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The role of VMT reduction in meeting climate change policy goals

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ABSTRACT

This article evaluates the case for vehicle miles traveled (VMT) reduction as a core policy goal for reducing greenhouse gases (GHGs), concluding the economic impacts and social consequences would be too severe given the modest potential environmental benefits. Attempts to reduce VMT typically rely on very blunt policy instruments, such as increasing urban densities, and run the risk of reducing mobility, reducing access to jobs, and narrowing the range of housing choice. VMT reduction, in fact, is an inherently blunt policy instrument because it relies almost exclusively on changing human behavior and settlement patterns to increase transit use and reduce automobile travel rather than directly target GHGs. It also uses long-term strategies with highly uncertain effects on GHGs based on current research. Not surprisingly, VMT reduction strategies often rank among the most costly and least efficient options. In contrast, less intrusive policy approaches such as improved fuel efficiency and traffic signal optimization are more likely to directly reduce GHGs than behavioral approaches such as increasing urban densities to promote higher public transit usage. As a general principle, policymakers should begin addressing policy concerns using the least intrusive and costly approaches first. Climate change policy should focus on directly targeting greenhouse gas emissions (e.g., through a carbon tax) rather than using the blunt instrument of VMT reduction to preserve the economic and social benefits of mobility in modern, service-based economies. Targeted responses are also more cost effective, implying that the social welfare costs of climate change policy will be smaller than using broad-brushed approaches that directly attempt to influence living patterns and travel behavior.

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1. Introduction

Climate change has been pushed to the forefront of public policy consideration, and legitimate questions about the appropriate responses have become central to international discussions. Transportation policy is important in these discussions since current technology relies heavily on oil as a source of energy. Not surprisingly, some have recently proposed policies that explicitly discourage vehicle travel in order to reduce oil consumption and thus limit greenhouse gas (GHG) emissions (particularly carbon dioxide). We believe this strategy is counterproductive on practical grounds.

Urban economists have long recognized the importance of reducing generalized transportation costs as a means of increasing productivity and enhancing human welfare. The goal of reducing transportation costs is a core principle underlying fundamental theories explaining why cities exist, the size and scope of market areas, firm clustering, density gradients, and bid rent in mainstream urban economics texts (O'Sullivan, 2009, pp. 22–30, 45–53; McDonald, 1997, pp. 168–169; Blair, 1995). Indeed, this is one reason economists consider traffic congestion an external cost (O'Sullivan, 2009, pp. 254–266; McDonald, 1997, pp. 168–194). Recent research has also found a statistically significant empirical link between higher travel

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speeds, increased productivity and higher income (Broersma and van Dijik, 2007; Cervero, 2001; Graham, 2007; Hartgen and Fields, 2009; Pozdena, 2009; Prud'homme and Lee, 1999; Prud'homme, 2000). Rising traffic congestion (and its associated longer travel times and higher transportation costs) is an external cost that offset the productivity benefits of agglomeration economies that make cities wealth generators and growth centers for national economies. We believe this research highlights the importance of mobility, the ability to move from point to point more quickly and easily, to urban development (and by extension national economic growth and productivity).

Public policies that curtail vehicle travel will often lengthen travel times (and thus increase generalized transportation costs) and imply a non-pareto optimal shift in travel consumption that reduces human welfare, income, and the ability of societies to address environmental problems and other externalities. Public policy would enhance both effectiveness and welfare if it focused on incentives, transparent marginal-cost pricing for travel, and direct internalization of externalities. While these strategies might have the effect of lowering vehicle miles traveled (VMT), this outcome is not an explicit goal and would be the result of consumers voluntarily readjusting their preferences in a more transparent market place.

The next section frames what we believe is the core policy question in the context of the current debate over transportation and climate change. The third section examines in depth the tradeoffs involved with some key policies proposed for reducing transportation GHG emissions. The final section sets forth how we think policies should proceed.

