Hyatt-Crozier, Anna [LEGIS]

From: Hanley, Paul F [paul-hanley@uiowa.edu]
Sent: Wednesday, November 14, 2007 12:47 PM
To: Hyatt-Crozier, Anna [LEGIS]
Subject: RE: research on taxes by miles driven.
Attachments: OverviewNov_1_07.pdf

Hi Anna,

You are correct. We, at Public Policy Center, have a US Congressionally funded study of mileage charges. We have been directed by congress to evaluate the technologic feasibility and social acceptance of moving from the gas tax to a mileage charge system. This is a field test within six states (IA, TX, CA, MD, NC, and ID). The field data collection was scheduled to run for four years. I would rather be telling you that we finished the first and in the middle of the second year field test gathering data, but I have to say we have not. The study has been in review by the Federal Highway Administration within the US Department of Transportation since October 2005. For the last year, we have been waiting on their review and approval of the computer system security at the University and for our study. We do not know how much longer before we receive authorization despite our numerous inquiries.

I have attached an overview of the project. Let me know if you need more information.

Paul

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Project Overview
National Evaluation of a Mileage-Based Road User Charge

This overview summarizes a major study to conduct a national evaluation of a new approach for charging vehicles that travel on public roadways. The new approach applies intelligent transportation system (ITS) smart-vehicle technology to the problem of assessing road user charges, allowing them to be fairer, more stable, and more flexible. Though very simple in concept, the new approach requires that a number of institutional and technological issues be resolved. It is to resolve both types of issues that we are undertaking this research.

Part I of this research, which was a three-year effort, was concluded in September 2002. A final report is available from the University of Iowa Public Policy Center. This research was funded through a special consortium comprised of the Federal Highway Administration and 15 state departments of transportation: California, Connecticut, Iowa, Kansas, Michigan, Minnesota, Missouri, North Carolina, Ohio, Oregon, South Carolina, Texas, Utah, Washington, and Wisconsin. As called for by Sections 1919 and 1934 of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFTEA–LU) of 2005, Part II seeks to field-test the concepts developed, so that by the time the federal and state governments consider implementing it, the new approach will be fully tested and widely understood. Before implementation can be considered, it is vital that so different an approach be thoroughly tested because the stakes are high indeed—nationally the amount of revenue generated by road user charges is substantial, with the motor fuel tax alone generating upwards of $74 billion annually.

Basic Design from Part I

The basic operation of the mileage-based road user charge is as follows: A receiver installed on board study participants' vehicles uses GPS signals (through triangulation) to determine the vehicle's position. A simple on-board computer stores a file consisting of data polygons, using geographic information systems (GIS). These data polygons define the boundaries of states and, if applicable, sub-state regions such as communities or metropolitan areas. It is thus possible to assess mileage-based road user charges simultaneously for federal, state, and municipal levels of government. A data file is stored in the on-board computer containing the per-mile road user charge for this particular type of vehicle in each participating jurisdiction.

The on-board computer continuously applies the per-mile charge rate to the miles being traveled within a given polygon and thus jurisdiction. What is stored in the on-board computer is the total amount owed to each jurisdiction. Note that route and time information are not stored. The on-board computer compares the mileage derived from the GPS signal with that from the odometer. The odometer is the primary source of distance data because in modern vehicles, the manufacturer has made electronic odometers virtually tamper proof to protect warranty limitations.

On a pre-programmed schedule (e.g., on the 15th day of each month), the vehicle uses cellular technology to upload these stored data to a billing and dispersal center. The center operates much

like a major credit card billing center. It bills the vehicle owner and apportions the revenue that is collected among the jurisdictions within which this vehicle has actually traveled. To elaborate a bit, when one purchases a vehicle, an account is established with the billing and dispersal center at the time the vehicle is registered. Payment options could include automatic credit card deduction, sending a billing statement, or payment from a debit account at the time that road user charge data are uploaded.

National Evaluation in Part II

Funded at $16.5 million, the purpose of this four-year evaluation study is to fully test and refine this new approach to assessing and collecting road user charges. The basic approach, just described, is a mileage-based road user charge system that will provide political jurisdictions with great flexibility. An important attribute of the mileage-based approach is that it can accommodate any form of vehicle propulsion system, including current technology gasoline- and diesel fuel-powered vehicles, new electric-hybrid power vehicles, and emerging vehicles that are powered with fuel-cells. At the state and federal levels, it is intended to eventually replace the motor fuel tax, not constitute an additional charge. Each jurisdiction—federal, state, and local—can enact per-mile rates that vary by vehicle attributes and that advance policy considerations.

Two important and interrelated issues need to be addressed in the evaluation study. The first is appropriateness of the technology. We need to be absolutely certain that the technology ultimately used is cost-effective, reliable, user friendly, flexible, and secure. In Part I of this research, we developed and refined the operating characteristics of the on-board computer and billing and dispersal center. In Part II, we are rigorously field-testing the operation of key components. Well-structured design-testing-feedback-redesign protocols will enable on-board systems and the billing and dispersal center to be fully refined and ready for implementation by the end of the four-year Part II effort.

The second and related issue is user acceptability. Assessing acceptability by road users involves more than acquainting a cross section of the road user population with the new approach and seeing how it reacts. Rather, the process must be iterative—feedback from a moderately large representative sample of users must be obtained to modify and revise the new approach. In this way, the evaluation study can converge on design and operational features that maximize its convenience and other user benefits while avoiding characteristics to which the traveling public would not respond favorably.

