

The Supporting Statement

The title of this information collection is “Experiments on Driving under Uncertain Congestion Conditions and the Effects on Traffic Networks from Congestion Pricing Initiatives”. This is a new study.

Part A. Justification.

1. Circumstances that make collection of information necessary:

In the US the use of toll financing is far less common than in other countries. Today there are 2,997 miles of tolled interstate and 1,989 miles of State highway in the US that employ tolls. In 2008, these facilities produced about \$10.9 billion in revenue, or about seven percent of transportation revenue collected by States and localities. This percentage has been relatively unchanged since the 1950s. While a small portion of all transportation revenues, there are indications that interest in toll financing is increasing as states find it more difficult to raise fuel and other highway use tax rates. States are also interested in understanding the impacts of varying toll rates in response to congestion. While some research has been done in understanding how drivers react to congestion pricing initiatives, there have been limitations on the data collected. The primary limitations have been that most investigations into how drivers will react to new initiatives have been done using stated preferences, i.e. survey responses to questions about intentions. These methods are known to generate biased and volatile responses. Tests of hypothetical bias have been performed by some of the PIs in earlier research.¹

This study will explore an alternative methodology for learning how drivers respond to congestion pricing. This methodology is based on providing respondents with travel options with actual consequences, primarily involving money, where the choice situations vary with respect to congestion and congestion pricing. Based on this study it will be possible to estimate how Orlando, Florida and Atlanta, Georgia drivers change their route choices when tolls change. Some of the scenarios included take into account how driver choices affect the level of congestion as well as the revenues collected from the tolls. This study is exploratory and will apply this methodology to two

¹ Cummings, Ronald G., Glenn W. Harrison, and E. Elisabet Rutstrom, “Homegrown Values and Hypothetical Surveys: Is the Dichotomous Choice Approach Incentive Compatible?”, *American Economic Review*, 85 (1), March 1995. In this paper we compare willingness to pay responses in a purely hypothetical survey-type setting to one in which respondents have actual, monetary consequences. We find a significant inflation in the willingness to pay reported in the survey setting.

metropolitan areas: Orlando, Florida and Atlanta, Georgia, assessing and validating various new and promising research methods in the area of traffic congestion. Many of the instruments and procedures have not previously been employed for the purposes of generating behavioral data on policy issues, as they are in this study. The potential value in identifying new methods for collecting and analyzing data on drivers and traffic systems is great since there are problems, such as the positive bias in stated preference surveys. Travel related stated preference surveys can take several different forms, but are often conducted either by telephone or postcard eliciting participants' willingness to use a new toll road. Both empirical and anecdotal experiences display this troublesome bias. If the results are promising based on data from these regions then extending the tests to other regions may be warranted in future research efforts. In this study it will be possible to explore how transferable findings are across simulator and field driving and across the four regions (East and West Orlando and East and West Atlanta). Extensions to other regions would provide a way of identifying the boundaries for such transferability. These extensions are outside the scope of this study, however.

This study will assess the responses to several congestion pricing schemes by asking volunteer participants to make driving choices under these schemes in an experiment where there are actual monetary and not just hypothetical consequences. The study will present participants with a number of choice situations involving routes that vary in road pricing and travel time. Three basic types of experiments will be conducted: a field experiment using GPS instruments; a multi-driver traffic simulation experiment; and a single driver simulator experiment. Data collected from these experiments are essential to create a better understanding of how this methodology can be used to understand motorists' decisions to whether they are willing to pay tolls or extra charges for their trip and how much they are willing to pay. These experiments will also provide FHWA and its state partners with validation of a method to test toll alternatives. Currently this is done using stated preference surveys. It is well known that stated preference surveys contain a positive bias where respondents often state a preference for a toll road (or other travel option) that is not born-out in the real world implementation. Researchers have not been successful in designing a calibration factor that appropriately correct for this bias.

