

Planning Lee County's Variable Pricing Program

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Abstract

Congestion (or variable) pricing can be described as the charging of more for goods or services during periods of peak demand. In theory, this practice would prove beneficial when setting fares on toll roads and bridges. However, in practice it has proven extremely difficult to implement in the United States. This paper examines many of the planning issues and solutions found during the early phases of a variable pricing pilot study currently being conducted in Lee County, Florida.

The planned variable pricing scheme is detailed, along with how this publicly and politically palatable pricing scheme was derived. Data collection efforts, which include origin/destination surveys, focus groups, mail back surveys, video taping of traffic, and detailed traffic counts are described to emphasize the substantial effort undertaken to obtain accurate and meaningful variable pricing data that can be applied across the country. The paper concludes with a summary of work done to date and an overview of the next steps towards implementation of the variable pricing program in Lee County.

The practice of charging higher prices for a commodity during times of peak demand is common in many industries, for example telephone rates increase during peak periods. This pricing scheme enables commodity providers to regulate usage and attempt to flatten out the peaks and valleys in the demand curves. In theory this is an equitable and efficient form of pricing, but application has proven difficult in toll roads and toll bridges across the United States.

Despite the fact some transportation providers, such as airlines, have used variable/congestion pricing schemes for years, variable road pricing is proving extremely difficult. Several countries have successfully instituted variable pricing (most notably Singapore) but several factors have delayed or stopped variable pricing in the United States. This paper examines the initial steps in one of the possible variable pricing success stories in the United States, the Lee County variable pricing program.

United States Efforts in Congestion Pricing

In recent years the United States has made several attempts to introduce variable pricing to highways and bridges. The Federal Highway Administration's (FHWA) Congestion Pricing Pilot Program choose its first project in 1993. The San Francisco-Oakland Bay Bridge project was to lead the way for other congestion pricing projects in the US, but the state legislature refused to allow the bridge toll to be raised from \$1 to \$3 during peak periods. The efforts to install variable pricing on this bridge have reverted to feasibility and background studies.

The FHWA has funded six other pre-project studies in Minneapolis-St. Paul, Los Angeles, Portland, Boulder, New York, and Houston. However, there is no money under the pilot program to fund these projects past the study phase. There is money to fund two other projects to implementation, a high occupancy vehicle (HOV) buy-in project in San Diego, and a variable toll project in Lee County, Florida. In addition to these two projects, State Route 91 in California and the Maine Turnpike have already instituted congestion pricing programs.

At the same time, the general public is being introduced to congestion pricing through focus groups, surveys, and in one case, a citizens jury. During the summer of 1995 the Humphrey Institute for Public Affairs at the University of Minnesota conducted an intense five day citizens jury on the topic of congestion pricing. Twenty-four citizens were exposed to the concept, the benefits, and the disadvantages, through testimony from industry experts. Despite the fact this event was held in an area without toll facilities, the jury's responses proved insightful. To summarize, the jury voted against the use of congestion pricing to raise revenues for transportation. The main reasons for this vote were that congestion pricing:

- would not result in a change in driving behavior;
- is an inefficient way to raise revenues; and
- is a regressive tax system.

The National Research Council also examined congestion pricing (Special Report 242). This report was written by industry experts and compiled a vast amount of data available on tolls. Their findings included:

- Depending on the level of peak period fees applied, some motorists would change their driving habits. Using data from past toll increases at toll facilities and parking lots the researchers estimated that an increase of \$2.00 to \$3.00 per daily round trip would reduce peak period congestion by 10 to 15 percent. This would depend heavily on numerous factors such as alternate routes, alternate modes of transportation available, and the demographics of the area's population.
- The shifting of 10 to 15 percent of drivers from the peak period would result in a net benefit to society. The benefits derived from the time saved by the remaining peak period drivers would outweigh all disbenefits of such a system.
- Some individual motorists would lose under any variable pricing scenario. Although a great deal can be done to try to ensure very few motorists feel they have been inconvenienced (such as using the congestion toll collected to improve transit) some will inevitably be disadvantaged.
- Air pollution would be reduced.
- A major stumbling block to implementation is the political feasibility of congestion pricing. Lee County's variable pricing program uniquely addresses this issue as tolls will not be increased during the peak hours, but reduced during the times just before and after the peak period. This has the support of the politicians in the area and has been viewed favorably by residents in focus groups.
- It is critical to gather data on early congestion pricing programs to provide careful analysis of results. To convince additional areas to attempt congestion pricing there needs to be hard data on the success of the program in the few trial sites.

