Congestion Pricing:

A Smart City View

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Introduction

Congestion Pricing

Cities in the U.S. and around the globe are struggling with vehicular traffic and its consequences. And the problem is only getting worse. The 21st century megatrend of urbanization has pushed more individuals and businesses to cluster around increasingly attractive economic centers. As populations have increased in successful urban regions, so have the number of vehicles and volume of traffic.

The resulting traffic congestion is costly and harmful. For many major U.S cities including Los Angeles, Boston, New York, and Chicago, traffic costs tens of billions of dollars a year in lost time, wasted fuel, and unhealthy air quality. Traffic congestion causes secondary effects as well, such as slowing down buses and emergency responses, disrupting the movement of goods, interfering with business, and ultimately, causing people to abandon the trip or even the region.

Cities are turning to congestion pricing as a way to sustain the productivity of their most economically and culturally productive regions. Governments have seen poor results from highway expansions, few engineering options to expand already-built city roadways, and continued, alarming decreases in driving efficiencies.

Congestion pricing is an attractive option: cities across the world have seen positive outcomes. And the new efflorescence of internet-enabled Smart City technology has created new options for how to deploy congestion pricing approaches. But they also bring new risks and complexities. Getting it right requires solutions that balance policy, technology, and implementation.

Congestion pricing isn't new: harm charges

Critics of congestion pricing complain that it is a new burden and a new constraint on freedom. But congestion pricing is part of a long tradition of using financial incentives to address collective social problems driven by individual actions. A harm charge—known to academics as a Pigouvian tax---makes it more expensive for an individual to engage in the undesired behavior. One of the most basic harm charges is highway tolls, which help defray wear and tear on publicly-funded infrastructure, and have been around at least since Ancient Rome. Other types of common harm charges include taxes on alcohol and cigarettes: we agree that these products increase collective healthcare costs and traffic deaths, and accept that they should be made more expensive. Similarly, car tires and batteries create toxic dumps and expensive cleanups, and so a disposal fee is built into the purchase price. Congestion wastes time and money, and hurts safety and health. Pricing it is a natural government response.

Policy Design

Prioritize among possible goals

Harm charges work in two ways: they create a financial incentive to deter the action, thereby reducing the overall size of the problem, and they create funds to address the problem. An important consideration when designing harm charges is how to apply them most efficiently—to deliver the desired outcome without being overly burdensome. And this consideration is central to congestion pricing.

How to distribute the fee

Making driving more expensive reduces total driving. And designing congestion pricing can be that simple—creating a flat fee paid by any and all users. However, governments have many other considerations as they assign the charges.

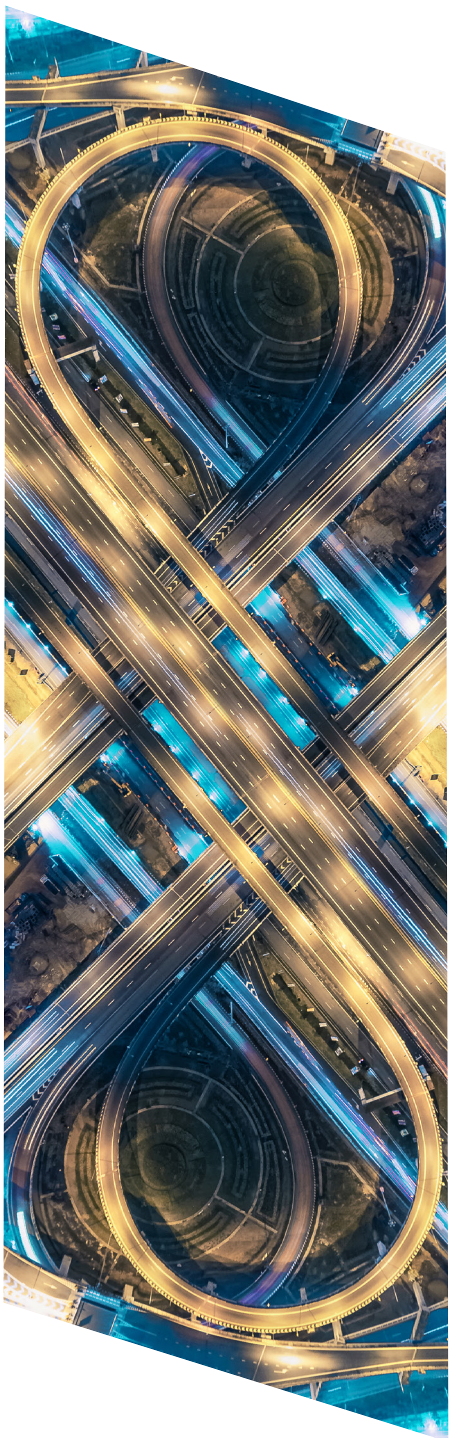
Governments have the opportunity to incentivize certain behaviors with how they apply the fees. In Milan, the fee is tied to the air emissions of the cars—Hummers pay more than Teslas—as a way to further the core aim of air quality.