The initial phase will consist of recruiting participants by sending out invitation letters to potential participants who are drivers on select routes in the Orlando, Florida and Atlanta, Georgia metropolitan areas. Potential participant population consists of residents in zip codes that would use these routes for commuting. Florida Turnpike Enterprise, a

local toll road agency in Florida has agreed to collaborate with the researchers in this phase. Invitations also go out to Florida Turnpike Transponder holders, targeted for those who commute on the study routes. Respondents who express interest in being part of the experiments will be asked to attend four face-to-face sessions. There will be a choice of times and locations for these sessions so as to make it convenient for the participant. In these sessions participants will be presented with choices over risky prospects, tasks for reporting beliefs about travel time, and simulator driving tasks. These tasks are intended to observe characteristics in drivers that are important to their driving choices when roads are congested. Choices over risky prospects are presented as different die rolls resulting in different money earnings. For example, one can choose a prospect that pays \$5 if a roll of a 10-sided die is 1-5 but pays \$10 if the roll is 6-10. The belief reporting tasks are presented as choosing how much money to be paid conditional on various travel times, for example one can choose to receive \$10 if the travel time is less than 20 minutes but \$5 if it is more than 20 minutes. The simulator driving tasks involve driving a car in a computer simulation and choosing between various routes to get from the origin to the destination, and where earnings depend on how long the drive takes and whether the route is a tolled route or not. In all these tasks the consequences are real money, not just hypothetical. In addition participants will respond to a socio-demographic questionnaire, an opinion questionnaire about congestion policies, and a traffic survey about their driving habits and congestion experiences.

In addition, participants' cars will be outfitted with a Global Positioning System (GPS) device that can receive but not send signals, allowing the researchers to collect information on driving habits. All driving data will be downloaded directly from the device to a computer. Sensitive data, such as the home and work locations of the drivers, will not be downloaded. Approximately two weeks will pass between each meeting; a time frame that is determined by the capacity of the GPS device's ability to store data of participants' travel log.

In addition the FHWA and their state partners are extremely interested in the impacts of congestion pricing on income equity. Previous research on California State Road 91, shows that congestion priced lanes are used across all income classes. The present research will oversample low income areas to increase the potential that this study can further assist FHWA and their state partners in understanding if this research conclusion is validated for two different regions of the country and importantly *why* there are or are not differences across income groups. The focus is not primarily on studying low income groups, but it is essential that these groups are as

well represented as possible. Part of the methodological interest in this study is to see how well participants of various income and education levels respond to various tasks. Some tasks may be more appropriate for participants of low income or education than others. One-on-one help is available to all participants for all tasks. Our research assistant helpers walk participants through practice tasks before the actual tasks, giving participants additional opportunities to clarify their understanding. This personal approach to is intended to make it possible to have a very diverse subject pool.

Participants will attend four meetings. At the first meeting they receive their GPS device. At subsequent meetings, data from the GPS device will be downloaded to allow the researchers to study the driving choices in the intervening weeks. Meetings will be spaced approximately two weeks apart. Participants will receive money for driving on the routes studied but tolls that vary across routes and departure times will be subtracted from this money. If a toll from the study is applied to a route that already has a toll, the existing toll is subtracted from the toll charge in the study. If the existing toll is higher than the toll charge in the study, the participant will receive the difference. Some routes will have no toll charge.

From the perspective of the participant the following is the chronological order of events:

1. A letter is received in the mail or the participant sees an announcement in the Florida Turnpike Newsletter, with an invitation to join the study and a link to our web page.
2. The web page gives directions on how to register for the study.
3. Registered participants are directed to an online schedule for signing up for specific sessions at various times and locations.
4. Participants come to a first meeting in which they participate in driving simulator tasks, belief tasks, risky prospect tasks, surveys, and are given directions for how they will be paid based on the GPS recordings of their driving between the first and second meeting.
5. At the end of the meeting the participant is paid the fixed \$25 fee, plus any earnings from the tasks. These will average \$20.
6. Participants drive for up to 20 times on the study routes during the 2-3 weeks that pass between meetings.
7. The second meeting again involves driving simulators, belief tasks, surveys and risky prospect tasks. The GPS records from the first set of study route drives are downloaded, and directions are given for the continuation of the driving that is GPS recorded.
8. At the end of the meeting the participant is paid the fixed \$25 fee, plus any earnings from the tasks including the GPS recorded drives on the study routes. These earnings average \$94.

