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## ANALYSIS

# Motor fuel taxation, energy conservation, and economic development: A regional approach<sup>☆</sup>

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## ABSTRACT

Combustion of motor fuels has a variety of environmental impacts on local, regional and global scales. Taxing motor fuels more heavily would mitigate those environmental impacts. However, many governments are reluctant to increase motor fuel taxes because they fear that the tax incidence will be regressive and that economic development will be impeded. Using data for the New England region of the United States, this paper argues that an oil-importing region can conserve energy, avoid regressive impacts and encourage economic development by taxing motor fuels more heavily and rebating the incremental revenues to owners of motor vehicles.

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## 1. Introduction

Without doubt, the motor vehicle is central to daily life in the United States. In 2003, the nation's fleet of autos, trucks and buses numbered 231.4 million. There was nearly one auto for every two Americans (FHWA, 2003, Table MV-1). In order to service this vehicle fleet, governments at the federal, state and local levels had constructed 3.97 million miles of public roads by 2003, almost 23.7% of that mileage in urban regions (FHWA, 2003, Table VM-1).

This enormous fleet of vehicles and extensive network of streets and highways permits an unprecedented degree of mobility in the contemporary United States. In 2003, vehicles logged 2.89 trillion miles of travel (FHWA, 2003, Table VM-1), the equivalent of more than 6 million round trips between our

planet and its moon. Along the way, those vehicles burned 169.6 billion gallons of gasoline and diesel fuels (FHWA, 2003, Table MF-21).

Mobility of people and freight carries a high price tag, however. In 2001, the private cost of operating an automobile (fuel, depreciation, maintenance, etc.) ranged from 20 to 50 cents per mile (Harrington and McConnell, 2003: 21). Of greater relevance to this study are the numerous external costs associated with the nation's dependence on motor vehicles to transport drivers, passengers and cargo. Soil and groundwater contamination from leaking fuel storage tanks is a widespread problem, for example. The US EPA (2005) has confirmed nearly 449 thousand leaks from underground tanks.<sup>1</sup>

The operation of vehicles results in highway fatalities and injuries, noise pollution, and urban road congestion. In 2000,

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<sup>1</sup> Many, but not all, of these tanks contained gasoline and diesel fuel stored at retail locations.

more than 40,000 people died in traffic accidents and 3.1 million received injuries (Parry, 2004: 346).<sup>2</sup> Road congestion led to 3.7 billion hours of travel delay in 85 metropolitan areas during 2003 alone (Schrank and Lomax, 2005: 1).

During their operation, motor vehicles also emit a wide variety of combustion products into the atmosphere. Several of these emissions contribute to health problems at the local and regional scale. McCubbin and Delucchi (1999), for example, find that vehicles are a primary source of small suspended particles and that particulate matter contributes to asthma attacks and other respiratory problems. Neidell (2004) reports that as much as 90% of carbon monoxide in California cities comes from vehicle tailpipes and that this air pollutant apparently elevates the hospitalization rate of young children.

In the presence of heat and sunlight, two types of auto emissions contribute to the formation of ground-level ozone. Hubbell et al. (2005) estimate that if all locations in the U.S. were to comply with the EPA 8-h standard for ozone exposure, there would be 800 fewer premature deaths, 4 thousand fewer hospital admissions and 900 thousand fewer school absences per year.

Another category of external cost associated with vehicle emissions is reduced atmospheric visibility. Although sulfates discharged from power plants and industrial plants are a major source of haziness during summer months, nitrous emissions from autos also play a substantial role (US EPA, 2005).<sup>3</sup> Survey research by Crocker and Shogren (1991) revealed that visitors to a Cascades wilderness site were willing to pay for improvements in visibility. In a more recent study of house prices in four California counties, Beron, Murdoch and Thayer (2001) found that, after controlling for ozone and suspended particle concentrations, a one-mile improvement in mean visibility was associated with a 3% to 8% increase in sales price. Visibility is an environmental amenity that people value and are willing to pay for.

Still another external cost of vehicle emissions is damage to forests, agricultural crops and other forms of plant life. Murphy et al. (1999) have estimated that eliminating ozone precursor emissions from vehicle tailpipes would have increased U.S. agricultural output by 3.5 to 6.1 billion dollars in 1990.

