The Discrete Charms of Congestion Pricing

By Lewis Lehe

Introduction

When Nobel laureate Daniel Kahneman and Princeton economist Alan Krueger asked working women to measure how much they enjoyed daily activities, the women ranked "commuting" last.[1] Likewise, economists Bruno Frey and Alois Stutzer determined that someone who makes a one hour commute twice per day must earn 40 percent more money than someone who doesn't commute in order to report feeling equally satisfied with life.[2] The message is clear: You forget what you're paid for, and people have to be paid well to forget the misery of a long commute.

Fortunately, local governments have a policy at their disposal that could shorten commute times for millions of Americans. This policy could make commuting so bearable that people would want to pay to drive at rush hour. In fact, making commuters pay is the policy itself. It's called "congestion pricing," a system of road tolling whereby toll rates vary according to the intensity of traffic congestion.

Traffic is Bad and Getting Worse

The Texas Transportation Institute (TTI) issues a biannual report detailing congestion trends. According to its study, in 2007, congestion wasted 4.2 billion hours of Americans' time. Using estimates of time value and average vehicle gas mileage, the study finds congestion wasted $87.2 billion of time and fuel—approximately $762 per traveler. Worse, the data also show that the situation is deteriorating:

Table 1: Average Annual Delay Per Traveler (hours)

	1982	2007
Very Large Urban Areas	21	51
Large Urban Areas	11	35
90 Area Average	16	41

Source; Texas Transportation Institute

As seen in Table 1, congestion wasted 41 hours for the average urban commuter. This is more than one week of work or vacation—not spent working, with family, pursuing hobbies or relaxing. The time is simply wasted.

Why Does Congestion Happen?

We can imagine a road where traffic is bumper-to-bumper but the cars are still coasting comfortably at 60 mph. Unfortunately, in the real world this situation could never last very long. The more cars there are per mile, the less space there is between any two cars. The less space there is in front of a car, the lower the speed at which it can safely drive. So, when too many cars drive on not enough road, each driver can only go at a fraction of the speed limit. Balance is the challenge.

Instead of balance, Americans have accumulated a gross disparity between demand and supply for road space. Between 1980 and 2005, the total vehicle-miles of travel per year in urban areas rose from 855 billion mi. to 1.95 trillion mi.—a 128 percent increase. Travel jumped in part because now there were 35 percent more people and 55 percent more registered vehicles than in 1980.[3] But more importantly, people drive more. Three reasons for the trend include: (1) People live farther from workplaces; (2) Gas is cheaper (both in real dollars and relative to our increased incomes); and (3) Cars get better gas mileage. Meanwhile, the total lane-miles of major urban

roads rose from 220,000 mi. to 351,000 mi.—only a 60 percent increase.[4]

Inadequate infrastructure investment is not all that ails the U.S. transportation system, though. Even with more lanes and bigger ramps, roads always wind up choked during rush hours. Traffic researchers call the phenomenon "triple convergence." As a dour report on Los Angeles traffic from the RAND Corporation—a leading policy think-tank—explains, "When traffic conditions on a roadway are improved during peak hours, additional travelers will tend to converge on that newly-freed capacity from (1) other times of travel, (2) other routes of travel, and (3) other modes of travel."[5] It's a classic tragedy of the commons: any individual benefits from using a road at rush hour, but when everyone converges on the road at once, nobody goes anywhere.

Of course, this would also be true of Internet bandwidth, cattle-grazing land, and cellular networks. But private companies control these resources and charge money for access. Roads, on the other hand, are free to access. The only force limiting usage of a road at rush hour is that driving becomes so frustrating and coutnerproductive that nobody else wants to get on the road.

A New Hope

"Congestion pricing" refers to proposals that share a powerful tool: road tolls that mimic congestion levels. At rush hour, the toll is highest. At times when few people drive, the toll is lowest.