9. During the next 2-3 weeks participants make up to another 20 drives on the study routes.
10. The third meeting has no driving simulator or belief tasks, only risky prospects, surveys and directions for continued participation in the GPS recorded driving. GPS driving records for the past drives are downloaded.
11. At the end of the meeting the participant is paid the \$25 fee plus any earnings from tasks and GPS recorded drives. These earnings average \$51.
12. Another period of 2-3 weeks takes place where participants make up to 20 drives on the study routes.
13. A fourth, and final meeting takes place which has a belief task and surveys. Driving records from the third and final set of drives on study routes are downloaded.
14. At the end of the meeting the participant is paid the \$25 fee plus any earnings from the GPS recorded drives and the \$100 fee for returning the GPS unit. Task and GPs earnings average \$55.

2. How, by whom, and for what purpose is the information used:

The information collected will be utilized by FHWA and researchers at the University of Central Florida, Georgia State University, and Louisiana State University to reach a better understanding of how this methodology can be used to study how willing motorists are to pay for avoiding congestion and utilize alternatives to congested facilities. While the field experiments will generate valuable data about trip makers' decisions, their daily trip making habits, and their willingness to change their decisions, the lab experiments will complement the field experiments to enable the research team to advise FHWA if lab experiments are comparable to on-the-road driving choices and to provide additional observations on driver characteristics that are not otherwise observable, such as risk attitudes. The data collected will be used to validate the explored methodology. Several questions will be approached with the data:

1. Do risk attitudes and perceptions explain a large part of the variation in route choices of our participants during congestion conditions such as morning and afternoon commutes as road pricing varies?
2. Does behavior observed among drivers in one region transfer to drivers in other regions?

3. Are results from using driving simulator experiments comparable to on-the-road choices?
4. Does the distribution of risk attitudes and perceptions of travel time among drivers explain important endogenous properties of the traffic system they are in?
5. Are there significant differences in reactions to congestion pricing across observable demographic segments of the population such as gender, age and household income?

The most important results of this study will be (1) a set of estimated decision models that characterize drivers in terms of their risk attitudes and perceptions and the importance of these characteristics in explaining their choices of routes for various congestion levels and congestion prices; and (2) an understanding of how on-the-road travel decisions compare to simulated driving choices executed in a laboratory environment.

In all publications containing a discussion of the results of this study the following caveat shall appear: *This study is exploratory and experimental in nature. Results from this study will not be used as evidence in reports to Congress or in responses to Congressional testimony. Results from this study will not directly be used to alter programs or policies until followed up with further studies.*

3. Extent of automated information collection:

The GPS devices used in the field experiments will create detailed information about trip makers' diaries in an automated format. Appropriate software will permit downloading this data from the devices and processing it. Sensitive data, such as the home and work locations of the drivers, will not be downloaded.

4. Efforts to identify duplication:

This study is new and unique and there is no duplication between the planned data collection and existing sources. FHWA is aware of three other related studies, the first was funded via statute and the other three were funded in whole or in part by grants under the Value Pricing Pilot Program at the Federal Highway Administration, that use on-board systems to assess road user fees.

