International Transport Forum

# Have Americans Hit Peak Travel? A discussion of the changes in US driving habits

Revised February 2013

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International Transport Forum

# Have Americans Hit Peak Travel?

## A Discussion of the Changes in US Driving Habits

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## INTRODUCTION

American driving habits are changing. After decades of steady increases the growth in driving is clearly leveling off, and dropping on a per capita basis, even at a time when a vast array of public policies continue to support and encourage driving. Perhaps even more amazing are total aggregate declines in some recent years coupled with drops in licensing, trips, and vehicle purchases. These shifts have enormous implications for public policy in the US. Ample evidence shows that this phenomenon is not limited to the US, but is generally reflected in other developed countries around the world with mature transportation systems.

However, this phenomenon is still not well known. When they are recognized, these individual trends are either largely dismissed as economic factors caused by the global recession and stubbornly high unemployment rate. While there is little doubt that the sputtering US economy has major impact, emerging research suggests the changes in US driving habits are also the result of a long-term structural change reflective of a host of shifts in demographics, culture, technology, as well as settlement patterns in US metropolitan areas. A set of public policies also plays a key role.

This paper explores those macro forces through an analysis driving trends, a review of existing literature, and discussion what is likely behind these trends as well as implications for public policy.[1]

## 1. BACKGROUND AND KEY AMERICAN DRIVING TRENDS

In 2008, for the first time in human history, the majority of the world's inhabitants lived in urban and metropolitan areas. In the United States, the 100 largest metropolitan areas constitute two-thirds of national population, and account for fully three-quarters of US GDP. This represents a fundamental and dramatic shift and is only expected to intensify. The impacts on the global economy, our social networks, and the built environment will be dramatic and are likely to transform the very fabric of human life.

In the US, this conversation is affected by several factors:

Our national economy is in the midst of broad and **intensive restructuring**. This is partially unintentional and precipitated by the most severe economic crisis in more than a generation. The reverberations from the Great Recession are still strongly felt. In response, major attention is being given to moving away from the over-leveraged, debt-driven economy that

[1] It is important to note that data sources for several of these trends discussed here are inconsistent, both in terms of its coverage as well as years analyzed. This report endeavors to use consistent figures, years, and geographies where possible.

preceded the recession to one focused on globalization, technological innovation, and production, rather than consumption.[2]

At the same time, the US is undergoing the most remarkable **socio-demographic changes** it has seen in nearly a century. The number of seniors and boomers already exceeds 100 million, and racial and ethnic minorities accounted for 83 percent of our population growth this last decade. But unlike our international counterparts in Europe and parts of Asia, the US is also growing rapidly overall. Our population exceeded 300 million in 2006, and we remain on track to hit 350 million in the next 15 years.[3]

Cities and large **metropolitan areas are leading this transformation** and will, in many ways, determine the path forward. America's 100 largest metros already account for two-thirds of our population and generate 75 percent of our gross domestic product. What is more is that most of the future growth of the US is expected to occur in these places. About 60 percent of the future residential growth will be in just the 50 largest metros.[4]

How these trends are playing out carries far-reaching implications for transportation especially in light of significant new constraints at the intersection between place and the economy.

One is the imperative of lower carbon. The world economy is rapidly moving away from carbon-based fuels and towards new sources of energy, driven in part by state, national, and international goals and agreements. Narrow discussions of the impacts of cap and trade regimes or of green jobs have obscured how profound and market-driving a transition this will be (similar to the transformative effect of the internet). Shifting to new energy sources will affect energy sources, the types of vehicles produced, the types of homes built, the shape and location of communities, and how we get from one place to another.

Another is the nation's current fiscal situation. With horrendous budget conditions on the federal, state, and local levels and several years of national economic uncertainty, a tense new climate of austerity has sharpened debates over government spending, economic development, and the physical growth of states and metropolitan areas. Leaders in this environment are eager for fiscally prudent ways to simultaneously support their communities, stimulate their economies, and operate smarter and more efficiently. This impacts everything from tax policy, to business subsidies, as well as transportation and infrastructure spending.

The US is also facing unprecedented constraints when it comes to its natural resources. Driven by cheap land, abundant water, and low cost energy, American growth patterns over the last several decades followed the same sprawling, consumption-oriented style as our national economy. Accommodating future growth will require a long-time partnership of all relevant actors—public, private, and non-profit—to design the kinds of accessible and sustainable communities the market is increasingly demanding.

The confluence of these macros factors certainly impacts overall driving levels. However, these effects are extraordinarily complex and broad agreement does not exist with respect to

[2] Bruce Katz and Jennifer Bradley, 2010, "Growth Through Innovation: A Vision of the Next Economy," Brookings.

[3] Alan Berube and others, 2010, "State of Metropolitan America: On the Front Lines of Demographic Transformation" Brookings.

[4] Alan Berube, 2007, "MetroNation: How US Metropolitan Areas Fuel American Prosperity," Brookings.

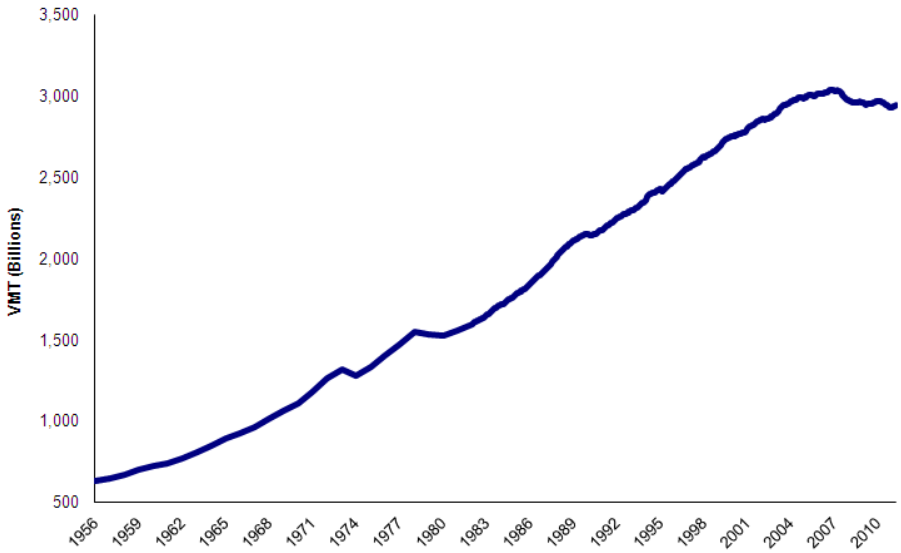
the nature of the relationship. Nevertheless, we can observe several major trends with respect to American driving habits that represent a significant departure from prior decades.