Another common goal is to minimize the impact on goods movement for business while trying to reduce individual "car trips of choice," by applying fees only to specific modes of transportation. But this can be a tricky undertaking. In London, taxis (and now Transit Network Companies i.e., Uber and Lyft) are exempt from the charge, a measure that was intended to support businesses. Instead, it has become an awkward loophole.

Pricing decisions also need to take into account the user's ability to pay. There are many criticisms, for example, that flat fees on driving may hurt a low income population. But it's difficult to vary fees according to individual means without major privacy incursions.

Exclusions and different prices can be powerful tools, but they can also lead to counterintuitive behaviors or the perception of preferential treatment. Sometimes, the simplicity of a single fee provides important messaging around fairness.

A crucial first step is for cities to really consider their end goals for congestion pricing, what they want the outcomes to be, and then prioritize those outcomes accordingly. A tax designed to reduce total lost time in traffic will look different from one designed to reduce total air pollution. A city whose public transit uses dedicated lanes and tracks will have different goals for its congestion pricing than one whose buses are stuck in the traffic jams.



Determine the congestion pricing application method

Taking priorities and turning them into a functioning system requires some important decisions. Technology-led discussions often jump right to selling an e-tolling system. But there are a number of ways to apply congestion pricing, not all of which rely on e-tolling.

Congestion pricing is described by the Federal Highway Administration as taking three forms: cordon pricing, variably priced lanes, and variably priced whole assets. We add to that list two other pricing approaches: variable parking pricing and strategic scarcity of parking.

Cordon pricing

This is the most well-known approach to congestion pricing for dense urban areas. Governments set up traffic cameras or e-tolling gantries in a cordon surrounding an urban core, and charge those who enter. London's Iron Ring, Singapore's Electronic Road Pricing system, and Rome's Zona Traffico Limite all rely on this model. Among other advantages, cordon pricing relies on relatively established technology. But it also has drawbacks: for example, the many gantries needed may cause disruptions to the public right of way.

Variably priced lanes

High Occupancy Toll (HOT) lanes are the most common example of this approach, which layers a pricing concept on to the well-established practice of designating "HOV/carpool" lanes. With HOT lanes, certain lanes are available to "preferred" vehicles, such as those with multiple occupants, transit buses, emergency vehicles, or those willing to pay a fee. This approach is most commonly applied to congested highways near economic centers, such as the D.C. beltway or Atlanta, where HOT lanes are currently in force, or Silicon Valley's 101 freeway, where they have been proposed. Variably priced lanes create an option not to pay, which minimizes stakeholder concerns. But it also requires multiple lanes, is difficult to apply in urban cores, and can be vulnerable to charges of elitism, as those willing to pay high fees are provided a superior experience.

Variably priced whole assets

This approach builds on the long-established toll road concept and implementation, with bridges and toll roads being the most common applications. The congestion pricing model simply changes the price of the toll based on demand, time of day, or other relevant variable. New York City is currently considering a proposal to implement an approach that combines variably priced whole assets with cordon pricing.

Variable parking pricing

Sometimes called Smart Parking, this approach changes the price of street parking meters based on location and time of day, and is being piloted in San Francisco and Boston. It is in some ways an emerging version of pricing whole assets—relying on many small, internet-enabled parking meters rather than a few toll gantries. Responses to pilots have been positive, although the prices deployed may not be high enough to shift behavior substantially. This approach also excludes many classes of driver, including TNCs, taxis, and those with private parking.

Scarcity of parking

Rather than directly controlling the price of parking, the government can simply make parking generally scarce. This can be done via reducing public street parking and/or making permitting for private garages more difficult. The end result is a similar disincentive for individual cars to make elective trips into the zone, but with a much smaller role for the government to play. Seattle has made strides in reducing its total parking footprint. It has also invested heavily in transit to absorb trips no longer made by car.

Implementation

Smart City Technology

The megatrend of technological change has revolutionized our private lives as well as many business industries. The linking of data and devices via the internet has created new possibilities and risks. These changes are relevant to governments as well, which can now deliver services that weren't possible or practical before.