- A study conducted by The University of Iowa Public Policy Center was designed to test implementations of mileage based road use pricing. It was conducted on an entire roadway network in which participant vehicles would be traveling, collecting mileage data and data on user fee revenues. Participants were provided with varying levels of information that allow the ability to audit the reasonableness of the mileage fee charges. The proposed study will improve on this work by examining the impacts of congestion fees that could be either part-of or separate-from a mileage based user fee system.
- A study conducted for the Puget Sound Regional Council (Washington State) was designed for congestion management purposes. The study examined variable tolling on selected roadways and used GPS systems to collect location and travel-time data. The field driving data were the only observations collected on participants; no simulator driving tasks were included. The proposed study will improve on this work by including simulator driving tasks to improve FHWA's understanding of toll road utilization and potentially provide FHWA and its state partners with an additional tool to estimate driver reactions to congestion priced facilities.
- Oregon is conducting a pilot test of a mileage-based road user charge to replace the state fuel tax. The methodology used for the pilot collects data that determines which miles are driven within the state, and subject to the mileage charge, and which are not driven in the state, and not subject to the mileage charge. Mileage fees are collected at service stations when the vehicle is fueled and only the total mileage subject to the mileage-based fee is transmitted. The fee is added to the price of the fuel purchase and fuel taxes are deducted. The current study will improve on the Oregon test by generating prediction models at the individual driver level for use in a broad range of road pricing.
- FHWA is conducting research examining changes in behavior before and after a toll lane is introduced in Atlanta, Georgia. The methodology for observing that behavior is written travel logs. The current study will improve on the Atlanta Study by providing insights into how drivers choose to incorporate a congestion priced toll road under a range of pricing options. These studies are not conducted on the same routes and do not sample from the same populations.
- Other studies being funded by the Value Pricing Pilot Program are investigating charging some currently fixed costs of operating a motor vehicle, such as registration fees and insurance, by mileage. The current study improves on the current research by incorporating

other behavioral observations on the participants, such as risk preference.

The information collected in these other studies are significantly different from the information to be collected for this study - none of the studies discussed above used experimental techniques with controlled variations in tolls applied to participants' field driving correlated to behavioral measures of the same participants in driving and traffic simulators as well as behavioral measures of risk preference and risk perception characteristics collected from non-driving choice situations. The technique of collecting measures on the same participants from a number of different choice situations is unique to this study and will enable developing precise prediction models for how drivers respond to changes in congestion and economic incentives aimed at relieving congestion.

5. Efforts to minimize the burden on small businesses:

Some small businesses that operate commercial vehicles in the study area may choose to participate in the study but this is an entirely voluntary participation.

6. Impact of less frequent collection of information:

The impacts of not collecting the proposed data under this research will be felt in the next few years. Several state and local governments are exploring options to finance this important sector of the economy. In doing so, they need better scientific information about trip making habits and decisions and the willingness of motorists of different socio-economic strata to pay to avoid congestion and delays. So the consequences of not conducting this research misses a good opportunity to develop good sound decisions about different congestion pricing strategies that will alleviate traffic congestion, enhance road safety, and improve the environment. The FHWA and their state partners would also miss a valuable opportunity to understand how driving simulators can assist estimations of toll road and congestion pricing options.

FHWA is requesting a onetime approval for this research that will be conducted over the next two years.

7. Special circumstances:

None

8. Compliance with 5 CFR 1320.8:

The federal register number is: FHWA-2010-0114

Authority: The Paperwork Reduction Act of 1995; 44 U.S.C., Chapter 35, as amended; and 49 CFR 1.48.

Compliance issued on August 30, 2010. Contact person: Juli Huynh, Chief, Management Programs and Analysis Division.

[FR Doc. 2010-22164 Filed 9-3-10; 8:45 am]

BILLING CODE 4910-22-P

A copy of this notice is attached as Appendix A

No comments received on this posting.

9. Payments or gifts to respondents:

Each participant receives a fixed fee of \$200 if they complete all parts of the study. This includes a \$25 participation fees for each of the four meetings, and the \$100 fee for returning the GPS unit at the end of the study. If a participant does not complete the study the fees for the meetings not attended will not be paid. For example, if the participant does not come to the last meeting but returns the GPS unit the \$25 fee for the last session will not be paid so the total fixed compensation is only \$175. In addition the experiment models actual economic incentives facing drivers by using monetary payments tied to their decisions. This results in additional earnings, but these will vary with the circumstances and the choices participants make.