Central to the evaluation program is field-testing. It is vital that a sizable sample of motorists in different regions of the nation operate approximately a sizable number of vehicles equipped with the necessary on-board equipment for an extended period of time. The six sites in which the field tests will occur are: Austin, Texas; Baltimore, Maryland; Boise, Idaho; Eastern Iowa; the Research Triangle Region of North Carolina; and San Diego, California. We will include ample provisions for concerns or suggestions of participants to be reflected in second-year changes to make the on-board system work as well as possible by the end of the project. Over the course of the two-year field-testing, we will have enabled a diverse sample of approximately 2,700 participants to become highly familiar with the mileage-based road user charge. This will allow us to gain considerable insight into (1) the technological workability of the approach and (2) its acceptability to road users. At the conclusion of Part II, we expect to have developed a fully

operational system to enable a mileage-based user charge system to be implemented. This system will be maximally acceptable to road users and capable of enabling a series of public policy objectives to be achieved, especially a stable flow of revenue.

Progress to Date

The national evaluation study began on October 1, 2005. Now, 24 months later, considerable progress has been made. Specifically, we have:

- Assembled a study team with key people hired by the University or retained under contractual arrangements.
- Selected the six national evaluation sites and established contact with the appropriate state DOTs and local councils of government.
- Completed the design of all technological components, including several computerized data servers and wireless communication links connecting on-board computers with the servers.
- Completed the design of the on-board computers, constructed prototypes and beta tested them in each of the six evaluation sites, and manufactured 1,200 units. A total of 18 different vehicle classes have been established, and the class for the vehicle in which the on-board computer is installed is programmed. This makes it possible to charge different per-mile rates for various types of vehicles.
- Designed a device through which participants enter the number of gallons of fuel purchased. This amount is sent to the on-board computer, which determines the jurisdiction in which the purchase occurred. A credit is then applied for the motor fuel tax paid to the particular jurisdiction.
- Issued a request for proposals to numerous marketing and communications firms nationally to assist us in public information efforts as the first step in recruiting participants at six sites nationally. Based on the proposals we received, three firms have been selected. Materials for the selection and training of study participants have been finalized.
- Designed a sampling strategy to select from the pool of volunteers the 200 participants in the first year of field-testing (250 in the second year) at each of the six sites, taking into account (1) demographics, (2) attitudinal profile, and (3) driving patterns.
- Developed a database that defines the boundaries of the states and of local jurisdictions within them. This enables the on-board computer to properly record the travel within each jurisdiction and thus the amount due to it. As noted, it is possible to levy separate per-mile charges simultaneously at the federal, state, and municipal levels.
- Designed a user charge data upload convention that virtually assures participant privacy. In fact, the only information that can be associated with a given road user is (1) the total amount of user charges due and (2) the total number of miles traveled since the last data upload. Using sophisticated asymmetric encryption, the amount of this total to be allocated to each jurisdiction (state or local) is then sent anonymously.
- Developed a series of survey questionnaires for participant recruitment and periodic contacts with participants. These questionnaires have been reviewed and approved by the University's Institutional Review Board (IRB). The questionnaires will be administered monthly and will

enable us to evaluate changing perceptions of the mileage charge by a diverse sample of participants.

- Prepared four technical reports that document (1) the overall study design, (2) design of the technological components, (3) the process being followed to select and train participants, and (4) policy choices when establishing per-mile rates for various types of passenger vehicles.
- Tested the performance of on-board computers in ten different makes and models of passenger vehicles to assess its performance and to fine-tune installation procedures in the field testing phase.

Field Testing

Awaiting federal clearance, current plans are for participant recruitment at the six sites to begin late in 2007 or early 2008. The marketing firms will conduct an aggressive public information campaign using ads in newspapers, television and radio spots, and op eds. Assisting the recruitment efforts will be information regarding the stipend that a participant will receive over the course of his or her efforts in support of the study. Receipt of the monthly stipend is conditional upon completing the periodic survey questionnaires.

People wishing to be considered for participation in the study can apply in either of two ways: (1) through a study Website or (2) by calling a toll-free telephone number. A short prescreening questionnaire is administered first, asking a few fundamental eligibility questions, such as whether the person has a driver's license and a vehicle available. Those who pass through this screen are administered a more extensive questionnaire regarding (1) demographic characteristics, (2) attitudinal profile, and (3) general driving behavior.

Using a sample selection procedure, the study team will select the candidate participants who will then be notified as to their candidacy. Selection will be made on the basis of diversity in terms of the three criteria just listed. Training sessions will fully inform participants about (1) the study objectives, (2) what is asked of them during the field-testing process, and (3) their rights such as privacy protection.

On a designated date each month, the on-board computer will upload road user charges due, and a simulated bill will be sent to each participant. Initially, the billing statements will only reflect the total amount due, in a maximum privacy protection configuration. After a few months, the study team will send billing statements with much greater detail, fully documenting the basis for the user charges levied. The objective is to test whether participants would rather have their privacy almost totally protected or would prefer to have the basis for the charge very well documented.

Every month, a survey questionnaire will be sent to each participant. During the course of field-testing, the questionnaires will address a variety of topics related to acceptance of a mileage-based road user charge. The objective is to determine characteristics and views that tend to be associated with support for the mileage charge. The questionnaires also will serve as one of the several means for assessing the performance of the on-board equipment.

Summary

In summary, the National Evaluation of a Mileage-Based Road User Charge is the product of almost ten years of research. The design of on-board equipment and data transfer mechanisms has evolved over a considerable amount of time, and the sample design for participant selection likewise is quite refined. We look forward to the insights that will result from the two years of field-testing.

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