Considering Congestion Pricing in Hong Kong and Mainland China: What can we learn from other cities?

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Abstract

This case discusses how congestion pricing has been utilized in a number of cities across the globe to address the economic and environmental impacts of urban traffic. We introduce the problem and touch on the air quality problems in China, and then describe the variety of pricing schemes implemented and their benefits. We then look at three cases: Singapore, London, and New York: two successful pricing schemes and one failure, and analyze why it failed in New York City. We ask whether and how Chinese cities should implement congestion pricing, and what Chinese cities can learn from these examples presented here.

Introduction

Congestion Pricing, a form of value pricing which charges vehicles for entrance to a city's center, has demonstrated its effectiveness at reducing congestion and pollution and improving air quality. Additionally, the revenue from this type of policy can be a dedicated stream of funding for public transportation expansion and transportation infrastructure improvements. Congestion pricing can serve as an important component of a suite of transportation strategies in Chinese cities, which face deteriorating air quality and traffic problems. The acceleration of this deterioration has spurred negative global attention on the congestion issue in China and its effects on quality of life in Chinese megacities. As cities vie for status as economic centers and attempt to attract businesses to locate there, issues of air quality can either attract or repel business. Chinese cities need to aggressively address the congestion issue in order to improve air quality, and reduce the time wasted in traffic and congestion pricing can serve as a strategy to do so.

The Problem: Congestion and Air Quality in China

Congestion and subsequent poor air quality are major issues facing Chinese cities. Private car ownership in China reached 120 million cars in 2012 and is expected to hit 200 million by 2020.[i] The number of cars on the road is growing rapidly, but the amount of space allocated to these cars is not. High congestion in metropolitan areas, particularly in the central business district (CBD) is intensified. The cities in China with the worst traffic include Beijing, Shanghai, Zhengzhou, Guangzhou, and Shenzhen.[ii]

Poor air quality causes serious health effects and vehicle emissions are a major contributor to air pollution in Chinese cities. In Beijing, vehicles account for 22% of fine particulate (PM2.5) in the capital. In Hong Kong, vehicles account for 25% of total pollution from particulates and nitrogen oxides, and are the second largest source of these pollutants.[iii] In a study of air quality in the world's cities, 16 of the world's worst 20 cities are in China.[iv] Poor air quality, both indoor and outdoor, is causing serious illnesses and the World Health Organization estimates, "in 2007 that 656,000 Chinese died prematurely each year from ailments caused by indoor and outdoor air pollution."[v] In a staggering demonstration of the severity of the issue, the Chinese government released statistics that "300,000 die each year from ambient air pollution, mostly from heart disease and lung cancer."[vi] Alleviating congestion is one method to reduce pollution and its health effects.

Congestion also prohibits cars from moving efficiently through the city, increasing the time each vehicle is on the road, and decreasing productivity. The total cost of congestion due to traveler delays and air pollution in Beijing is estimated at 50-101 billion RMB annually (US $7-15 billion).[vii]

Chinese cities have attempted various methods to reduce congestion, though none have implemented a congestion charge. One method is capping the individual registration of cars: Beijing caps registration of personal vehicles at 20,000 per month.[viii] Additionally, Beijing recently implemented a system of reversible lanes during rush hour.[ix] Shenzhen attempted employing a congestion charge, and Hong Kong is considering instituting an electronic road pricing system similar to Singapore's.[x]

Congestion Pricing

Congestion pricing is a form of value pricing, which is a tool to harness the power of the market to reduce the waste associated with traffic congestion. Value pricing in the transportation sector, "works by shifting purely discretionary rush

hour highway travel to other transportation modes or to off-peak periods, taking advantage of the fact that the majority of rush hour drivers on a typical urban highway are not commuters"[xi] There are four main types of congestion strategies:

> ***Variably Priced Lanes*:** These include express lanes, carpool lanes and High Occupancy Toll (HOT) lanes. "On HOT lanes, low occupancy vehicles are charged a toll, while High Occupancy Vehicles (HOVs), public transit buses and emergency vehicles are allowed to use the lanes free of charge or at reduced rates. HOT lanes create an additional category of eligibility to use HOV lanes. People can meet the minimum vehicle passenger requirement - or they can choose to pay a toll to gain access to the HOV lane." [xii]
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> ***Variable Tolls on Entire Roads:*** "With this type of pricing, flat toll rates on existing toll roads are changed to a variable toll schedule so that the toll is higher during peak travel hours and lower during off-peak or shoulder hours. This encourages motorists to use the roadway during less congested periods, and allows traffic to flow more freely during peak times." [xiii]
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> ***Cordon Charges:*** "Cordon pricing involves charging a fee to enter or drive within a congested area, usually a city center. Singapore introduced the first such pricing scheme in 1975 using low-tech daily charges."[xiv] This is the most common form of congestion pricing, and the congestion pricing schemes described below are all considered cordon charges.