2. Climate change, greenhouse gases and transportation

We accept that the earth is warming, CO_2 is the major component to greenhouse gases, and anthropogenic sources are a significant concern. But determining which policy responses are most appropriate and necessary is far from settled. In fact, this discussion is just beginning. We will return to this question, which is central to our position on VMT reduction as a policy goal, in subsequent sections of this article.

Given the potential of many climate change policy proposals to reduce freedom and wealth, any policy discussion must also recognize the inherent uncertainties surrounding climate science and the implications for social welfare. Here, we make four observations that inform our policy framework.

First, climate models are extraordinarily imprecise, because they attempt to extrapolate from a century (or less) of detailed data phenomena that take centuries and millennia to unfold (Idso and Singer, 2009, pp. 9–22; Wielicki et al., 2002). Moreover, the primary drivers of climate change are not particularly well understood and modeling the effects of clouds, precipitation, light, and other factors is difficult at best with high levels of uncertainty. Thus, the apparent policy goal of attempting to achieve an 80% reduction in carbon dioxide emissions by 2050 is at best a rule of thumb, not an objective conclusion grounded in hard scientific evidence.

For example, many climate change policy proposals are based on climate models that tie rapidly-growing concentrations of CO_2 in the atmosphere to rapidly rising temperatures (IPCC, 2007, pp. 2–4). These links are extrapolated through climate models that predict with "virtual certainty" continued temperature increases, weather variability, and other environmental impacts in the 21st century (IPCC, 2007, Table SPM-2, p. 9). Indeed, the controversy over the so-called "hockey stick" graph (see Mann, Bradley and Hughes, 1998) showing a dramatic rise in temperatures since 1910 is also cited as corroborating evidence for the role of carbon dioxide (IPCC, 2007; see also the critique of the hockey stick in McIntyre and McKittrick, 2003). Yet, the earth has not experienced statistically significant warming for more than a decade, and global temperatures appear to have declined. In testimony before the US Congress, climatologist John Christy (2009) reported actual temperature changes had fallen during the first decade of the 21st century, contrary to predictions from mainstream simulations of climate change (see also the review in Idso and Singer (2009), pp. 63–134).

Even if global warming is progressing as many climate scientists predict, this brief respite may well provide the breathing room necessary to develop more effective technological solutions to the challenges presented by rising temperatures in the future. Ten years in the context of global temperature changes is small, but can be quite dramatic in the context of recent human history. The variance and imprecision of current climate models strongly suggests that draconian policy proposals that severely limit transportation, land use, and housing choices may not be necessary or even the most appropriate. A decade in the course of human history allows for a reasonably wide window for innovation and technical progress through less intrusive policies and organic market forces. For example, automobiles fully powered by electricity generated by nuclear power plants is feasible within a twenty or 40-year window for most high-income nations as the price of gasoline increases and technology advances. France generated 76% of its electrical power from nuclear sources in 2008 according to the World Nuclear Association (an international trade association for the nuclear industry). Some rapidly growing emerging nations have more potential to use this technology. China for example, has 11 nuclear reactors in operation, 18 under construction, and 90 planned, according to the NWA.

Second, controlling emissions in one country may have little impact on the larger goal of limiting global GHGs. The US, for example, accounted for 20.3% of global *man-made* carbon emissions in 2006, and is projected to contribute 18.7% in 2010 (DOE, 2009, Table A10). Burning US gas and diesel fuel accounts for about 8.9% of world wide man-made carbon emissions in 2006 and 7.7% in 2010 (DOE, 2009, Tables A10 and A11). On a per capita basis, increasing energy efficiency has slowed the growth of carbon dioxide emissions in the US, which have even fallen since 2006 (DOE, 2006, Table H.1cco2; Staley and Moore, 2008, p. 200). But, while the US and Europe remain the largest overall emitters of GHGs, the real pressure on future emissions will come from growing countries such as India, China, Brazil and even continents such as Africa, as they become

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