First, after decades of steady growth, driving in the US has leveled off, and is dropping relative to the population.Vehicle miles travelled (VMT) is a straightforward statistic to use to measure the demand for driving in the US since it is collected at the national level, reported regularly, and is easy to understand. This figure includes all drivers, roads, and vehicle types (i.e., whether for passengers or freight, or public or private purposes.) Not only does it provide important data on the use of an individual piece of roadway, but aggregated up—to metropolitan, state, or national levels—it also shapes the transportation planning and programming of billions of public dollars.

Total driving in the US hit its peak in 2007 when Americans logged over 3 trillion VMT. Since then, there has been no growth in driving in the US. In fact, the latest data through early 2012 indicates an annualized drop of over 93 million miles since the peak. The average annual change since 2007 is -0.03 percent, at a time when the average change in population is 0.07 percent.

As Figure 1 illustrates, the drop in total driving is a remarkable trend historically since for nearly every single year since the statistics were collected, overall driving always increased. Sometimes dramatically so, such as the 5.3 percent change from 1987 to 1988, or the 6.8 percent jump from 1971 to 1972. The last increase of over one percent was from 2003 to 2004, and the overall drop in 2007 was the first since a slight decline in the early 1990s and only the fourth time since World War II. In short, we are currently witnessing the largest sustained drop in driving in American history.

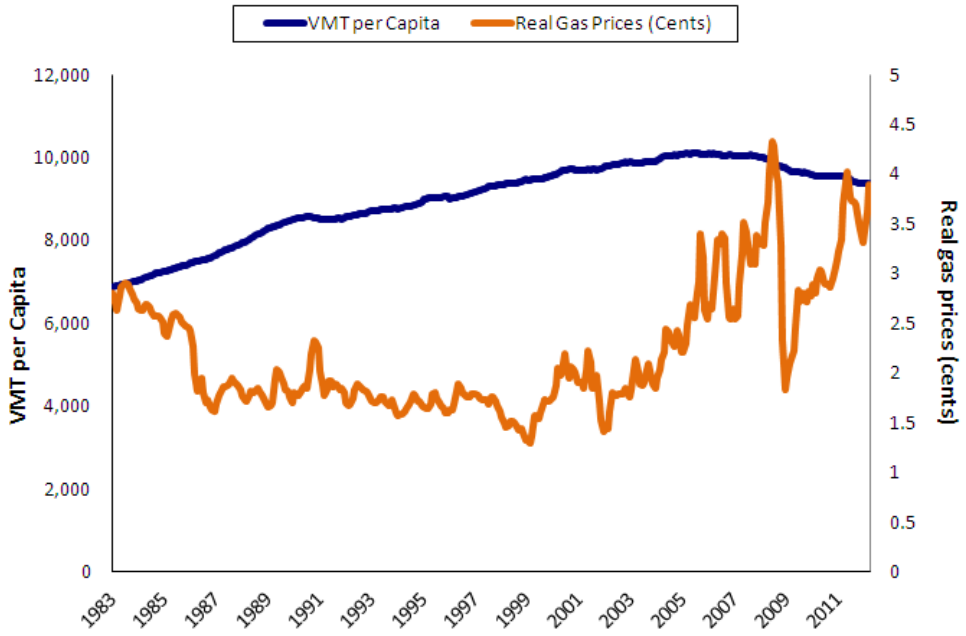
Figure 1. **US Vehicle Miles Travelled, Annualized, December 1956–November 2012**




*Source:* 1956–1982*: Highway Statistics,* Table VM-20*1;* 1983–November 2012*: Traffic Volume Trends.*

The overall declines are noteworthy but comparing overall driving to population growth indicates that the slowdown in VMT growth actually began as early as 2000. Figure 2 shows that VMT per capita rate in November 2012 was about the same as in 1999 with an overall downward trajectory ever since. It is interesting to note that the years of slow or negative growth do not always coincide with increases in fuel (gasoline) prices, as discussed below.

Figure 2: **US Vehicle Miles Travelled Per Capita, Annualized and Real Gasoline Pump Prices, January 1991–November 2012**




*Source:* Traffic Volume Trends and Energy Information Administration.

While the aggregate and per capita numbers described above are for total VMT, for the purposes of this analysis it is important to look at the types of vehicles to better understand the possible purpose of those trips. For example, to determine if the overall declines in VMT are attributable to drops in freight traffic. Indeed, since 2007, passenger vehicles saw a smaller drop in overall (-1.8 percent) than trucks (-5.8 percent)[5]. However, since the vast majority of VMT was generated by passenger vehicles (89.9 percent in 2010) the overall trends are largely the result of changes in passenger vehicles. (It is important to note that truck VMT increased from 7.5 percent in 2000 to 9.7 percent in 2010.)