These cordon charges, like fuel taxes, proportionally charge the users for use of the infrastructure. The State of Oregon in the United States is currently testing a pricing scheme involving per-mile charges, which it will consider using as a replacement for fuel taxes in the future. Variable pricing strategies are also used for parking to incentivize turnover of prime spots and to reduce idling.

Congestion pricing is the brainchild of the Nobel Prize Winning economist and Columbia University professor, the late William Vickerey, who first proposed the idea in 1952. According to Vickerey, an efficient congestion price follows the following principles:[xv]

1. Charges should reflect (as closely as possible) the marginal social cost of each trip in terms of the impacts on others.
2. Charges should vary smoothly over time.

3. Efficient charges cannot be determined solely by conditions at the time of the individual trip, but must take into account the impact of the trip on other traffic from the time the trip is made until the end of the congestion period.
4. Efficiency can be enhanced, for a given level of data collection, by charging on the basis of the trip segment from one observation point to the next, rather than by merely the passage of an observation point.
5. All vehicles should be charged without exception, including trucks, doctors' cars, press cars, and cars of public officials and diplomats, among others.
6. Taxicabs present a special problem of ascertaining the charge at the time of incurrence, so that it can be charged to the customer.
7. Curb parking, where permitted at all, should be charged on the basis of clearing the market.
8. One simple and inexpensive method of collection would be by means of parking cards.
9. Another method would use parking ticket vending machines.
10. Delivery vehicles and other vehicles making frequent short stops need special treatment, such as by using on-vehicle meters.
11. Political interference and bureaucratic bungling can spoil the game.

The problem is that there are too many people moving at the same time in too small a space. When someone decides to drive to work, part of the cost is borne by society, in terms of pollution and use of the roads. Because the individual driver is not required to pay for these costs to society, it alters their decision of whether or not to drive. The result of people receiving something for free is overuse of the resource. In theory, the solution is to charge for the use of roads. When people are forced to pay each time they use the road, it will change their calculation of the personal cost of driving. People who benefit more from driving than the cost of the congestion charge will continue to drive. Those who benefit less from driving will use alternatives. The degree of congestion can be controlled by the level of the fee. Some drivers will decide they still need or want to drive while others will use alternatives; as a result, use of roadways will be more efficient.

Benefits of Congestion Pricing

Congestion pricing benefits drivers, transit riders, businesses and the environment. It reduces travel time, and subsequently increases productivity, reduces vehicle emissions, and thus, improves air quality. Moreover, state and local governments can also benefit by "improving the quality of transportation services without tax increases or large capital expenditures."[xvi] Congestion pricing can provide additional revenues for funding transportation, retaining businesses and expanding the tax base, and potentially shorten incident response times for

emergency personnel.[xvii] "By preventing the loss of vehicle throughput that results from a breakdown of traffic flow, pricing maximizes return on the public's investment in highway facilities."[xviii] Overall, congestion pricing can benefit society as a whole in various ways:

Improved Speed of Traffic

A congestion fee for driving in central business districts typically results in fewer cars on the road during peak use time. This provides toll-paying drivers a more reliable speed on the road, faster travel time, and less stress by increasing the predictability and reliability of trip times and reduced cost of trips.[xix] For example, in Orange County, California, tolls are set up along State Route 91 to help traffic move flow more smoothly during rush hours. Commuters traveling on priced lanes were able to move at over 60 miles per hour, while traffic in adjacent lanes were moving at an average of 15 miles per hour or less. This has helped toll payers save as much as half an hour each way per 10-mile trip.[xx]

Improvements in Mass Transit

Congestion pricing can also benefit transit riders, carpoolers, and individual drivers through improvements in infrastructure and transit systems. Pricing schemes are often coupled with enhanced transit services funded by the fees generated. Because pricing commuters may increase ridership on mass transit system, additional investments in public transit are often required in order to accommodate more transit riders.