Thus the focus is now on implementing, and carefully analyzing, several congestion pricing pilot programs. The analysis of how travel patterns were altered, how citizens reacted, how politicians reacted, etc., will be shared so that other areas will have evidence of the benefits of congestion pricing. This will inevitably be a slow process (serious emphasis and money has been focused on

congestion pricing since 1993 but only two projects have succeeded in implementing some form of variable pricing with Lee County soon to become the third. Gathering ample data on these few projects will be crucial to the success of variable pricing in the U.S.

Lee County Characteristics

Lee County currently has two toll bridges (Sanibel Island Causeway and Cape Coral Bridge) with a third toll bridge (the Midpoint Bridge) to open in November of 1997. The current toll collection system allows payment via a bar code sticker system or by cash. With the bar code sticker system, patrons have several payment options — making the entire tolling system somewhat complex. At the Cape Coral and Midpoint Bridges the toll is \$1, charged in each direction, unless the user has purchased a discount sticker. At the Sanibel Bridge the toll is \$3, charged in one direction only, unless the user has purchased a discount sticker. Users can also purchase two forms of discount stickers to be placed on their side windows. The expensive version of these stickers allows the user to pass the toll plaza toll-free for one year. The less expensive option allows the user to pay a discounted toll (\$0.50) every time they drive through the plaza for one year.

A laser reads the bar code on these stickers to identify the vehicle and determine the toll to be paid. However, the sticker system has a high percentage of misreads and there are numerous “misread days” during the year, particularly in winter. Environmental conditions along Florida’s coast cause a great deal of condensation on vehicle’s windshields, causing the optical scanners to have difficulties reading the stickers. Due to these problems Lee County is upgrading their system using newer electronic toll collection (ETC) technologies.

TransCore (formerly Syntonic) was chosen to integrate ETC with the traditional toll collection equipment. TransCore then selected Amtech to supply a Radio Frequency Identification (RFID) system with toll plaza readers and vehicle transponders. The transponders (or tags) will be “off the shelf” Amtech technology. This benefits Lee County in several ways, it is a known and widely used technology and most problems with the devices have already been eliminated, transponders are available now, and SunPass (Florida’s Turnpike’s ETC system) also chose Amtech to supply tags allowing for greater interoperability.

To estimate the potential benefits of ETC, and to determine the optimum toll plaza configuration for the ETC equipment, computer simulation modeling of the toll plazas will be performed. This effort will help the Lee County DOT to determine which lanes should be dedicated ETC lanes, mixed use lanes (with both ETC and automatic coin machines), and manned lanes. It will also help to optimize the entire operation, as some manned lanes may not be needed as many patrons will be using ETC. This is a critical part of the ETC installation planning process.

Data Collection

Not surprisingly, peak levels of traffic and congestion occur during the winter months, with the peak being in March. This being tourist season, a great many more vehicles are on the road. Furthermore, few of these vehicles are equipped with the bar code sticker to allow for faster processing at the toll plaza. This puts an added strain on the manual toll lanes that already have the longest queues year round. Since the peak traffic is in March, all pre- variable pricing traffic data collection was done during this month. The following is a summary of the data collected to date:

- Origin/Destination Surveys were completed for Sanibel, Cape Coral, Caloosahatchee, and Edison Bridges (the latter two are untolled bridges in the area). Data was obtained for an

eleven to twelve hour period on a week day and a weekend day, on each bridge. Responses were coded into analysis zones and an Origin/Destination table for each bridge was prepared.

