



Why does driving too much make you poorer?

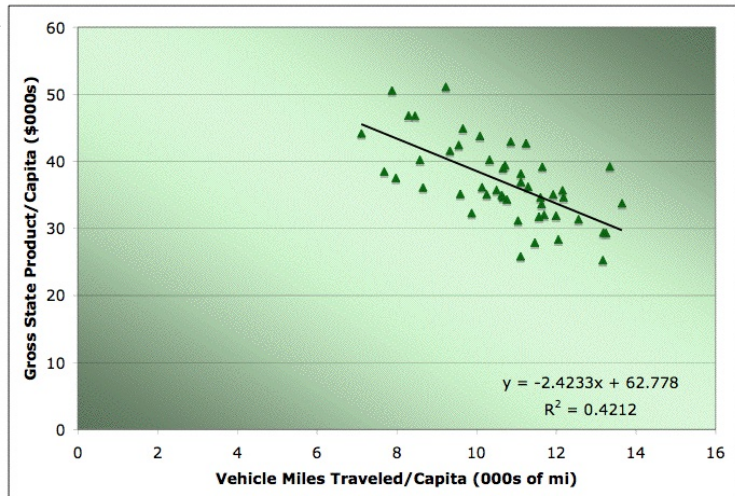
Posted by [Stuart Staniford](#) on January 15, 2006 - 4:00am

Topic: [Economics/Finance](#)

Tags: [gdp](#), [hubbert peak](#), [oil prices](#), [peak oil](#), [us states](#), [vmt](#) [[list all tags](#)]

This is one of those analyses that I started with a firm opinion: I thought I knew where it was going. And then it went somewhere else and ended in a bit of a mystery. Details of my puzzlement below the fold.

The graph to the right shows Gross State Product/Capita (source: [BEA, 2003](#)) plotted versus Vehicle Miles Traveled/Capita (source: [FHWA, 2003 table VM-2](#)) for 48 of the 50 US states. Click the graph to enlarge it.



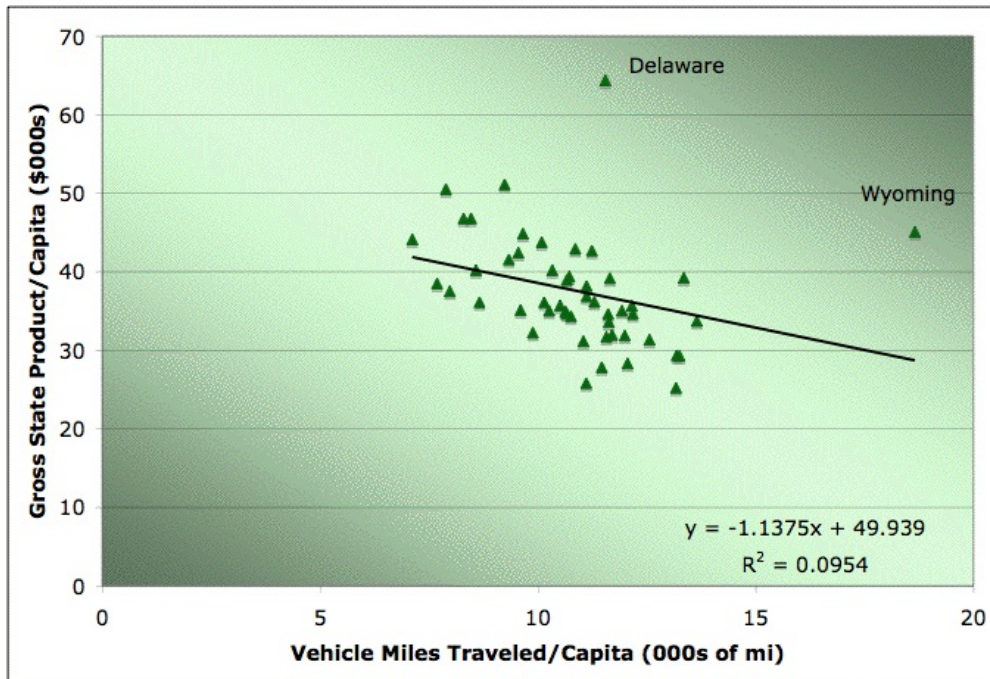
For some time, I've been exploring the [very strong relationship](#) between GDP and total vehicle miles driven. In the US, they appear to grow in near lockstep, but even in Europe, there is a [pretty strong relationship](#). Presumably growing the economy involves adding more and bigger houses, stores, offices, etc to the edge of town, which increases the need to drive more (though the exactness of the relationship is still a mystery).

However, tonight I wanted to take up a different theme. I have a somewhat contrarian stance on the idea, popular in certain parts of the peak oil community, that it's a good idea in the face of peak oil to move to the back of beyond and start trying to live off the land. My idea, prejudice, hypothesis, whatever we want to call it, was that rural economies produce less wealth but need to drive further, and therefore will suffer particularly hard as oil becomes less available.