Through the reduced traffic and the associated investments in mass transit, the benefits to transit riders include improved speeds and reliability of service, shorter trip times, and reductions in the wait time through increased frequency of service. This can also make the city more attractive to bicyclists and pedestrians, and improve the overall quality of life of residents in the city.[xxi]

After implementing a system of congestion pricing in London, the city saw a major shift in commuters from private vehicles to public transit, particularly buses. According to the US DOT Federal Highway Administration, bus delays in central London dropped by 50 percent after the pricing scheme was introduced and saw a 7 percent increase in bus riders. In addition, within the first three months of priced express lanes on State Route 91, there was a 40% increase in the number of vehicles with more than three passengers.[xxii]

Benefits to Business

Traffic congestion and unpredictable travel times can affect business productivity due unreliable and more expensive delivery. When delivery becomes

unreliable, businesses must keep extra inventory on hand, which can become expensive.[xxiii] Also, delivery costs are dependent on fuel costs. When delivery trucks, particularly those that require refrigeration, have to idle in traffic, it drives up their costs. Congestion pricing can guarantee improved traffic flow, helping to keep business and transportation costs low and reduce tardiness of employees to meetings.[xxiv]

Social and Environmental Benefits

With fewer cars on the road, society as a whole benefits from the reduction in pollution caused by vehicle emissions idling in traffic. This is essential to improve local air quality and the associated negative health impacts like asthma. In some cases, safety and driving accidents may also be reduced. Additionally, pricing schemes can include incentives for low-emissions vehicles, which can facilitate uptake of fuel-efficient cars, further reducing pollution.

Congestion Pricing in Action

Many large cities around the world have already adopted or attempted to implement a congestion pricing system. There is much to learn and adopt from those that have effectively deployed congestion pricing, as well as lessons that can be drawn from those cities that failed.

Programs in Singapore, London, Stockholm, and others have operated without major problems. Cost-benefit analyses for the London and Stockholm initiatives have found that the "combined benefits to motorists, public transport users, and the environment exceed system setup and operating costs."[xxv] While each of these cities' situations was unique, there is every reason to believe that congestion pricing should work in cities across the globe, including China, as it deals with its massive urbanization plans over the next two decades.

Singapore

Singapore was the first city in the world to successfully implement a congestion pricing scheme. The charge was implemented in 1975 in the form of an Area License System. This scheme affected all roads within a 6-square-kilometer area in the Central Business District (CBD) called the "Restricted Zone" (RZ). This was later increased to 7.25 square kilometers in order to include areas that later became commercial in nature.[xxvi] It was designed to reduce rush hour traffic into the central business district, and included exemptions for special vehicles (ambulances, fire trucks, etc.) as well as cars carrying four or more passengers.[xxvii]

According to Singapore's Land Transport Authority, fairness has been one criteria used in setting fees. "Charges are based on usage - those who contribute more to the congestion pay more, while those who use the roads less frequently or who travel during non-ERP hours will pay less or not need to pay at all."[xxviii] Twenty eight Electronic Road Pricing System (ERP) gantries formed an entry cordon around downtown. They operated from 7:30am to 7pm. Payments varied for different half hours from $1.60 during rush hours to $0.70 for quieter periods.[1] The initial drop in traffic entering restricted zone was 44% and succeeded in effectively restraining congestion in the zone for more than 20 years. Before the implementation of the system and the other complementary measures, the motor vehicle fleet was growing at an annual rate of 6%, and in 1975 the traffic volume entering the restricted zone was about 100,000 vehicles. After the government intervention, the fleet slowed down to a more moderate 4% rate of growth, and traffic entering the restricted zone was limited to 230,000 vehicles in 1994. The city cited the country's land constraints, the desire for economic competitiveness, and the need to avoid the traffic gridlock as reasons to execute this policy and their subsequent traffic reduction strategies.[xxix] The policy is generally deemed very successful and serves as a model for other cities as they look to implement policies of congestion pricing.

