Congestion Pricing: What Is It?

by Marika Benko & Lauren Smith

Congestion pricing is far more than a simple tax strategy to manage traffic, it also constitutes a very real way to raise significant investment for major transit infrastructure. Though the concept has not yet been instituted in the U.S. -- it was recently turned away in the New York City region -- it will no doubt be part of the discussion on funding transit investment in the coming reauthorization.

“Congestion pricing” is also known as “value pricing,” “peak-period pricing,” time-of-day pricing,” and “variable pricing.” To avoid the word “toll,” transportation experts and politicians have coined various terms for the same concept.

Congestion pricing charges motorists a toll for using a particular stretch of highway or bridge or for entering a particular area. It is a market or demand-based strategy designed to encourage a shift of peak period trips to: a. off-peak periods; b. to routes away from congested facilities or c. to alternative modes – high occupancy vehicles or public transit – during the peak demand periods. Congestion pricing proposes to monetarize and internalize the transportation and environmental costs – delay, pollution, accidents – associated with congestion, costs that are largely unaccounted for in the current transportation system. Variable pricing, lane charging – including HOT or FAIR lanes – and cordon tolls are three main forms of congestion pricing. A distinction should be drawn between tolls to fund roadways and tolls to reduce congestion as these have different objectives and impacts.

Benefits

1. Reduction of peak-period and total congestion. As certain roadways are priced, drivers will be more likely to combine multiple destinations into one trip, share vehicles, change their destination, and shift routes to untolled or less-tolled roads.

2. Transit benefits from both additional passengers and developing new financing mechanisms.

3. Road savings: Reduction in the need for new construction to serve the peak period demand. Parking savings if total car trips are reduced.
4. Enhancement of transportation choices: congestion pricing increases transportation choices by offering additional options to travelers. On an unpriced highway, the traveler essentially has two options: drive in congestion or ride a bus that will also be delayed by congestion. On a priced highway or one that has High Occupancy Toll (HOT) lanes, the traveler actually has three options: a. drive free in congestion b. ride a bus or take a carpool in the tolled lane without paying a toll(s) or c. drive alone on the HOT lane(s) and pay a toll. This allows consumers to choose the travel option that best suits their needs.

5. Safety: reduced congestion may enhance road safety by reducing accidents. Here the results are mixed because, while crashes are more common under congested conditions, crashes that occur on less congested roads are more severe due to higher speeds.

6. Reduced emissions of pollutants and greenhouse gases and reduced energy consumption. Reduced congestion will reduce emissions of hydrocarbons, carbon monoxide, and carbon dioxide and will reduce fuel consumption. If overall trips are reduced, emissions of nitrogen oxides will also be reduced.

7. Land use: in the long-run, land use patterns could be affected in ways that are still unclear. Some argue that it would discourage sprawl; others believe it would increase decentralization.

8. For the time being, research results in the U.S. seem to indicate mostly shifts in travel time, routes and modest shifts to HOVs. The results in Europe and Asia also indicate shifts in travel time, routes, and more important, shifts to HOVs and a small percentage shift to transit. This is likely due to more widespread transit systems in Europe and Asia.

Costs

- Toll collections infrastructure, staffing and enforcement.
- Inconvenience to motorists: mainly the time required to pay the tolls.
- Financial costs to consumers for paying the toll: this last element is actually not a cost but an economic transfer from the travelers to the toll authority. How this transfer affects the consumer ultimately depends on how much she or he values the time savings and how the revenues are used.

System Description

There are three main congestion pricing systems:

1. Variable tolls are placed on existing and new toll roads, bridges, and tunnels. The tolls rise and fall depending on traffic levels.

2. Lane charging tolls are electronically collected via transmitter from drivers in added or converted highway lanes. Lane charging includes High Occupancy Toll (HOT) lane charging. HOT lanes are converted from high-occupancy vehicle (HOV) lanes, and allow low-occupancy vehicles for a fee.