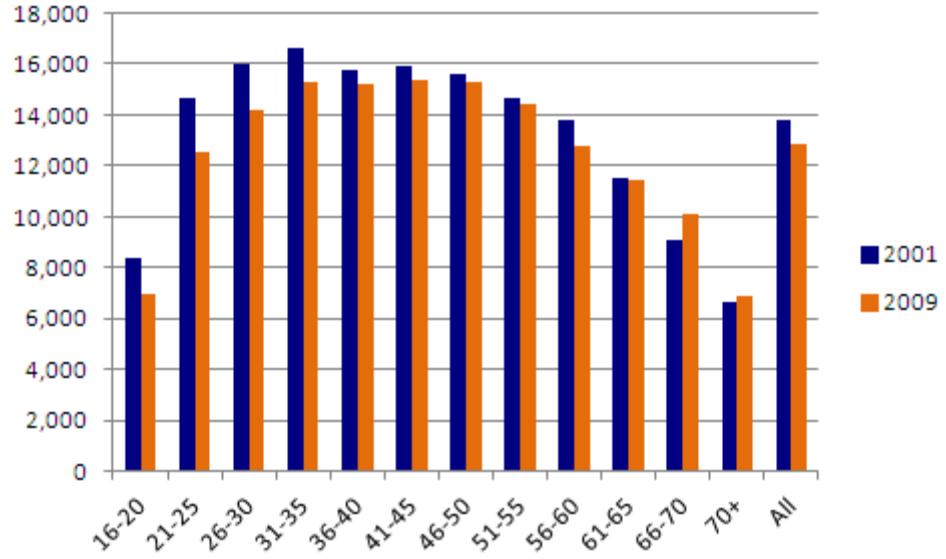
As discussed later, Baxandall, David, & Dutzik (2012) show that from 2001 to 2009, the annual number of vehicle miles traveled by young people (16 to 34-year-olds) decreased by 23 percent, from 10,300 to 7,900 miles per capita. They report that that same age group took 15 percent fewer trips in 2009 than 2001, and the trips they did take in a vehicle were 6 percent shorter. Looking only at drivers age 16-20, the amount of annual VMT fell from 8,410 in 2001 to 6,964 in 2009, a remarkable decline of 21 percent.[6] Figure 3 shows that

[5] Passenger vehicles include all light duty vehicles (cars, light trucks, vans and sport utility vehicles) regardless of wheelbase.

[6] Federal Highway Administration, National Household Travel Survey.

the only age groups that drive more in the aggregate from 2001 to 2009 were those over the age of 65.

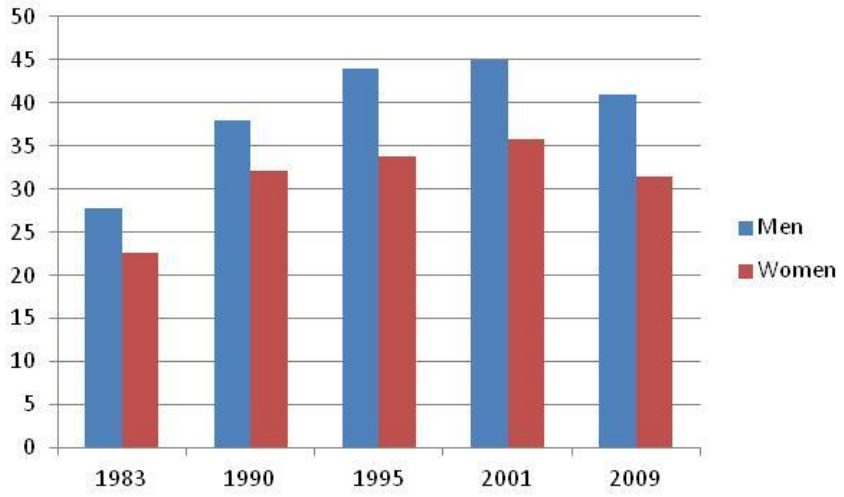
Figure 3. **Annual Vehicle Miles Travelled/Driver by Age Group, 2001 and 2009**




*Source*: Federal Highway Administration, National Household Travel Survey.

On average in the US, women take slightly more trips than men. While men report more work-related trips, women take more trips for family errands and school. However, because of the purpose of these trips, American men drive much greater distances, averaging 40.9 person-miles of travel per day. Figure 3a shows a much greater drop in miled travelled per day for men. Men aged 36-65 drove, by far, the most per day: 50.9 miles.

Figure 3a. **Person miles of travel per person by age**



***Second, the number of licensed drivers in the US is barely growing.***

As a growing country, the number of licensed drivers in the US continues to increase. The latest data shows that over 211 million Americans had driver's licenses in 2010.[7] Yet this was only an increase of 1.7 million from 2009 though the population grew by four times that amount. The growth in drivers licensing from 2009 to 2010 was the smallest increase since 1960.[8] About two-thirds of all Americans are licensed, which is generally the same figure since the early 1980s.

Much of the attention for drops in drivers licensing in the US focuses on younger drivers. Indeed, since 1983 there was a substantial reduction in the percentage of young persons with a driver's license from 46.2 percent in 1983 to 28.7 percent in 2010. Other teenage cohorts saw significant drops as well. Figure 4 also shows that every cohort under the 50 has a smaller percent of the population that is licensed in 2010 than in 1983.[9] Sivak and Schoettle (2011) show that since the 20-44 age group in 1983 is the same as the 45-69 age group in 2010, and as the percent of those with a drivers license did not change much, this suggests the same individuals remained without one.

However, partially offsetting a portion of the decline in younger drivers is the aging of the baby boom generation. Pre-seniors (55–64) are this decade's fastest growing age group, expanding an amazing 50 percent in size from 2000 to 2010 with a "senior tsunami" predicted to arrive soon thereafter. The portion of the population over the age of 65, now at 12.6 percent, will increase dramatically in the coming decades. While media and political attention to this massive shift in age distribution has focused on its impact on Social Security and Medicare, the aging of America also will lead to significant changes in travel demand, and the physical form of metropolitan areas.

For example, there were 22 million US drivers over the age of 70 in 2010, compared to only 10 million in 1983.[10] (By comparison, there were only 10 million drivers under 19 in 2010, compared to 11 million in 1983.) However, as discussed above, while there are more elderly drivers, data from 2009 shows that they drove about the same (6,890 annual VMT) as drivers aged 16-20 (6,964 annual VMT.) Other research shows that drivers with reported physical impairments (e.g. memory, vision, arthritis) will "self-limit their driving by making fewer trips [and] traveling shorter distances" (Braitman and McCartt, 2008).