London

London implemented a congestion charge in February 2003 to reduce traffic congestion and air pollution.[xxx] The system was initially implemented in a highly congested 21 square kilometer area containing about 200,000 residents and five times as many jobs.[xxxi] People residing within the zone receive a 90% discount on the daily charge. The charge applies to vehicles parked or driving on public roads within the zone, but residents whose vehicles are parked off-street or in a resident's parking bay throughout the congestion charge operation period for one day do not have to pay the charge for that day.[xxxii]

London charges a flat fee to enter the specified zone, in contrast to some other usage-based systems. Commuters were originally required to pay £5 on weekdays between 7:00 am and 6:30 pm, and increased to £8 in July 2005 then to £10 in 2013.[xxxiii] Unlike Singapore, which was equipped with an E-Z pass-like transponder and billing system to assess and pay the fee, the London program is based on cameras at entrances and exits to the zonal area. Images of license plates taken of cars entering and exiting the zone are compared to a database containing exemptions and other rules, and users are issued fee notices, which can be paid

online.[xxxiv] Electric vehicles and low-emission alternative fuel vehicles are exempt from the charge in order to promote environmentally friendly vehicles.[xxxv] Partly as a result of this policy, the number of electric vehicles registered increased from 11,000 in 2005 to 18,000 in 2007.

By law, all revenues in excess of expenses were dedicated to transportation. The congestion charge was introduced together with a package of other transportation policies, including many improvements to public bus transportation. The transport package included: "increased service, increase the length of bus lanes, the introduction of out-of-bus ticket sales (and banning of ticket sales by drivers, to reduce waiting time at stops), the introduction of a smart-card, and investment in robust schedules".[xxxvi] The benefits of this charge and the impact of the investments in public transit are clear. Prior to congestion charges, 85% of commuters entering London were using public transportation and about 12% of peak-period trips were by private automobiles. Automobile traffic declined by 20% (approximately 20,000 vehicles per day), resulting in a 10% automobile mode share.[xxxvii] Traffic speeds significantly increased from 13 km/hr to 17 km/hr. Peak period congestion declined about 30% and bus congestion delays declined 50%. Bus ridership increased 14% and subway ridership by about 1%.[xxxviii] The London Underground runs 5 percent more train-miles on the Tube, and traveler delays are down around one-third, when compare to delays a decade ago.[xxxix] Bus usage reached a 50-year high in 2011, with 30 percent more service and 20 percent less waiting compared to 2000-01.[xl] Bike trips increased 79 percent from 2001 to 2011, after having stagnated between 1993 and 2001.[xli] Travel fatalities and serious injuries were the lowest on record in 2011, and although cycling casualties have risen in recent years, it is likely a function of increased cycling.[xlii] Carbon dioxide emissions dropped 15 to 29 percent, and fine particulates and nitrogen dioxide dropped 10 percent.[xliii]

The project was initially very controversial and widely criticized by various groups – politicians, motorists, and labor organizations. However, the program went ahead anyway, and after it was implemented, it was widely accepted. In a survey of business owners, the majority (69%) felt charging had no impact on their business, 22% reported positive impacts on their business, and only 9% reported an overall negative impact.[xliv] What London found key to its success was conveying widely the program's benefits and its ability to overcome public skepticism.

By introducing the charge along with the other policies, the package as a whole was able to generate political support. "London raised hundreds of millions of dollars in new revenue, which it invested in better transit such as new buses, delivering immediate benefits to affected commuters affected by the

charge."[xlv]Increasing transportation, particularly for those adversely affected by the charge, can increase buy-in for the policy.

New York City

New York City, on the other hand, is an example of a city that has tried and failed to implement congestion pricing. New York City has made attempts throughout the last century to tax congestion in some form or another: in 1911 by Mayor Jay Gaynor, 1973 by Mayor John Lindsey and Governor Nelson Rockefeller, and in 1980 and 1987 by Mayor Ed Koch.[xlvi] Most recently in 2007, Mayor Bloomberg attempted again, by including plans for a congestion charge in the city's long-term sustainability plan, PlaNYC 2030. The plan proposed an $8 fee to cars entering Manhattan's Central Business District (CBD) between 6 a.m. and 6 p.m. Tolls would be paid through the existing E-ZPass electronic tolling system or through payment options at retail locations, by telephone or online. Drivers who live within the CBD would be charged $4 for trips within the district. Emergency vehicles, taxis, cars with handicapped license plates and for-hire vehicles would be exempt from the charge.

With significant personal leadership from the Mayor himself, the plan was able to generate support across the city, but after a lengthy process, it was ultimately rejected by the New York State legislature, which had to approve any congestion pricing plan. Bloomberg called the failure "a terrible setback for clean air and to our critical commitment to fight climate change".[xlvii] In the end, while Bloomberg was a great champion of the proposal and succeeded in winning many skeptics over, it was not enough. The Mayor of New York City is an enormously powerful elected official, but he needs the approval of the state government to generate revenues and he does not control the mass transit system.