- Approximately 8,000 bridge user surveys were distributed in conjunction with the Origin/Destination survey outlined above. The survey included questions relative to potential transponder usage, as well as congestion avoidance behavior. Approximately 2100 surveys were completed and returned, a typical response rate for this type of survey. The following details some of the more interesting results of the survey done on the Cape Coral Bridge:

Questions regarding current toll payment method:

Do you currently have any type of toll sticker?

Yes: 37% No: 63%

Does the sticker give you:

a 50 cent toll per trip?: 72% no toll per trip?: 28%

Questions regarding transponder usage:

How likely is it that you would obtain a transponder for use at the toll facilities?

very likely: 29% somewhat likely: 24% very unlikely: 47%

How important is it that the transponder be transferable between vehicles?

very important: 44% somewhat important: 23% not important: 33%

Would you pay more if the transponder were transferable between vehicles?

- a) Yes, if no more than 25 cents extra per trip: 3%
- b) Yes, if no more than 10 cents extra per trip: 8%
- c) Yes, if no more than 5 cents extra per trip: 7%
- d) No: 82%

Compared to the toll you are now paying, would you be willing to pay an additional amount for the convenience of using a transponder?

- a) Yes, if no more than 25 cents extra per trip: 3%
- b) Yes, if no more than 10 cents extra per trip: 9%
- c) Yes, if no more than 5 cents extra per trip: 9%
- d) No: 79%

If you used a transponder would you prefer to handle billing by:

- a) Pre paid account: 17%
- b) Automatic deduction from checking or credit card account: 10%
- c) Pay a monthly bill similar to electric or water bill: 73%

Questions regarding variable pricing:

If a reduced toll were offered outside of rush hour could you change the time you make:

- a) Almost all of your rush hour trips: 27%
- b) Some of your rush hour trips: 32%
- c) Almost none of your rush hour trips: 41%

To persuade you to make the trip outside of rush hour, how much of a savings would have to be offered?

- a) 10% savings: 4%
- b) 25% savings: 21%
- c) 50% savings: 41%
- d) Greater than 50% savings: 34%

- Time/Delay studies were completed over 18 primary commuter routes, most of which included bridge crossings. These routes were traveled a minimum of two times in each direction during peak travel hours.
- Congestion video tapes were made utilizing seven complete video systems at thirteen sites. A total of 142 video tapes were made for use as qualitative baseline archives.

The survey results indicate economics is a prime consideration in all aspects of this project. Respondents wanted the ability to transfer the electronic toll collection (ETC) tag between vehicles so that they could get the reduced price on more than one family vehicle. The question on whether they would pay more for the convenience offered by ETC was met with a resounding “no.” The responses from this survey, and in the focus groups, showed a strong dislike and distrust for any form of automatic debiting system. For variable pricing to be effective at least a 25 percent, if not a 50 percent, decrease in the toll rate is necessary. These results will be used extensively when attempting to market the new ETC devices and the variable pricing program.

In addition to this data, Lee County has an impressive traffic count program and an additional origin/destination survey was performed in 1993. To obtain citizen reactions to both variable pricing and ETC many focus groups were convened. The first set of focus groups was held in March 1996. A total of 6 groups were convened with eight to ten members in each group. The groups consisted of employers, commuters, retirees, and students. The principal findings of these focus groups were:

Once explained, the idea of ETC was almost universally accepted.

- The idea of variable pricing as an abstract concept was generally acceptable if it were implemented as a discount to the existing toll structures.
- The level of discount necessary to induce a significant diversion was at least 25 percent, and more likely 50 percent.
- As anticipated, persons with limited amounts of time available were more receptive to variable pricing and ETC. Retiree and student population appeared to be the least interested.
- Strong resistance to allowing a governmental agency to automatically debit checking or credit card accounts was encountered.

A second set of focus groups was held at the end of July 1996. The groups were similar to the first session, but the participants were new. The focus of these sessions was citizen reactions to the various possible variable pricing scenarios.