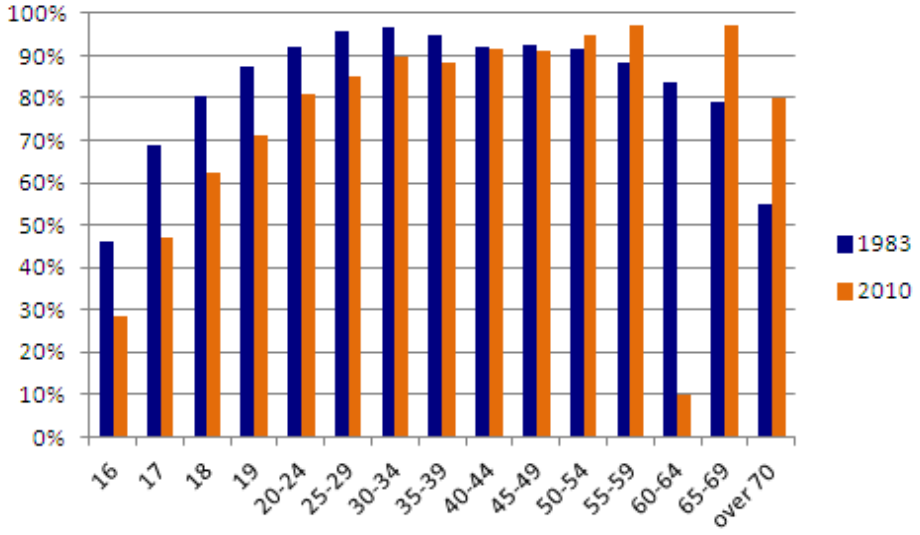
[7] Federal Highway Administration, Highway Statistics Series, Table DL-22.

[8] Federal Highway Administration, Highway Statistics Series, Chart DV-1C. (1960 is the earliest date from which data is available.)

[9] Sivak and Schoettle (2012b) also show an increase in the amount of older persons with a driver's license from 1983 to 2008 in 15 other countries.

[10] Federal Highway Administration, Highway Statistics Series, Chart DV-1C. (1960 is the earliest date from which data is available.)

Figure 4. **Percent of Population with a Driver's License, by Age Group, 1983 and 2010**




*Source*: Federal Highway Administration, Highway Statistics Series, Table DL-20.

***Third, for the first time in a generation, the total number of vehicles on the road in the US recently dropped although new car sales have recently picked up.***

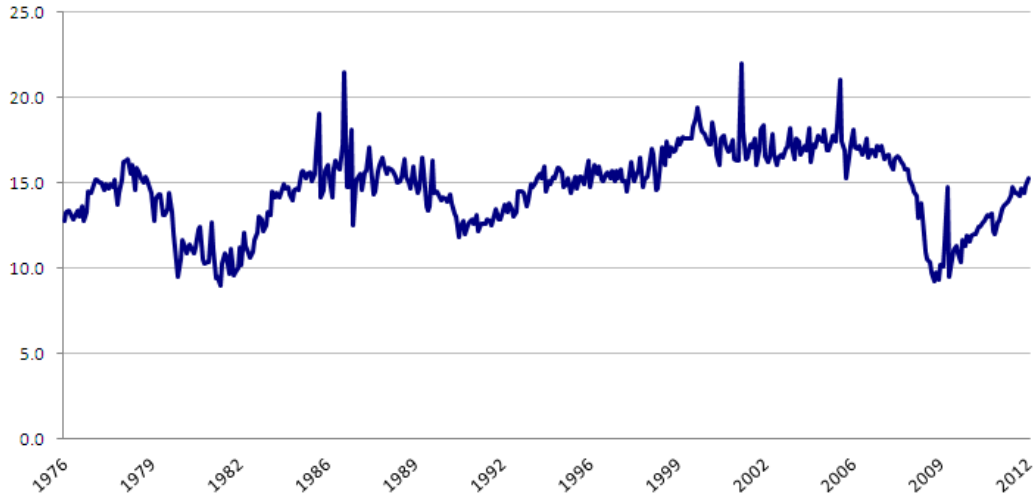
After steadily increasing every year since the end of WWII, the total number of registered vehicles in the US declined in 2011, the most recent year for which federal data is available. The number of registered light duty vehicles (passenger cars, light trucks, and SUVs) fell from an all time high of 236 million in 2009 to 234 million a year later. Only the number of registered motorcycles has continued to rise. More recent data from the Bureau of Economic Analysis on new passenger vehicle purchases shows a sharp decline beginning in late 2007 that did not begin to recover until the middle of 2009 (Figure 5). Sales increased steadily since then but only up to 2008 levels, and still far short of the peak in July 2005.

Nevertheless, the total number of registered vehicles in the US rose by 14 million from 2001 to 2011, a time when the number of licensed drivers grew by 20.5 million. California and Colorado each have nearly a half million less registered vehicles in their states in 2011 than they did in 2001. In Ohio, there are over 720,000 less vehicles. Fast growing states like North Carolina, Oregon, and Tennessee also have less registered vehicles.

A recent report highlights stagnant demand in the US automobile market, noting that there are five million fewer car buyers today than five years prior.[11] The report predicts the success of "mega-producers" whose production levels will double by 2017, and will account for the major part of industry growth. According to John Hoffecker, managing director at AlixPartners, these companies must implement a global standard of production and account for varying consumer need.

[11] AlixPartners. 2012. "Lingering Low Employment Nationally, Demographic Shifts, Potential Contagion from Europe Present Big Challenges to the Auto Industry."

Figure 5. **Motor Vehicle Unit Retail Sales, Autos and Light Trucks, Seasonally Adjusted at Annual Rates, January 1976-September 2012** (in millions)




*Source*: US Bureau of Economic Analysis (BEA), from American Automobile Manufacturers Association.

## 2. WHAT IS BEHIND THE CHANGES IN US DRIVING HABITS?

For years, the most obvious factor contributing the growth in VMT was population growth and the increase in American drivers. More drivers meant more driving. And with population growth expected to continue, traditional transportation forecasts continue to maintain that driving will also increase (see, e.g., McClain and Pisarski, 2012.) Some continue to dismiss the drops in driving and licensing as recessionary factors and—the argument goes—once the economy recovers, Americans will resume their traditional travel habits. By the same token, others argue that youth culture has changed so much that America's love affair with the car is over.[12]

However, it is clear that the dramatic and fundamental shifts in driving habits—that essentially went unchanged for decades—are not the result of one thing. More likely is that the changes we are seeing are due to a confluence of factors, discussed below.