Under congestion pricing, the tolls are set to optimize daily traffic flow. During stop-and-go traffic conditions, the flow through a bottleneck—a downtown on-ramp, for example—might be up to 10 percent lower than if the cars were spread out.[6] Traffic engineers estimate that flow on a highway is highest when cars are running between 45-55 mph.[7] So, a toll authority using congestion pricing looks at rush-hour congestion and asks, "How many cars have to get off the road for traffic to run at optimal speeds?" Of course, a toll authority can't control traffic demand in real time. The tolls are set according to historical trends and advertised to the public.

Governments can apply congestion pricing in several ways. Stockholm, London, and Singapore have "cordon" charges, whereby drivers pay a toll to enter high-demand areas of the city. On the other hand, State Road 91 in Orange County, California has High-Occupancy Toll, or "HOT" lanes. Vehicles with two or three passengers can enter HOT Lanes for free, while drivers of single-passenger vehicles pay a toll. Proposals like HOT lanes, which give drivers the option of free-flowing toll lanes or congested free lanes, are the flavor of congestion pricing most likely to gain acceptability in the United States.

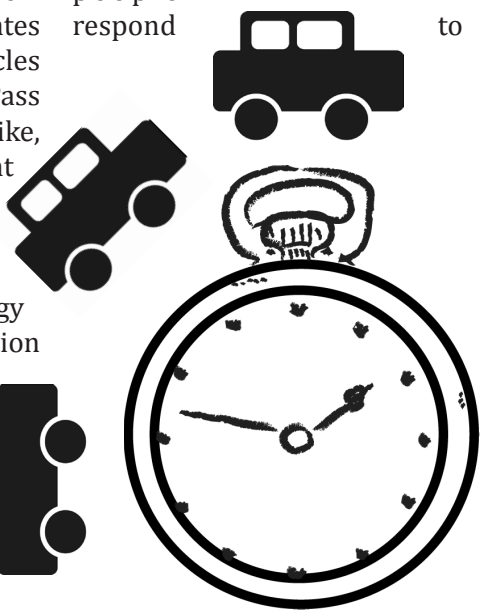
Congestion pricing relies on new tolling technology that eliminates the need for toll booths. Vehicles carry transponders, like the E-ZPass used on the Pennsylvania Turnpike, that charge tolls to an account or by mail. Vehicles without transponders are charged with cameras that take a picture of the license plate. This new technology is a major reason that congestion pricing has become viable in recent years, because it keeps the costs of tolling low and traffic moving quickly.

How Will Americans Cope?

Americans complain about an addiction to the automobile. Addiction is a convenient metaphor, because it expresses regret but explains indulgence. The satirical news source *The Onion* says it best with the headline: "98 percent of US Commuters Favor Public Transportation for Others."

However, even if Americans are addicted to the automobile, driving at rush hour is a part of the addiction we can curb. A commuter in an area with congestion pricing can avoid tolls by carpooling, bicycling, riding public transit, rescheduling appointments, rescheduling deliveries, working at different times, combining several trips into one, telecommuting, or choosing destinations closer to home. Each of these alternatives might seem like a fanciful prescription for the overwhelming majority of American commuters. But for congestion pricing to work, it is only necessary that a small fraction of people choose any given alternative.

Guessing the exact means by which people will respond to an



How Congestion Pricing Makes Bus Transit Viable

Another reason to expect that people can comfortably reduce their driving at rush hour is that congestion pricing makes riding the bus cheaper and more convenient.[9] University of California-Irvine's Dr. Kenneth Small, the world's leading expert in urban transportation economics, has found that congestion pricing induces a virtuous cycle with the following steps:

- Step 1: Tolls induce some drivers to switch travel modes, from cars to alternatives like buses, carpooling, and subways.
- Step 2: Less congestion lets buses run at higher speeds.
- Step 3A: Faster buses cost less money to run on a given route. (One bus traveling 10 mph can serve a route with the same frequency as two traveling 5 mph.)
- Step 3B: Faster buses induce more people to ride the bus. (Note: these new riders are not only would-be drivers. They are mainly people who were not going to travel, but ride the bus because it now takes less time.)
- Step 4: With more riders (3B) and lower costs (3A), it is financially viable for buses to charge lower fares and go more places.
- Step 5: Expanded routes and lower fares induce more people to ride the bus.
- Step 6: Some of the people who start riding the bus are automobile drivers, which frees up traffic.
- The Cycle: Steps 3B, 4, 5, and 6 reinforce each other.

