller than 40% did not even keep up with inflation. This was the case for Michigan, Florida, Ohio, and Mississippi.

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