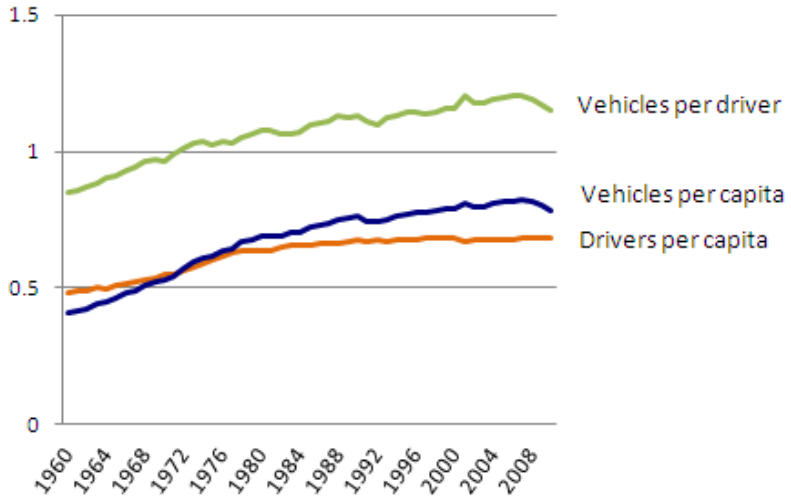
### *Several macro factors seem to suggest structural changes in driving habits*

Several macro factors that contributed to VMT growth over the past several decades yet do not appear to be as relevant for the future. For example, women entering the workforce several decades ago had a significant impact on VMT that will not be repeated. In 1950, only one in three working-age women were considered part of the labor force, by the end of the century that figure rose to its peak of 60 percent and, overall, has remained fairly constant ever since (DiCecio, Engemann, Owyang, Wheeler, 2008.)

[12] Ashley Halsey, 2012, "Has the Passion Gone out of America's Fabled Love Affair with the Automobile?" *Washington Post,* May 21.

Related, the National Surface Transportation Policy and Revenue Study Commission (2008) pointed out that vehicle ownership, which contributed to VMT growth, cannot get much higher because "there is near saturation of vehicle availability for the able-bodied adult population." (Figure 6) Since the fleet turns-over every decade or so new vehicle production and purchases will undoubtedly continue, the overall scale of the impact is likely to be relatively modest on the amount of VMT.

Figure 6. **Comparison of Vehicles and Drivers per Capita, 1960-2010**




*Source:* Federal Highway Administration, *Highway Statistics Series*

Others suggest that there simply may be a ceiling on the amount of driving that Americans are capable of, especially on an individual basis [for example, see discussion in Barnes (2001)]. The theory is based on the concept of "Marchetti's Constant" which suggests that all people have a maximum amount of travel they wish to conduct during the course of each day and that +analyses of relatively constant travel times indicate we have reached the maximum travel budgets (Marchetti, 1994.) In a comprehensive look at the American travel behavior, Polzin (2006) points out that while travel times (and therefore travel budgets) in the US have increased, *additional* increases at high rates are unlikely in the future since people will only dedicate a certain amount of time to driving. Nevertheless, Polzin points out that the link between travel time budget and VMT growth are not yet fully understood.

There are also number of changes in consumer preferences for mode and housing choice

One of the interesting facts associated with the drops in US driving is the increase in so-called alternative modes such public transit and non-motorized modes like biking and walking. While we do not know for certain that Americans are shifting from one mode (driving) to another, the data does suggest that might be occurring to some degree.

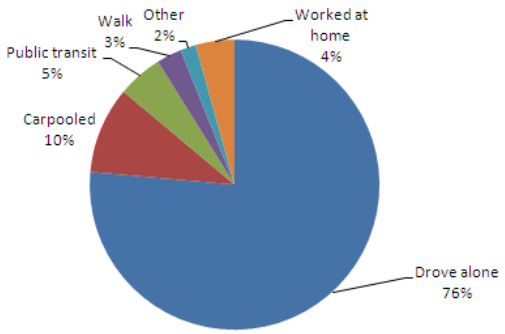
The ridership for all modes of public transit in the US increased 32.3 percent from 1995 to 2011, doubling the growth rate in population during that time (16.8 percent.)[13] The over

[13] American Public Transportation Association, "Public Transportation Ridership Report."

three-quarters of the increase in ridership game from increases in rail transit, especially heavy rail (subways.) Bus ridership rose by only 6.7 during that time.

Public transit ridership grew at about the same rate as population from 2001 to 2011 (9.5 and 9.2 percent, respectively) with strong increases in rail ridership (31 percent.) However, bus ridership declined by about 418,000 passengers; a drop of 7.3 percent. Further, the latest data from the American Community Survey shows that, from 2010 to 2011, commuting habits remained largely unchanged (Figure 7.) However, the commuting data only covers only about one-quarter of all trips.

Figure 7. **Commuting Characteristic: Mode to Work, 2011**




*Source:* American Community Survey, 2012

Another study by Pucher and Buehler (2011) found that the average American made 17 more walk trips (for any purpose) in 2009 than in 2001. They calculated the additional distance as nine more walking miles each year. Still the US Centers for Disease Control and Prevention (2012) found that in 2010 only 62.0 percent of Americans reported that they walked at least 10 minutes over the course of one week. This figure is up from 55.7 percent in 2005. The figures are generally consistent across all age groups, except for those over 65. There are some stark differences, however, such as the low walking figures for among non-Hispanic blacks (about 55 percent in 2010) and high figures for college graduates (71 percent.)

Baxandall, David, & Dutzik (2012) found that while young people are travelling less by car, they are increasingly using alternative transportation means including biking, walking, and public transit. In 2009, Generation Y took 24 percent more bike trips, walked 16 percent more, and increased the number of annual public transport miles by 40 percent. Similarly, Lynott and Figueiredo (2011) discuss the increases in non-driving modes by the elderly.