So I decided to investigate this more carefully. It's hard to clearly delineate rural communities from urban in all the statistical series I needed, but what is generally available is state-by-state statistics (in the US). I figured that ought to be good enough for a first cut - we should be able to see how very urban states differ from very rural states.

So I got VMT statistics from the [FHWA, 2003 table VM-2](#), gross state product statistics for 2003 from the [Bureau of Economic Affairs](#), and population statistics from the Census Bureau, but the Wikipedia helpfully tabulates the states in the 2000 census in terms of [Population](#), and also [Population Density](#).

The first graph I produced was wealth created per capita (as measured by Gross State Product/capita) versus vehicle miles driven/capita:

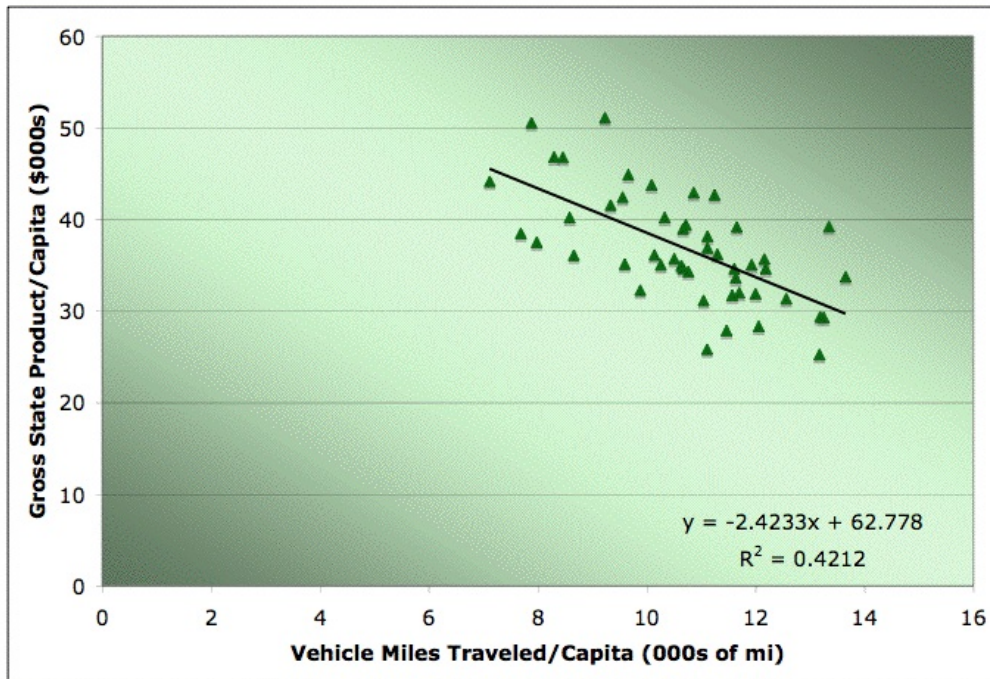


Gross State Product/Capita (source: [BEA, 2003](#)) plotted versus Vehicle Miles Traveled/Capita (source: [FHWA, 2003 table VM-2](#)) for all US states. [Click to enlarge.](#)

Well, two states are clearly messing up the picture. I decided that we should sell Wyoming to Canada to pay down some of the national debt, and tow Delaware down to the Carribean to save most of our corporations the trouble of reincorporating themselves offshore.

There's probably a reasonable case for considering Delaware as a removable outlier due to it's special status as the headquarters of so many of our large corporations. However, I can't think of any good excuse for excluding Wyoming other than that it's having way too much influence on the trend for a state of small population and moderate area.

Anyway, after the dirty work is done:

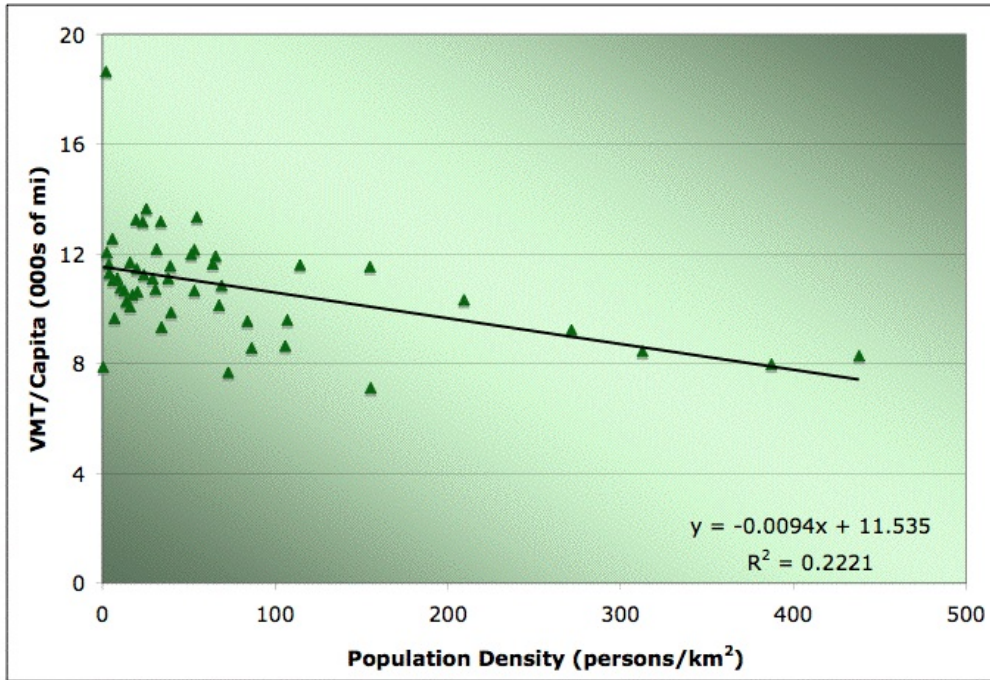


Gross State Product/Capita (source: [BEA, 2003](#)) plotted versus Vehicle Miles Traveled/Capita (source: [FHWA, 2003 table VM-2](#)) for all US states except Delaware and Wyoming. [Click to enlarge](#).

Prejudice confirmed, right? There appears to be a reasonably strong inverse relationship between states where people drive a lot, and states where people generate a lot of wealth. The technical criteria is the R^2 , which says that 42% of the variation in GSP/capita is explained by the inverse relationship with VMT/capita. It's not the only thing going on (58% of the variation remains to be explained by other things), but it's quite a big chunk of what's going on.

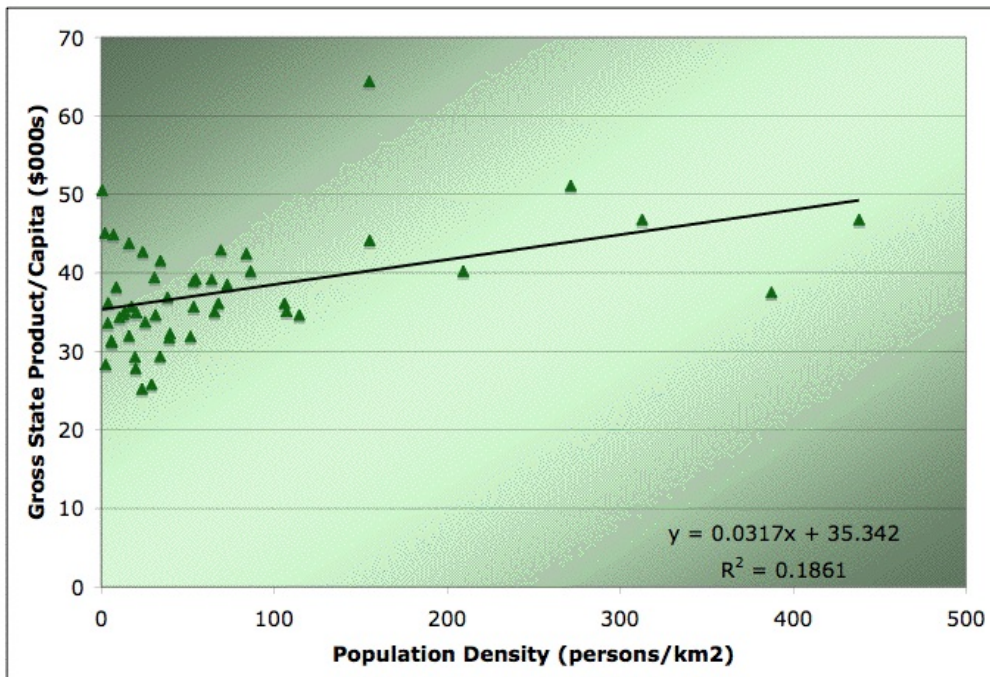
Well, not so fast.

When I delved into population density, to check that it really is rural/urban that explains this, it got more complicated. Here's vehicle miles driven/capita as a function of population density.



Vehicle Miles Traveled/Capita (source: [FHWA, 2003 table VM-2](#)) plotted against Population Density (source: US Census Bureau 2000 via [Wikipedia](#)) for all US states. Click to enlarge.

There is **some** trend for states of low population density to drive more, but it's not that strong (R^2 of 22%). And then here's wealth created as a function of population density.



Gross State Product/Capita (source: [BEA, 2003](#)) plotted against Population Density (source: US Census Bureau 2000 via [Wikipedia](#)) for all US states. Click to enlarge.

This isn't that strong either. It's somewhat true that low population density states create less wealth/capita, but it's a weak relationship (R^2 of 19%).

So while my initial hypothesis isn't exactly wrong---the correlations do run the way I expected---they aren't as strong as I expected. And, more interestingly, it looks like there must be some **other** linkage between driving a lot and producing less wealth. It doesn't seem to be just having low population density. I would like to know what that linkage is.

In particular, its intriguing that growing the economy appears to require driving more, and yet places that drive a lot produce less wealth per capita. It suggests something that I explored quite a bit back when I was looking at the lockstep relationship between GDP and VMT - I wonder if growing the edge of town is one of the harder things the economy has to do to grow, and so it has something to do with setting the rate of economic growth.



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