Dr. Small has looked at London's experience with congestion pricing and made the following discoveries: Reduced traffic increased bus speeds by 9 percent. Faster buses let the bus system increase the total number of miles of service by 23 percent while lowering fares 16 percent.[10]

incentive like road tolls is dubious. Who could foresee the surges in gas mileage and natural gas exploration following the oil price hikes of the late 1970s? However, given the lackluster public transit options for some commuters, carpooling would probably be a common way to avoid tolls. The average passenger vehicle traveling at rush hour today carries only 1.25 persons, so there is significant unrealized travel capacity in place on existing roads, tunnels and bridges.

Can Americans Really Stop Driving?

Hundreds of millions of Americans have to travel to and from work, deliveries, and appointments every day. Cars are comfortable, convenient ways to travel. It seems tyrannical to demand everyone rearrange their lives to stop driving at rush hour.

The good news is that only a few vehicles need to get off the road at rush hour. Reducing the number of cars per lane-mile by as little as 10-15 percent can take a road from highly congested to free flow. That's because the relationship between the number of cars on the road and the severity of congestion exhibits non-linearity. The more cars already on a road, the more delay a single car that drives onto the road will cause other drivers. Non-linearity explains why, although total vehicle-miles traveled on urban roads rose just twice as fast as urban lane-miles (128 percent vs. 60 percent), the amount of time wasted per traveler more than doubled (16 hours vs. 41 hours).[8]

One tragedy of the debate over congestion pricing is that observers often walk away thinking, "They want everyone to ride trains and buses. Those pie-in-the sky social engineers!" The congestion pricing position is just the opposite: Car travel is the best choice for most Americans, so government should make driving less hellish.

Objections to Congestion Pricing

Objection 1: I'm taxed enough!

Any spending requires the government to collect money—whether by taxes, tolls, fees, or citations. Instead of opposing congestion pricing, many fans of small government—including the conservative Heritage Foundation and the libertarian Cato Institute—support replacing taxes with tolls. What's the difference? A toll is collected from those who drive on the road, just as a subway fare is collected from those who ride the subway. A tax is collected regardless of one's level of usage; it is only voluntary in the sense that someone chooses to live in a given area.

Despite the clear difference between tolls and taxes, opponents often oppose congestion pricing as a form of taxation. In 2008, New York City rejected Mayor Michael Bloomberg's plan to implement congestion pricing in lower Manhattan. A newspaper editorial written by City Council Member David Wepring, a critic of congestion pricing, stated, "Regardless of

what argument you hear out of the Bloomberg administration about the necessity of implementing congestion pricing, it is a tax."[11] In 2009, with the Metropolitan Transportation Authority financially in shambles, New York City raised payroll, property, and sales taxes. Effectively, New Yorkers rejected a toll with positive spillover effects because they suspected it was a tax—a tax that said, "Don't drive so much!" They wound up with actual taxes—taxes that said "Don't work, build, or buy so much!"

Objection 2: The answer to U.S. traffic problems is more public transit, not congestion pricing.

The choice between public transit and congestion pricing is a false one. Public transit is an expenditure, while congestion pricing is a revenue source. If public transit is an alternative to congestion pricing, then public schools are an alternative to property taxes. In fact, Stockholm and London have both used toll revenue to improve public transit, while congestion pricing has been proven to make bus transit more viable.