Drops is driving are also associated with the rise of telecommunications technology such as social networking. Sivak and Schoettle (2011) inversely relate the percentage of young drivers to internet availability and hypothesize that "virtual contact (through electronic means) reduces the need for actual contact." Burwell (2012) reaches a similar conclusion and postulates that internet-based social networks are a more important means of interaction among young people. While it is unclear how strong the substitution factor is, a recent article in the *Economist* (2012) cited a survey by the consulting firm TNS that found social media more important than cars for personal interaction. That article also cites a study

by KCR that found young Americans do consider online socializing to be "a substitute for some car trips."

Telecommuting, telework, and the possibility for reducing travel demand in the switch from physical to electronic retail commerce is also suggested as a factor in the drops in car use.

In an examination of the effect of telecommuting on personal transportation, Choo, Mokhtarian, and Salomon (2005), telecommuting was found to have an effect on reducing travel. Through examination of the effects of telecommunicating and alternative fuels on travel demand, Rentziou, Gkritza, and Souleyrette (2012) determined that increasing the percentage of telecommunications would reduce the number of short-distance trips traveled on collector roads in both urban and rural areas, as well as some longer trips and urban freeways and principal arterials. Overall, analysts do seem to agree that in the future, technology will have the greatest impact on socio-demographic and travel behavior patterns. However, the digital divide between white and non-white households may be problematic as the information gap worsens, and demands further study[14].

Growing demand for urban housing is another factor that may contribute to the decline of automobile use. Frey (2012) shows that the nation's core "primary cities" grew at a slightly faster rate (1.1 percent) than their suburbs (0.9 percent) between July 2010-2011. Other data from the US Census shows that the "downtown" portion of cities in the largest metropolitan areas grew their population by 13.3 percent from 2000 to 2010. While these areas still make up a small share of the overall metropolitan population, cities (and especially downtowns) are where public transit service is almost ubiquitous and provides potential for travel choices other than driving (Tomer and Puentes 2011.) In metropolitan Washington more than half (55.8 percent) of new housing units constructed so far this year (through August) were in the core cities or inner ring suburbs. In metropolitan Atlanta, the figure is 59.9 percent.[15] These preferences may be led by young people as Doherty and Leinberger (2010) cite a survey showing that 77 percent of those aged 18-35 said they plan to live in urban centers.

Increasing the overall density of an urban area clearly results in shorter vehicle trips, but density in and of itself is no guarantee of spatial efficiency (Gordon and Richardson 1997). Los Angeles is by some measures the nation's most densely populated metro, due to the lack of significant difference in population density between the central city and its suburbs, as well as a dearth of open space within urbanized portions of the metropolitan area. It provides an excellent and cautionary example of a densely developed yet automobile-dependent region, with prevailing land-use patterns (long blocks, wide arterial roads, strict functional separation of primary land uses) that discourage walking and consequently inhibit the development of transit ridership outside the lowest socioeconomic strata (Eidlin 2005).

Nevertheless, careful urban planning, with a particular eye to factors that impact residents' willingness and ability to use alternatives to the automobile for many trips—or at least minimize the length of car trips—can be a powerful tool for reducing transportation's contributions to carbon emissions. Even in suburbs where the vast majority of commuting occurs by automobile, individuals who live near pedestrian-oriented shopping districts are more likely to walk to shopping than those who live in automobile-oriented areas (Boarnet et al. 2011). While the collocation of housing and shopping can reduce vehicle

[14] Nancy McGuckin (2000), "Work, Automobility, and Commuting", in: *Travel Patterns of People of Color*, Federal Highway Administration.

[15] Brookings analysis of US Census Building Permits Survey.

travel significantly, the collocation of housing and employment yields even greater reductions in driving (Cervero and Duncan 2006).

### *Other shifts may be the result of restrictions or constraints to driving*

In the US, states are primarily responsible for laws and rules that govern drivers licensing. In 1996, just before driving began to plateau, states started approving tougher laws. In particular, states began to adopt graduated driver licensing (GDL) programs that require greater experience before new drivers are granted a full license.[16] By the end of 2000, all but nine states had GDL laws and others have additional requirements that place restrictions on unsupervised driving (Masten, Foss, and Marshall, 2011.) The motivation for these laws is not so much to restrict youth driving as it is to improve safety. The Insurance Institute for Highway Safety shows that the "crash rate per mile driven for 16-19 year-olds is four times as high as the rate for drivers 20 and older."[17]

In addition to new limits when it comes to licensing, the national recession also undoubtedly poses economic restrictions on driving. When workers fall out of the labor force, they presumably cut down on their trips (since they are not commuting to work) and may cut down on discretionary trips for shopping and entertainment. Polzin, Chu, and Roman (2008) show that an average US household savings of an estimated $3,500 per each relinquished vehicle. The implications of vehicle reduction were also found to have an effect on transit use. Household shifting from one to zero vehicles had a more substantial effect, and increased transit use was found in this circumstance. Yet this should not lead to the conclusion that VMT must grow in order for the economy to prosper.

Access to opportunity is a requirement of economic activity because individuals must be able to reach certain locations where their economic activities take place. If an individual's same level of mobility is achieved through other means, less driving does not have a negative effect on their economic actions. Thus, aggregated up, declining VMT for a large geographic area will not be an indication of declining economic activity. This is especially true in modern times with other substitutes for mobility, such as telecommuting and online retail. Further, issues such as energy independence and climate mitigation (goals which are made more reachable through declining VMT) also affect economic competitiveness and are important to consider. It is still too early to determine exactly how the 2008 financial crisis, and its ripple effects on the national economy, will affect consumer and business-driven driving levels.

However, there is not comprehensive data on this connection. We do know that the unemployment rate for young adults remains troublingly high at 23.7 percent, though this is down from the peak of 27.0 percent in 2009. As a result, the percentage of young people who are counted in the labor force fell to its lowest level since 1955.[18] Baxandall, David, & Dutzik (2012) address this issue extensively and while they acknowledge the recessionary effects, they point out that VMT was on the decline before youth unemployment spiked in 2009.