3. Cordon tolls charge a price for entering and driving in an impacted, urban area.

Most congestion pricing strategies use electronic toll collection technology.

As an overview, program-participating vehicles are equipped with radio frequency identification tags (RFID) and transmitters. Some new electronic toll collection systems do not need on-board transmitters. When driving through a former toll plaza or below an open road gantry, the RFID tags communicate with RFID readers. Electronic toll collection allows drivers to be charged without slowing down or stopping. This is true for variable toll, lane charging, and cordon toll charging systems.

The collected information is relayed to a computer system which connects the toll with the appropriate vehicle, registered credit card or pre-paid account, and owner. Charges may vary depending on vehicle size and make. High-occupancy, hybrid, natural gas, or electric vehicles are usually not charged a toll, or receive a discounted rate. Cameras capture license plate images of vehicles that are not equipped with RFID tags. These images are later reviewed by humans or run through a computer system, depending on the available technology. Bills are sent out by a customer service division. The basics of all modern, successful congestion
Congestion pricing is currently implemented in London, Stockholm and Singapore. Other cities, including San Diego and Minneapolis, utilize a system of charging on corridors (as opposed to a cordon zone) during peak hours.

**London**

Before instituting Congestion Pricing in 2003, London was afflicted by many of the problems facing New York today: gridlock, poor air quality, hazardous streets and a transportation system that lacked the investment necessary to accommodate growth. London suffered the worst traffic congestion in the United Kingdom; drivers in central London spent 50 percent of their time idling in traffic. Despite these problems, former Mayor Ken Livingstone's congestion pricing proposal was initially met with skepticism from many quarters. All that has changed, as the system has reduced congestion by 20 percent.

Since the inception of $13 charge in 2003, traffic delays in the Congestion Zone have dropped by 26 percent. Bus service has become dramatically faster and more reliable, while bicycling rates have skyrocketed. The charge has resulted in a substantial improvement in what was once the UK's most polluted air. Nitrogen Oxides and particulate matter have dropped sharply, while CO2 emissions are down 15 percent.

Meanwhile, the feared drop in business within the Congestion Zone never materialized. The impact of the charge has been broadly neutral with respect to citywide employment, number of businesses, turnover, commercial rents and profitability all remaining stable. London now leads the UK in economic growth. Two-thirds of Londoners now approve of the congestion charge, and it is slated for expansion into west London.

**Stockholm**

Stockholm initiated a pilot congestion pricing project for seven months between January and July 2006. As with London, the project was preceded by transportation improvements including 197 new buses, 16 new bus lines and more trains at peak periods. The congestion charge resulted in a 20 percent reduction in traffic, while air pollutants dropped roughly 10 percent. The charge was heavily contested at its outset, but public opinion gradually veered in its favor. The issue was put before voters in a referendum, and more than 50 percent voted to reinstate the charge. It took effect in July 2007.

**Singapore**

Singapore was the first city to implement a cordon-based congestion pricing system in 1975. The charging area is much smaller than that of London and is divided into central business districts and expressways/outer ring roads. An Electronic Road Pricing system introduced in 1998 now charges for different roads at different times automatically as vehicle passes under gantries.

The charge has been successful in reducing the number of solo drivers and shifting trips from peak to non-peak times. Singapore's Congestion Zone has seen a 13 percent reduction of traffic during charging period. It has also led to a reduction of 24,700 cars driving during peak and a 22 percent rise of traffic speeds.
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Pricing schemes generally include the following components: transmitters, radio frequency identification (RFID) tags, RFID readers, and a customer service/enforcement department. HOT lanes require some highway patrol enforcement, as there are not currently reliable and affordable automatic systems for detecting the number of people in a vehicle. More successful congestion pricing strategies work with government and industry to implement better transportation alternatives.

Variable tolls, lane charging, and cordon pricing are the three main types of congestion pricing. Mileage-based user charges and parking pricing are also sometimes considered examples of congestion pricing.