The objection that more road construction can obviate congestion pricing likewise posits a false choice. Even counting the money that drivers pay through the gas tax, roads are an expenditure: Construction costs for adding lanes in urban areas average $10-15 million per mile, while revenues raised from gas taxes on an added lane-mile during rush hour amount to just $60,000 per year.[12]

Objection 3: Only rich people will drive on the roads.

Congestion pricing sets tolls at a level high enough to keep the tolled road at optimal flow. There are not very many rich people. If only rich people drove on a road, the road would be below capacity, so the toll would fall. Above, it was noted that only about 10-15 percent of the cars on a congested road have to leave for traffic to reach optimal flow. Are 85-90 percent of the people on any road rich?

Objection 4: The tolls will hurt poor and middle-class Americans.

Voters wonder, "Is it fair to force poor and middle class Americans to pay for something that used to be free?" This is an acute concern for citizens with no access to alternatives. However, there are several reasons that equity concerns should not undermine congestion pricing.

First, governments can identify the genuinely needy and offer discounts on tolls or public transit. Protecting such people is cheap, because few drivers who make a daily commute to urban centers at peak hours are low-income. A study on prospective congestion pricing in Washington, D.C. found that the highest income quartile would pay 50.3 percent of tolls while the lowest would pay just 5.2 percent.[13]

Second, roads have never been free. Governments pay for roads with vehicle registration fees, fuel taxes, and sales taxes—all three of which are regressive charges, meaning they eat a larger slice of one's income the less income one earns. Low-income Americans seem to recognize that taxes are not in their best interest: A poll of King County, Wash., which contains Seattle, revealed that voters earning less than $35,000 per year preferred tolls over taxes by a margin of 58 percent to 32 percent, while those earning more than $100,000 per year preferred taxes over tolls by a margin of 45 percent to 42 percent.[14]

Finally, because it is possible to imagine a person being harmed by any large reform—even those society considers unequivocally worthwhile—a good way to frame the equity debate is to ask, "In a world with congestion pricing, would anyone propose making the roads free as a way to help low-income workers?" Probably not. In a congestion pricing world with smoothly flowing traffic and lower taxes, someone with compassion for the disadvantaged might think it natural to offer discounts on tolls to poor workers, but would shudder

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at the idea of sacrificing millions of hours of other people's time every year—by making roads free—to save one small group a few dollars in toll money every day. In fact, anyone in a world with congestion pricing would likely find bizarre the idea of enacting any policy that benefited only that segment of low-income workers who happen to commute to urban centers at rush hour by car. Imagining how citizens would think if congestion pricing were already in place avoids a bias toward the status quo.

Conclusion

Congestion pricing can substantially reduce traffic congestion without expensive outlays on transportation infrastructure and services. It raises money that government can use for expanding road capacity, public

transit, or reducing taxes. It draws on the same dynamic of price as mediator between supply and demand that society uses to ration almost all of society's resources. The logic of pricing roads is so compelling that opposition to congestion pricing is rooted mainly in an attachment to the tradition of free roads.

In the United States, this tradition is very inconsistent with the modus operandi of most government resources. Education is not free at public universities, nor health care at public hospitals. Courts, national parks, subways, buses, Amtrak, turnpikes, federal lands, airport security, Medicare, and flood insurance all rely on user fees for at least some of their funding. According to the soldier-supporting country music community, even freedom isn't free.

Fortunately, because opposition to congestion pricing stems primarily from fear of the unknown, familiarity breeds acceptance. When Stockholm implemented cordon charges as a trial in 2006, public approval for the measure was just 30 percent. Within six months of the trial, approval reached a majority, and now congestion pricing is a permanent feature of life in Stockholm.[15]

Ben Franklin said, "In this world nothing can be said to be certain except death and taxes." He did not mention traffic congestion. Thanks to congestion pricing, traffic congestion is not a certainty and Americans can even alleviate some of the taxes.

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