Other studies seek to draw a direct parallel between driving habits and the health of the US economy (measured by gross domestic product.) Pozdena (2009) found that VMT, economic activity, fossil fuel, and total energy use are intimately related over time and asserts that VMT is a major contributor to economic activity. He found that the impact of a "shock" to

[16] Insurance Institute for Highway Safety, 2012, "States Could Sharply Reduce Teen Crash Deaths by Strengthening Graduated Driver Licensing Laws."

[17] Insurance Institute for Highway Safety, Highway Loss Data Institute.

[18] US Bureau of Labor Statistics, "The Employment Situation—September 2012."

VMT per capita had a significant effect on GDP per capita. Specifically, a 1 percent change in VMT/capita causes a 0.9 percent change in GDP in the short run (2 years) and a 0.46 percent change in the long run (20 years). This finding suggests that VMT reduction policies would have negative economic consequences.

A recent longitudinal study by McMullen and Eckstein (2011) used time series techniques to empirically test for causality between VMT and level of economic activity. They specifically found that in less populated areas, VMT-reduction policies may limit access to economic opportunity and, because VMT in rural areas is falling at a higher rate, VMT reduction policies may be more relevant in urban areas where VMT reduction policies do not threaten economic growth, since they do not restrict access in the same way. The results are also shown to be time sensitive to economic period. For example, during economic downturns the effects of VMT on economic activity as bidirectional while during economic upturns, only economic activity caused VMT. The findings were contrary to the previous study by Pozdena (2009), which argued that VMT causes economic activity.

While more research is clearly needed Table 1 shows a simple correlation (Pearson) between GDP and aggregate VMT and VMT per capita, broken into recent five-year increments. Interestingly it shows near total correlation before the recession and almost none after. Burwell (2012) also discusses this "decoupling" of VMT and GDP in the US and the UK.

Table 1. **Correlation (Pearsons) of US GDP and VMT, Various Years**

| **Type** | **1956-2012** | **1956–1970** | **1970-1983** | **1983-1990** | **1990-1995** | **1996-2000** | **2000-2006** | **2007-2012** |
|---|---|---|---|---|---|---|---|---|
| GDP-Aggregate VMT | 0.9870 | 0.9894 | 0.9899 | 0.9865 | 0.9901 | 0.9952 | 0.9756 | **0.1621** |
| GDP-VMT per capita | 0.9409 | 0.9863 | 0.9790 | 0.9873 | 0.9859 | 0.9859 | 0.9360 | **-0.0230** |

*Source*: Federal Highway Administration, Highway Statistics Series, and Bureau of Economic Analysis, Real Gross Domestic Product, Quantity Indexes.

***The nature of US metropolitan settlement patterns, means that many Americans have no choice but to drive.***

Puentes and Tomer (2008) show that 70 percent of Americans in the 100 largest metropolitan areas live in neighborhoods with access to transit service of some kind. Potoglou and Kanaroglou (2006) show that the number of bus stops within walking distance from the place of residence was negatively correlated with household vehicle ownership, especially in household under 6 km (3.7 miles) from access to transportation.

These residents can presumably cut down on their discretionary driving if they chose to, such as when gasoline/fuel prices spike. Although research on the relationship between gas prices and commuting behavior is limited, a 2008 Congressional Budget Office (CBO) examination of driving trends in a dozen metropolitan highway locations in California found that rising gas prices reduce driving on metropolitan highways adjacent to rail systems, but have little impact in those places without. Further, they found that the increase in ridership on those transit systems is just about the same as the decline in the number of vehicles on the roadways, suggesting that commuters will switch to transit if service is available that is convenient to employment destinations. The State Smart Transportation Initiative (2012), on the other hand, found only a weak correlation between VMT and gasoline prices. Another study of the Philadelphia region by Maley and Weinberger (2009) shows that gas price fluctuations play a significant role in explaining transit ridership over the 2000s.

However, many cities and older communities have inherited a road and rail infrastructure and low-density settlement patterns where it is challenging to reduce or alter driving habits. For example, although nearly half of work commutes still originate from, or terminate in, central cities, 39 percent of metropolitan work trips are entirely suburban.[19] Only about one in five metropolitan jobs is located near the urban core, within 3 miles of downtown. As metropolitan areas decentralize in low-density forms of development—where residential and commercial uses are kept separate—it becomes increasingly difficult to connect people to jobs and economic opportunity with public transit in a cost-effective manner. From 2002 to 2007, the amount of developed land in the US increased by 8.4 percent, nearly twice the rate of population growth (4.5 percent).[20] Pendall, Puentes and Martin (2006) estimate that 55 percent of large metropolitan residents live under traditional or exclusionary zoning regimes that separate uses and/or emphasize low-density development.

Partly as a result, a well-documented "spatial mismatch" has arisen between jobs and people in metropolitan America. In some metro areas, inner-city workers are cut off from suburban labor market opportunities. In others, low- and moderate-income suburban residents spend large shares of their incomes owning and operating cars.[21] While owning a car improves chances of employment, a growing body of work quantifies the large combined impact of housing and transportation costs on households' economic bottom lines.

[19] Brookings analysis of US Census Bureau's Public Use Microdata Sample files from the American Community Survey.

[20] US Department of Agriculture, 2009, "Summary Report: 2007 National Resources Inventory," Natural Resources Conservation Service and Iowa State University.

[21] Elizabeth Roberto, 2008, "Commuting to Opportunity: The Working Poor and Commuting in the United States," Brookings.

## 3. IMPLICATIONS FOR POLICYMAKERS

While there are clearly major changes in American driving habits in recent years, the precise reasons for these changes remain elusive. A confluence of factors has introduced tremendous volatility into the transportation program. Yet irrespective of why these driving trends are changing, the reality is that it IS happening. What is still unanswered is whether we will revert to traditional trends once the economy is in full recovery (interrupted growth), whether we have such reached the limits of driving and car ownership and the new normal is the status quo (saturation), or whether the new trends will continue and American travel habits are changing and drops will continue (peak car).

But whether due to a momentary blip or long-term structural changes, policymakers are finding it difficult to react, perhaps because they do not exactly know or understand the cause. Nevertheless there are direct implications particularly with respect to how billions of dollars in public funding is spent.