In the field driving experiment, drivers may receive up to an additional \$50 per week for a total of 6 weeks. However, they may prefer to make decisions that have other benefits to them than the money paid by the study and thus receive less payment. We expect almost no participant to make choices that give them the maximum payment. Our expectation is that they will make choices resulting in average payments of \$150 for the 6 weeks.

Each participant in the field driving experiment also participates in either a single driver or a multi-driver simulator experiment. Again, we model actual economic incentives by using monetary payments tied to their decisions in the simulations. Across the four sessions in which they are given simulator driving tasks we expect them to earn on average \$70.

In summary a participant will be paid a fixed fee of \$200 for sure by completing the study, and will on average get an extra \$220 in the experimental tasks. The researchers will cap earnings at \$599.

10. Assurance of confidentiality:

The University of Central Florida jointly with Georgia State University both have a well structured program to review and approve all research involving human subjects. Before a research project involving human subjects is commissioned, the project must be reviewed and approved by an Institutional Review Board (IRB). The Federal wide Assurance (FWA) requires the IRB to adhere to ethical standards as provided by the Federal Policy for the Protection of Human Subjects, known as the Common Rule. The U.S. Department of Transportation's adoption of the Common Rule is codified at 49 CFR part 11.

The field data will be assembled through the use of 400 GPS instruments. All driving data will be downloaded directly from the device to a computer. Sensitive data, such as the home and work locations of the drivers, will not be downloaded nor will any personal identifiers be included. The multi driver experiment data will be gathered through specially designed software. Again, no personal identifiers will be included. The single driver simulator data will again not include any personal identifiers. This data is collected both through the simulation program and through record sheets handled by research assistants.

11. Justification for collection of sensitive information:

The recruitment and surveys conducted in this study will not collect information of a sensitive nature. The travel data collected from the GPS on-board instruments may include information that is not sensitive on its face, but may be sensitive under certain circumstances, such as travel outside of a jurisdiction that the study participant is under court order not to leave. Data of such a sensitive nature will not be collected in the study since no personal identifiers will be attached to the data. In addition the likelihood of sensitive data collection is minimal since the routes studied only extend approximately 5 miles.

12. Estimate of burden hours for information requested:

Full participation					
Session	Multi Driver Simulations	Single Driver Simulations	Field Experiment	Field Driving Log	Total burden hours
1	1 hour and 45 minutes	1 hour and 50 minutes	10 minutes	4 minutes	
2	1 hour and 25 minutes	1 hour and 40 minutes	15 minutes	4 minutes	
3	35 minutes	35 minutes	12 minutes	3 minutes	
4	20 minutes	20 minutes	10 minutes	0 minutes	
Total Hours over 4 Sessions	4 hours and 5 minutes	4 hours and 15 minutes	48 minutes	11 minutes	
Number of Participants	360	840	1200	1200	
total burden hours	1470	3570	960	220	
Attrition participation					
Session	Multi Driver Simulations	Single Driver Simulations	Field Experiment	Field Driving Log	Total burden hours
1	1 hour and 45 minutes	1 hour and 50 minutes	10 minutes	4 minutes	
2	1 hour and 25 minutes	1 hour and 40 minutes	15 minutes	4 minutes	
3					
4					
Total Hours over 4	3 hours and 10	3 hours and 30	25 minutes	8 minutes	

Sessions	minutes	minutes			
Number of Participants	120	200	320	320	
total burden hours	380	700	134	43	1257