Supporters of congestion pricing generally emphasized the societal benefits of reduced traffic, the increased funding for transit and its impact on sustainable transportation. Supporters generally saw the $8 fee as a reasonable fee, particularly in light of the increased transit service that would be funded by congestion pricing revenues.

Opponents were motivated primarily by the individual impacts on drivers. They felt that in some parts of the city mass transit was not and would not become a viable alternative to driving, that travel time savings were questionable, and that these benefits would not be worth the $8 fee. In addition, individuals liked the comfort, privacy and control they had by using their personal vehicle, and they would lose those benefits in their shift to mass transit. Still others saw congestion

pricing as unfairly targeting the "working person" in the outer boroughs. They viewed pricing as an attempt at social discrimination by Manhattan-based elites. They also objected to the fact that while East River bridge users would pay the full $8 daily congestion fee, peak-hour commuters from New Jersey would have the congestion fee fully offset by Port Authority bridge and tunnel tolls. This issue of regional equity became a significant obstacle in legislative consideration of congestion pricing. It was strongly opposed by residents in Queens, Brooklyn, and Bronx, claiming it was a regressive policy with disproportionately affected people in the outer boroughs.

Opponents also disputed whether pricing would have the societal benefits claimed by pricing's supporters. Opponents pointed out that trucks, taxis and black cars contribute to Manhattan's traffic congestion. Opponents also doubted that revenues would reach the Metropolitan Transit Authority (MTA), which runs public transit, or if they did, they were skeptical that the MTA would use the funds to make the promised service improvements. They also worried that riders would suffer from even more crowded trains and buses as people flocked to mass transit to avoid the fee and take advantage of improved service. This skepticism was reinforced in March 2008 when, for budgetary reasons, the MTA canceled $30 million in service improvements the agency had announced only three weeks earlier.

Lessons can be learned from New York City, as other cities attempt to create their own policies. Garnering support for congestion pricing among elected officials, key constituencies, and the general public is essential, and having clear information and plans communicated in advance could have alleviated some of this political struggle.

Congestion Reduction in China

What can China learn from these experiences? While Chinese cities have experimented with congestion-reducing policies, there are great opportunities to benefit from the implementation of a cordon charge (congestion pricing scheme).

Hong Kong

Prior to Singapore's use of the ERP technology, Hong Kong was the first pilot the ERP technology in 1980s.[xlviii] Hong Kong piloted a cordon charge in a 21 month pilot stage of Hong Kong's ERP system, which lasted from July 1983 to March 1985.[xlix] The pilot demonstrated the technical feasibility of ERP and used automatic vehicle identification.

However, the initiative failed due to poor timing. The Island Line route had just opened and made public transport more accessible. Also, the stock and property market crashes in 1982 resulted in a weakening in the demand for private cars. The introduction of ERP came in the wake of the fiscal restraint measure of May 1982 which may have curbed demand for driving because during that time, traffic speed in the urban area actually improved from 20 to 28 km/hr. from 1979 to 1984. Private car drivers felt singled out and discriminated against, during a time with decreasing traffic. Some argued that ERP was unnecessarily expensive and alleged that the forecast of automobile growth was overstated, therefore ERP would not be financially viable. It was also introduced at a politically sensitive time, shortly after the initialing of the Sino-British declaration in December 1984, which stated that Hong Kong would be handed over to China in 1997. For these reasons, the Hong Kong government did not succeed in effectively selling ERP to the public and didn't make necessary information available. The public was simply not convinced that the government would follow through with its promise to lower annual license fees and initial registration taxes. Though the technology was tested and the benefit cost ratio was favorable, some observers suggested that high income groups would benefit the most because the value of travel time was proportional to the wage rate.

Beijing

Beijing is an example of a Chinese city that could benefit from a congestion pricing system. The City of Beijing has attempted several other congestion-limiting policies. The 2008 Beijing Olympics Road Space Rationing policy, limited cars by license plate number, with odd numbers and even numbers driving on different days.[l,li] In a similar strategy, they have also attempted limiting the number of cars being registered per month in Beijing, only allow registration of 20,000 cars per month.[lii] Beijing has also tried raising taxes on big cars and reducing them on smaller cars.[liii] The city has also expanded roadways, but the problem of congestion persists. A cordon charge could reduce congestion and improve traffic speed.