*Safety*. Traffic accidents and crashes on our nation's roadways impose a considerable financial burden on households and on metropolitan areas in general: about $160 billion. These costs include property damage, lost wages, and medical and legal costs. Fortunately, recent analyses show that fatalities on the nation's roadways has fallen to levels not seen since the 1940s. The 32,367 deaths in 2011 is part of an overall declining trend and is 26 percent lower than in 2005.[22] The decline is due to a number of factors such as strengthened seat belt and drunk driving laws in states, but is likely also due to overall drops in the growth in driving.

*Traffic congestion*. Metropolitan residents in the US have struggled with effects of traffic congestion for years. Congestion imposes physical and psychological costs and it hinders access to jobs, recreation, and time with family members. At the same time, metropolitan civic and business leaders are leading the drumbeat concerning the economic effects of growing congestion, mainly due to lost time and productivity. However, the shifts in driving patterns also means changes in traffic congestion. For example, one study shows the hours of delay wasted due to traffic congestion in very large metropolitan areas dropped from 60 hours in 2005 to 52 in 2011. The figure is only slightly larger than it was in 2000. Other metropolitan size categories saw similar drops.[23] The implication s that the changes in travel habits coincides with a drop in traffic congestion measures.

*Gasoline consumption*. The US transportation system is still almost entirely dependent upon petroleum-based fuels, often supplied by other countries. However, dramatic increases in fuel efficiency of the new vehicle fleet, coupled with declines in the growth in

[22] National Highway Traffic Safety Administration, "2011 Motor Vehicle Crashes: Overview," U.S. Department of Transportation, 2012.

[23] Tim Lomax, David Schrank, and Bill Eisele, "Urban Mobility Report," Texas A&M University, Texas Transportation Institute, 2013.

driving, mean Americans are consuming about the same amount of petroleum (about 18,000 barrels per day) than in 2000 with an overall trend to lower levels of consumption. This has direct implications for national security since the US does not come close to producing the oil it consumes (only about one-third of the crude oil consumed in the U.S. is domestically produced.) Nearly twice as much is imported and the majority of that from countries considered to be in danger of "state failure" based on a range of social, economic, and political factors.[24]

*Transportation revenue*. Related, then, is the issue of declining revenues for transportation programs and projects. On the federal level, transportation revenue is largely derived from proceeds generated by the tax on gasoline. However, the gas tax does not generate enough revenue to cover the costs of the federal transportation program. Part of the problem is that the tax has not been raised, even to keep pace with inflation, since 1993. And as Americans have been driving less and driving more fuel efficient cars, they are buying less gas, so the tax is generating less revenue overall. The implication is that, on three separate occasions since September 2008, a total of $34.5 billion in general funds have been used to backfill the transportation account to keep it from running a negative balance. The end result is that the fuel tax is generating fewer revenues for all types of transportation improvements, including mass transit. States and metropolitan areas need to move rapidly to alternative sources of funding.

*Funding allocation*. The decreases in driving also have a direct impact on funding for states, cities, and metropolitan areas for several reasons. One is that large amounts of federal transportation dollars—about 17 percent—are distributed to these entities based solely on the amount of VMT driven. Several states' formulas use a measure of VMT to parse out these dollars, as well. The implication is that this creates a perverse incentive to keep VMT high in order to receive greater shares of funding. A better federal approach would be to reward states and metropolitan areas that can demonstrate how they are achieving national priority goals that derive from drops in VMT such as greenhouse gas and oil consumption reduction.

*Road pricing paradox*. Drops in the growth in driving may dim the prospects of the US transitioning to revenue based on mileage fees. A mileage fee is a direct user fee that charges drivers for miles traveled rather than fuel used, as is done now with the gas tax. A mileage fee would be unaffected by the move to more fuel-efficient vehicles but is obviously impacted as driving declines. Also potentially impacted are proposals by private investors to build toll roads as a revenue-generating investment and may result in negative ratings of toll and transportation authorities by rating agencies.[25]

*Planning and programming.* While no comprehensive analysis of state and metropolitan plans was conducted for this analysis, it does not appear that any have been amended to reflect these changes. In other words, these long-term plans are predicated on historical trends in driving and largely anticipate substantial future increases. While these self-fulfilling decisions have been the norm in the past, agencies should reexamine them to ensure they are truly reflective of the trends. Additional roadway capacity may not be as critical as previously thought so funding priorities should shift to addressing the enormous maintenance and operations backlog. For example, transportation planners in

[24] This assessment comes from the 2007 Failed States Index prepared by The Fund for Peace and Foreign Policy Magazine. The index employs a rating of 12 social, economic, and political/military indicators as well as other assessments of institutional capabilities.

[25] While a recent analysis in New Jersey showed increased toll revenues albeit with less traffic, that gain is attributed to toll increases to which there is a limit of how high they can get. Associated Press, "Traffic Down but Revenues Up on Turnpike, Parkway," NorthJersey.com, January 29, 2013.

the Washington, DC metropolitan area recently found inaccuracies in their travel forecasts largely due to overestimating increasing in driving.[26]

While policymakers appear to be slow in responding to these changes, automobile manufacturers in the US clearly have recognized the long term shifts. Major attention is now being given to the entire transportation system and the data and telecommunications deployments to facilitate integration across modes and sectors.

## 4. CONCLUSION

The realities of the 21st century mean we need not just new policies, but a different approach to building and strengthening the next American metropolis. Fortunately, we are also at a time where there are also new opportunities that make this transition not only possible, but probable. The reductions in driving and the overall changes in American travel habits should be considered generally positive given the potential for strengthen existing places, reducing greenhouse gases from transportation, and especially increases in safety. However, impacts on transportation revenues, job access, and the automotive industry complicate the discussion. The key is for policy makers to understand these new developments and their impacts on transportation finance, the environment, and general economic development.

[26] Washington Metropolitan Area Council of Governments, "Accuracy of Growth Forecasts Made 20 Years Ago Varied From Jurisdiction to Jurisdiction," TPB Weekly Report, January 8, 2013.

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