One important result from the July focus groups is a strong negative reaction to the concept of variable pricing in general. When participants first hear an explanation of the theory, they immediately oppose it, most often on the grounds it would penalize the worker who does not have a



Congestion on Cape Coral Bridge

flexible schedule. However, when participants were informed of Lee County's variable pricing plan (where tolls are not raised, but reduced in off peak hours) the groups response shifted 180 degrees, and they were in favor of such a system. From these limited encounters it is clear that variable pricing will meet with a great deal more success if it is offered as a carrot (monetary incentive to travel outside the peak periods) rather than a stick (penalize those traveling during the peak periods).

Other focus group findings are listed below:

Variable Pricing

1. When groups were first introduced to variable pricing, it was defined as paying more to travel across the toll bridges during peak periods and less in the off-peak periods. This initially produced a strong negative reaction. Participants felt this concept was unfairly charging the working class, who do not have flexibility in their schedule and must drive during peak periods. In addition, almost none of the participants had heard of variable or congestion pricing before.
2. The proposed variable pricing scheme for Lee County was then introduced. This pricing scheme involves no toll increases, only toll decreases, during set periods of time both before and after the morning and evening rush hours. Once participants learned of Lee County's specific variable pricing plans, they reacted very positively to variable pricing. Participants understood how this might reduce congestion during the rush hours.
3. Participants felt that it would require at least a 50% reduction in tolls during discount hours for the program to be successful. At this level many felt that some of the tourists, retired people, and others who do not have to be on the road at peak times of the day may be enticed to travel during the discount periods instead.

Electronic Toll Collection

1. Participants views varied considerably on ETC, but the majority saw ETC as a better toll col-

lection method than the current bar code reader system.

2. There was little correlation between those participants accustomed to electronic devices (ATM cards, computers) and those that have heard of ETC or those who enthusiastically wanted to use it.
3. Participants wanted the purchase of ETC tags and accounts to be as easy as possible for themselves. They wanted to have several different ETC tag purchasing methods available. The following methods were most often mentioned:
 - phoning in their tag order and receiving the tag through the mail.
 - picking up the tag at the tax collectors office — similar to how the stickers are distributed now.
 - purchasing the tag at a small store or booth in a shopping mall.
4. There were many questions on the accuracy and reliability of the ETC tags, the possibility of tag theft, enforcement in ETC lanes, and what happens when an account runs low or is empty. After explaining how accurate the tags are, the fact that the tag is encoded with your individual information and using a stolen tag would immediately pinpoint the thief, the use of video enforcement systems, and how other ETC systems take care of low accounts, participants were generally impressed with the technology.
5. Participants felt that the gates should be removed from the ETC lanes. They cited the fact that it would slow users down — and the purpose of ETC was so that users could drive through the toll plaza quickly. It was explained that gates can be very high speed and could allow for high speed travel, but it was still felt that the sight of gates would be a deterrent to people choosing ETC since it appears to be just as slow as the old method. They also thought that gates may prove to be a hazard.
6. Participants overwhelmingly favored tags that can be easily transferred between cars. They did not view them as significantly adding to the number of trips made across the bridge and felt that they would only transfer the tag between cars occasionally.
7. Many participants saw a great advantage to ETC in that record keeping would be made easier. They liked the idea of a monthly statement to keep track of their toll charges or for employee reimbursement.
 - Participants wanted choices as to how to replenish their accounts. Several methods mentioned repeatedly, included:
 - automatic charge on a credit card.
 - automatic charge to a checking account.
 - mail in a check.
 - pay cash at a convenient location.
 - an automated phone line which you can use to transfer money between a bank account and an ETC account.

8. Participants were generally not concerned with the fact that using one of these ETC tags gives the government the ability to automatically identify your vehicle (the “big brother” issue). This may be due to the fact that these residents are accustomed to having identification tags (bar code stickers) already.
9. Participants were not concerned with any possible detrimental health affects from the ETC system. No mention or questions arose with regards to possible health hazards (there are no known health hazards from ETC).