Implementation

Congestion pricing is a demand management strategy, and it is implemented on existing roadways to reduce the need to add roadway capacity. Its success depends on a host of variables such as the project objectives, marketing strategies, user acceptance, and whether there are workable travel alternatives or alternate routes. While it is often difficult to isolate the range of travel impacts of an isolated congestion pricing project, success can nonetheless be measured in terms of reduced congestion delay, improved transportation alternatives, and avoided roadway costs.

Congestion pricing has been found to be most effective when people have travel alternatives, alternate routes, alternate departure times, transit, or ridesharing. While analyzing results, one should keep in mind that they may be affected by events not directly related to the project – such as construction on a nearby freeway – or by a planning process that does not take into account the full range of issues related to congestion projects. After initial implementation costs, many non-American projects pay for themselves and more. In Singapore, only 12 percent of the revenue generated is needed to pay administration costs. Norway generates five times the revenue required to maintain the toll system. Congestion pricing schemes are generally implemented by highway agencies or local authorities. Sometimes other levels of government are involved in the approval process – for example, in the U.S., federal law restricts tolling on the Interstate Highway System. Several examples of implementation show the federal government as a main funder via grants. Increasingly, both state and federal governments are seeking to form public-private partnerships (PPP) to fund large transportation projects, including congestion pricing projects.

This article is excerpted from the ITC Decision website of the California Center for Innovative Transportation (www.calccit.org).
### Road Pricing Categories

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Objectives</th>
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<tbody>
<tr>
<td>Road toll (fixed rates)</td>
<td>A fixed fee for driving on a particular road.</td>
<td>To raise revenues.</td>
</tr>
<tr>
<td>Congestion pricing (time-variable)</td>
<td>A fee that is higher under congested conditions than uncongested conditions, intended to shift some vehicle traffic to other routes, times and modes.</td>
<td>To raise revenues and reduce traffic congestion.</td>
</tr>
<tr>
<td>Cordon fees</td>
<td>Fees charged for driving in a particular area.</td>
<td>To reduce congestion in major urban centers.</td>
</tr>
<tr>
<td>HOT lanes</td>
<td>A high-occupant-vehicle lane that accommodates a limited number of lower-occupant vehicles for a fee.</td>
<td>To favor HOVs compared with a general-purpose lane, and to raise revenues compared with an HOV lane.</td>
</tr>
<tr>
<td>Distance-based fees</td>
<td>A vehicle use fee based on how many miles a vehicle is driven.</td>
<td>To raise revenues and reduce various traffic problems.</td>
</tr>
<tr>
<td>Pay-As-You-Drive insurance</td>
<td>Prorates premiums by mileage so vehicle insurance becomes a variable cost.</td>
<td>To reduce various traffic problems, particularly accidents.</td>
</tr>
<tr>
<td>Road space rationing</td>
<td>Revenue-neutral credits used to ration peak-period roadway capacity.</td>
<td>To reduce congestion on major roadways or urban centers.</td>
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### Summary of Fee Collection Options

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
<th>Equipment Costs</th>
<th>Operating Costs</th>
<th>User Inconvenience</th>
<th>Price Adjustability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pass</td>
<td>Motorists must purchase a pass to enter a cordoned area.</td>
<td>Low</td>
<td>Low</td>
<td>Medium</td>
<td>Poor to medium.</td>
</tr>
<tr>
<td>Toll Booths</td>
<td>Motorists stop and pay at a booth.</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>Medium to high.</td>
</tr>
<tr>
<td>Electronic Tolling</td>
<td>An electronic system bills users as they pass a point in the road system.</td>
<td>High</td>
<td>Medium</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Optical Vehicle Recognition</td>
<td>An optical system bills users as they pass a point in the road system.</td>
<td>High</td>
<td>Medium</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>GPS</td>
<td>GPS is used to track vehicle location. Data are automatically transmitted to a central computer that bills users.</td>
<td>High</td>
<td>Medium</td>
<td>Low</td>
<td>High</td>
</tr>
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