The geography of Beijing, with its various ring roads, would lend itself very easily to congestion charging.[liv] A congestion charge zone could be introduced within either the second or third ring road and then be extended outwards depending on the success of the scheme and public support for it.[lv] As demonstrated in other cities, in order to win public support, the funds raised from the congestion charge would have to be reinvested into public transport.[lvi] Ideally, these enhancements would be implemented before the charge became operational, to generate support before the program began. Some exemptions, or discounted rates, would likely be necessary to be granted to residents within the charge zone. It could

use simple technology like closed-circuit television at the entry points off the ring roads and camera enforcement using a database of car licenses.[lvii]

Political Issues

When government sets a price on an activity or a public good, it is typically defined as a fee or a tax. It is always controversial when something that was given out for free, suddenly is "sold" for a price. Nearly any effort by government to generate revenue will generate some degree of political controversy.

While the political situation in each of these cities varied, each of the governments required some degree of insolation from public opinion to impose the congestion charge without significant fear of public retribution. In Singapore, the congestion charge was implemented without question and proved to be a success. In London, Mayor Livingston implemented the charge on his own authority despite objections from other city politicians and political groups. New York's Mayor does not enjoy the same kind of autonomy that some mayors have. As the London charge proved successful, opposition faded. Studies have found that in London, Stockholm, and other cities, public support for congestion pricing grew after the programs were implemented. People have a more favorable attitude towards the charges after they are able to experience the benefits themselves, and suggest that referenda on these types of programs are more likely to succeed following a pilot, rather than before implementation of a charging scheme.[lviii]

As cities consider a congestion charge, they should consider the interests of local stakeholders in their city and how those specific players and interests can affect the support or opposition of the policy. In designing a congestion price, several factors should be considered in facing the political obstacles. Cordon pricing, or any limit to free travel throughout one's city, conflicts with the fundamental and highly valued belief that mobility is a right; it is almost synonymous with freedom in the United States. The difficulty implementing congestion fees and the fact of congestion itself reflect those values.

Equity is at the heart of the opposition to congestion pricing. Politicians should consider disproportionate impacts on low-income constituents and small business owners. They should also ensure that those who are disproportionately negatively affected by a charge are given options for travel, through increased public transit to their neighborhood or are provided with targeted exemptions. A portion of the revenue from the charge must be dedicated to maintaining and improving mass transit service. Outreach for adoption of electronic tolling systems should be

targeted at the neighborhoods affected, so they can easily adjust and not increase their commute time.[lix] These concerns can be addressed in both the communication and design of the policy.

Policy Design

In designing the structure of the program, there are several things to consider:

- How do you set the price?
- Who gets exemptions (if any), and how to you determine these?
- How do you set the boundaries of the Central Business District?
- How do you appropriately subsidize and exclude commercial vehicles in order to be fair to lower income individuals and to businesses?

When policy makers decide the pricing scheme, it is important to consider the charging period, the charging rate, how that charge changes throughout the day to incentivize off-peak travel. The price should be set at levels that deter people from driving, or to change their driving patterns, but should not be too high so that a majority people couldn't afford to drive at all. The price should also generate revenue, to be used for transportation improvements. Exemptions or categories to receive reduced rates include: low income citizens, taxis, carpools, commercial vehicles, emergency vehicles, disabled individuals and elderly individuals.[5] However, over-exempting can complicate the system and reduce efficacy. The rollout of the policy should include a comprehensive public awareness campaign, particularly for those in these categories.

System design is important in achieving the goals of a congestion charge. Geography and existing traffic patterns specific to individual cities should be considered to improve traffic flow in the most congested areas. Similarly, setting the Central Business District is an important component of a successfully planned congestion charge. Can the area outside the Central Business District handle the increased traffic and parking needs? A city might want to consider restricting parking in the areas just outside of the Central Business District to residential parking. However, commuters and visitors may not know that, and this could increase idling in those neighborhoods. Signage will be important for limiting those effects. Electronic toll technology, now widely adopted, should be used to limit the cost of labor and increase traffic flow. Up-front and ongoing investment in the charging system and its infrastructure is essential for success.

Discussion Questions

1. What can Hong Kong and other Chinese cities learn from the experience of New York?
2. Should Hong Kong and other Chinese cities adopt congestion pricing?
3. How will Chinese cities overcome institutional and political barriers?
4. How will local leaders secure public acceptance?
5. How will they ensure low income populations realize improved mobility?
6. How will they address business owner concerns?
7. How will they design the system to meet technical and cost-effectiveness criteria?

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