The Variable Pricing Options

Lee County’s program has been termed variable pricing, and not congestion pricing, as it is significantly different from typical congestion pricing toll structures. The primary difference is that tolls are decreased in the time periods adjacent to the peak times, instead of simply raising the toll during peak periods. However, only two of the three bridges are being examined for this variable pricing toll structure. For several reasons the Sanibel Bridge toll structure will not be examined in depth for variable pricing. These reasons include:

- the peak period on this bridge occurs from 10 A.M. to 1 P.M., not in the traditional peak times. If traffic were induced into traveling outside of these hours it is likely that traffic in the 7:00 A.M. to 9:00 A.M. time frame would increase. Employers on the island feared that this would hinder their employees commute to work.
- citizen concerns that an increase in the toll could hurt the retail industry on the island;
- the large amount of tourists who would be unaware of the variable pricing program;
- the primary road on the island is a two lane facility that is already congested. Residents feared that a reduction in the toll rate on the Sanibel Bridge (which is the only road access to the island) at any time of day would exacerbate traffic problems on the island and lead to reduced toll revenue.

This leaves the Cape Coral and Midpoint Bridge’s toll structure to examine. These two bridges will be examined together since bonding covenants require the toll structure on the bridges to be identical.

There are two critical issues shaping the variable pricing toll structure for these particular bridges. The first is that the Board of County Commissioners (BOCC) has promised the citizens that the tolls will not increase on the Cape Coral or Midpoint Bridges. The second is that to collect meaningful data, the fare structures before and after variable pricing is implemented must be similar. This creates a challenge since Lee County’s current toll system can be described as anti-congestion pricing.

The toll structure in place encourages frequent users to purchase either the reduced price sticker or unlimited pass sticker. The average toll paid by these users (annual cost of the sticker plus the price paid per trip, all divided by the average number of trips per year for that vehicle class) is 64 cents for the reduced price sticker and 61 cents for the unlimited pass sticker. The regular toll is \$1 for two-axel vehicles. The majority of frequent users are undoubtedly commuters who travel during peak periods. Therefore, peak period users are now paying the least to use the bridge, and to shift a large percentage of these commuters from the peak, without raising tolls, will be diffi-

cult.

In order to avoid raising tolls and attract users to off peak periods, Lee County has decided to reduce tolls in off peak hours. However, reducing tolls during all off peak hours would result in substantial revenue loss. The loss would exceed the seven million dollars set aside for compensation for lost tolls under the congestion pricing pilot program.

Due to these factors the following variable pricing scheme has been brought forward:

- only ETC patrons will be eligible for the toll discount. This was done for several reasons including the fact that residents are much more likely to use ETC than visitors and residents can be better informed and educated about the variable pricing program. Secondly, it reduces the number of vehicles given the discounted toll, as vehicles that just happen to arrive during discounted hours, but do not have ETC, must pay full fare. In this manner the program targets and educates the frequent users to actually change their habits.
- Discount hours are limited to: 6:30 A.M. to 7:00 A.M. 9:00 A.M. to 11:00 A.M. 2:00 P.M. to 4:00 P.M. 6:30 P.M. to 7:00 P.M. This was also done to target a specific group of commuters to shift their driving patterns. Discounts for all hours of the day and night except peak times were not given as this would not focus on the desired effect of spreading out the peak.
- Discounts will be 50 percent.

From all early indications, this pricing scenario is acceptable to the public, politically acceptable, is financially feasible, and will successfully entice drivers to travel during the shoulder periods (those times adjacent to the peak periods).

Summary and Conclusions

Lee County has done a great deal of preparation work and study towards implementing a successful variable pricing program on two of their toll bridges. The plan has the support of local politicians and the public, thereby overcoming two of the major stumbling blocks to implementation. Focus group responses and results from a bridge users survey have helped a great deal in the formulation of an acceptable variable pricing toll scheme. However, a great deal of work is yet to be done, including marketing, ETC procurement and installation, public education, and post implementation data gathering. Plans to perform all of these tasks are being discussed to ensure the continued success of this variable pricing program.