TOTAL					7477
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The table above details the calculation of burden hours for the simulations and field experiment. We show separately the burden for those participants who complete the study, labeled in the table as Full Participation, and those who drop out sometime during the study, on average after the first two sessions, labeled as Attrition Participation. For the Multi Driver Simulations it is expected that the four face-to-face meetings will take up to 4 hours and 5 minutes of the participant's time. The first two meetings are expected to last 1 hour and 45 minutes for the first and 1 hour 25 minutes for the second, the third meeting will last up to 35 minutes, and the final meeting is expected to be completed in 20 minutes. There will be 360 participants in the Multi Driver Simulations therefore the total burden hours are 1,470. In addition 120 participants are expected to drop out and complete only sessions 1 and 2 for an additional burden of 380 hours. The 1,850 burden hours for the Multi Driver Simulations will cost \$23,865, evaluated at \$12.90 per hour. The hourly value of time used here is the value of personal travel time as provided in the USDOT's Departmental Guidance for the Valuation of Travel Time in Economic Analysis, adjusted to 2010 dollars.

For the Single Driver Simulations it is expected that the four face-to-face meetings will take up to 4 hours and 15 minutes of the participant's time. The first two of the face-to-face meetings are expected to last 1 hour and 50 minutes for the first and 1 hour 40 minutes for the second, the third meeting will last up to 35 minutes, and the final meeting is expected to be completed in 20 minutes. The time differs across the meetings because the tasks given are not the same. For example, only the first two meetings include the more time consuming tasks in the driving simulators. There will be 840 participants in the Single Driver Simulations therefore the total burden hours are 3,570. In addition 200 participants are expected to drop out and complete only sessions 1 and 2 for an additional burden of 700 hours. The 4,270 burden hours for the Single Driver Simulations will cost \$55,083, evaluated as \$12.90 per hour.

The burden per participant of the instructions and setup of the GPS unit for the Field Experiment is 48 minutes. In addition participants will spend 11 minutes on the pre-printed log that they keep in the car, where they circle the drives only when they are not especially rushed for time. All participants who take part in the Multi Driver and in the Single Driver simulations will participate in the Field Experiment. There will be 1,200 participants in the Field Experiment therefore the total burden hours are 1,180. In addition the 320 participants who are expected to drop out and complete only sessions 1 and 2 add a burden of 177 hours. The 1,357 burden hours will cost \$17,505, evaluated at \$12.90 per hour.

The total burden hours over all simulations and field experiments, including attrition, are 7,477. The value of time cost for these burden hours sum to \$96,454.

13. Estimate of total annual costs to respondents:

There are no costs to the participants beyond the hour burden.

14. Estimate of cost to the Federal government:

The total cost to the Federal Government of the three year study is \$1,999,974.

15. Explanation of program changes or adjustments:

This is a new program and therefore there are no program changes or adjustments.

16. Publication of results of data collection, plans for tabulations and projected time schedule:

In addition to the quarterly report, the research team will submit six technical reports. Three reports will document results of the field data, the multi driver simulation experiments results and the single driving simulator results for the test site in Orlando, Florida. The remaining three reports will contain statistical results of the same experiments conducted in Atlanta, Georgia. With permission from FHWA, the research team will publish archival journal publications, conference proceedings papers, and technical reports to selected stake holders like the Florida Turnpike Enterprise and Metroplan Orlando.

Projected time schedule:

Meetings with participants will be conducted during the summer and fall of 2011 as well as spring 2012. Data collection is expected to be finished by end of April 2012.

Data tabulation and analysis is expected to be finished by end of September 2012.

Final reports are expected to be finished by end of April 2013.

Planned data tabulations:

Data will be encoded as a panel. Each participant is a row in the data tables, and all observations on each subject across all the tasks and survey questions will appear as columns. These include the route choices in the

simulator drives for the various levels of congestion and tolls, the risky prospect choices, the choices in the belief tasks, the GPS recorded route choices, and responses to all survey questions. No personally identifiable information about participants, such as name, email address or home address, will be included in the data tabulations

17. Approval for not displaying the expiration date of OMB approval:

Not applicable.

18. Exceptions to certification statement:

None