Smart City refers to the application of new technology and data to government services. It is a broad, vendor-driven term, but still a useful shorthand for the risks and opportunities governments experience as they adopt and deploy new internet-enabled hardware.

The execution of congestion pricing is, in most cases, a Smart City technology application. The majority of congestion pricing applications are based on the relatively mature e-tolling technology of gantries and scanners. This is true across cordon and lane access approaches.

While some approaches, like limiting the number parking spaces, do not require these considerations, most congestion pricing approaches require governments to actively prepare to have a safe, successful deployment. We see the following as important: (1) data architecture, (2) privacy, (3) cybersecurity.

Data architecture and interoperability

A new tolling system will gather lots of new data. And the government in charge of it will need to decide how that data is managed. In many cases there is overlap of jurisdiction—multiple cities and the state government may have claim to the data.

Again, the entity needs to determine its goals for the data. If it wants a simple, siloed processing of payments, that is relatively easy. However, if it wants to be able to access records quickly in emergency situations involving Homeland Security or police activity, or for more benign purposes such as educating heavy trip users, this creates new data structure and process challenges. There are frequently data governance challenges as well, as governments must decide which department or even which jurisdiction the data belongs to.

Privacy considerations

A congestion pricing scheme means that the government now has a lot more data about the comings and goings of vehicle owners. And this data can be combined with camera, payment, or other data to triangulate the identities of individuals and their movements. Residents' opinions about privacy concerns are not static across the U.S., often varying by region. Thoughtful engagement with residents and advocacy organizations can begin to give a clear sense of what level of privacy is expected and what will constitute a violation of privacy. For example, would monetizing the data to certain third parties, such as repossession firms, be acceptable? What about if records are requested by ICE? This data can be a source of additional value, but may also create complexities.

Cybersecurity considerations

All technology hardware is subject to attack. Hardware in the public right of way that is actively engaging in sensing and communication can be particularly vulnerable. And as congestion pricing is often concentrated in crucial global economic centers, this infrastructure may be of particular interest to malevolent actors. Extending solid cybersecurity protocols to any new systems, and maintaining the overall security of the system (e.g., identify access management) is crucial to maintaining functionality and trust. The relative newness of congestion pricing in the U.S. only adds to the urgency of a detailed cybersecurity approach to any deployments.

Stakeholders

It is no secret that congestion pricing often results in strong reactions from stakeholders. New taxes that only apply to certain groups always create responses, because they have a direct and easily-identified advocacy constituency. Governments can minimize potential issues through robust stakeholder management and engagement with leaders. Advisory councils, of both technical experts and residents, can go a long way to bringing relevant perspective into the process. These have been successfully deployed for public technology projects in San Jose, Philadelphia, and elsewhere. A broad approach to coordinating this process can both deliver a clear sense of the response as well as begin to build legitimacy into the process.

Program Management

Deployment of congestion pricing will be a complex undertaking. Successful execution requires involving many departments, substantial new infrastructure new technology systems. And once up and running, maintaining and continuously improving such a large and dispersed new system will be a serious challenge.

Governments that deploy robust program management approaches see the best results for new programs. Effective program management will be critical to ensuring that the delivery of this program is on time, and will deliver the expected value and financial benefits to residents. To be able to plan a structured implementation while also respond to potential changes with agility, a centralized project management office (PMO) can help handle and coordinate the various activities involved. A PMO can be especially useful centralize the multiple workstreams involved and measure the progress of the overall implementation, serving as a central hub for all project management functionality and a centralized repository for project information. The PMO can centralize the project plans for:

- Physical implementation
- IT
- Transaction processing
- Change management

The PMO can oversee testing and quality gates necessary to ensure effective implementation, as well as integration with other systems and processes.

In addition, a PMO can centralize communication and stakeholder engagement, ensuring that messaging is consistent and outreach is coordinated. Congestion pricing implementation involves many parties and interested stakeholders including government officials, vendors, community groups, and of course, the media. A PMO can help develop a messaging strategy, and adapt this messaging to the changing environment and reactions to implementation. This centralized body can plan and then coordinate the phases of outreach necessary to increase buy-in and acceptance.

Complex programs need strong centralized PMO to be able to keep them on track with budget, timelines and quality, especially considering the highly-visible nature of this program.

Conclusion

Congestion pricing is a powerful opportunity for governments to manage some of the negative externalities associated with growth. To do it well requires expertise in policy, technology and implementation. Each step of the process brings considerations that governments must tackle to ensure they are designing the best system for their context while minimizing unintended consequences.

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