These and other empirical studies suggest that there are significant external costs at the regional and local scales associated with the use and storage of motor vehicles. Two surveys of empirical estimates suggest that these external costs could total as much as 66 cents per vehicle mile (Harrington and McConnell, 2003: 23).<sup>4</sup> This implies that the external costs of motor vehicle transport could be substantially higher, at the margin, than the private costs incurred by the operators of those vehicles.

<sup>2</sup> Not all of the costs of highway accidents are borne by parties other than the vehicle operator, however. Parry (2004) estimates that the accident costs imposed on other parties total 56 to 163 billion dollars per annum.

<sup>3</sup> The Region 1 office of US EPA reports that 56% of the nitrous oxides discharged during 2002 in New England came from motor vehicle tailpipes.

<sup>4</sup> This estimate is the sum of the high estimates for each category of external cost in Harrington and McConnell (2003, Table 3), excluding the (suspiciously low) estimated costs of global climate change.

## 2. Crafting an appropriate policy response

This difference between the private and social costs of motor vehicle transport points to a major misallocation of resources within the U.S. economy. What is to be done? The theory of optimal taxation points to a variety of specific levies, each intended to reduce the external costs associated with a particular dimension of motor vehicle use. Road congestion, for example, could be tackled by a road use fee tailored to the time of day on a particular roadway (Mills, 1998: 77).<sup>5</sup> Traffic accidents could be reduced by a vehicle mileage fee tailored to driver age and vehicle characteristics (Parry, 2004: 350). Air pollution resulting from tailpipe emissions could be abated by spatially differentiated emissions charges (Tietenberg, 1994: 58–70). Although theoretically attractive, proposals such as these are unlikely to result in adoption of a set of optimal taxes on vehicle-related externalities. Political opposition to new tax instruments, heavy information requirements and high administrative costs pose serious obstacles to implementation of optimal levies on the various externalities associated with motor vehicle use and storage.

The second-best, but politically feasible, alternative would be to reform and increase the existing excise tax on retail purchases of motor fuels. In a study of California, for example, Fullerton and West (2003: x) have found that using the gas tax to reduce vehicle emissions could achieve 62% of the maximum gain in social welfare via an emissions charge. Grabowski and Morrissey (2004: 588) report that the long-run elasticity of traffic fatalities with respect to the real price of gasoline is  $-0.34$ . This finding supports the comment of Parry (2002: 30) that the gas tax is the “next-best response for curbing...accidents.” Mills (1998: 79) argues that road use tolls are the preferred policy tool to control highway and street congestion but that “[a]s a practical matter, there is much to be said for fuel taxes. They are by far the cheapest taxes to collect...[and] are almost impossible to evade...’ Finally, Brueckner (2001: 77) has stated that a higher gas tax could be “a practical means of remedying...sprawl.”<sup>6</sup> If raising a single tax has the potential to reduce air pollution, highway fatalities, traffic jams and metropolitan sprawl, then this fiscal policy deserves serious consideration.

Although an increase in federal excise taxes on gasoline and diesel fuel should be considered, this paper argues that a state or regional approach to motor fuel taxation is warranted in the United States.<sup>7</sup> One reason is that the U.S. Congress shows little inclination to raise taxes of any sort.<sup>8</sup> Another

<sup>5</sup> A simple version of this theoretical proposal was adopted in central London in 2003.

<sup>6</sup> McGibany (2004) provides some empirical evidence that heavier state taxation of gasoline is associated with more densely populated urban areas. The econometric technique employed, however, does not allow the author to distinguish between cause and effect.

<sup>7</sup> Although the following arguments focus on the United States, one could make similar arguments for Canada, Brazil, Germany,

<sup>8</sup> The federal tax on gasoline was last increased in 1994, when its nominal rate reached 18.4 cents per gallon. During the next decade, the inflation-adjusted tax rate fell by 21.6%. This decline in the real value of the federal tax rate means that national policy today provides weaker protection from detrimental externalities associated with motor vehicle operation than a decade ago.

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