Traffic Congestion and Congestion Pricing:

Recent Peer-Reviewed Literature, Oversea Cases, and Their Policy Implications for Chinese Cities

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Context

- Congestion has become an epidemic facing Chinese cities, especially cities with population over one million
- Estimated direct costs of congestion to Chinese cities: RMB 72B
- Estimated total costs of congestion to Chinese cities: RMB ?00 billion
Congestion w/ Chinese Characteristics Mandates Special Countermeasures?

• Economy, urbanization, and motorization are still on the rise
• Dense/compact urban forms + huge population base
• Historical road systems
• Congestion on inner-city roads rather than on inter-city freeways
• Mixed traffic contributes to and suffer congestion
• Commuters’ love for cars is growing
• A strong government…
Popular Countermeasures by Chinese Cities

- Increase road supply
- Improve public transit, esp. rail rapid transit
- Modernize traffic management systems
- Flexible work schedules
- Odd/Even plate number rules
Let Drivers Pay for the Full Costs?

• Congestion pricing has been adopted in Singapore, London, and Stockholm
• Seriously considered in New York
• Will/Should Chinese cities follow suit?
Marginal-cost Pricing Principle
Chinese Literature on Congestion Pricing

- 1994-2008: 47 peer-reviewed publications
- Describe and agree on the marginal-cost principle underlying congestion pricing
- Confused with goals of curbing congestion and optimizing overall social welfare
- Feasibility studies of congestion pricing in selected cities: Beijing, Guangzhou, Shanghai and Kunming
- Introduce foreign cases
English Literature on Congestion Pricing

1998-2008: 100+ peer-reviewed publications, focusing on six aspects:
• Different forms of congestion pricing
• Goals of congestion pricing
• Distributional effects of congestion pricing
• Performance evaluation of existing cases
• Public acceptance of congestion pricing
• Mathematical models for congestion pricing
Different Forms of Congestion Pricing

More cities have adopted or explored various forms of congestion pricing, some were not covered in the Chinese literature:

• Credit-based in Dallas, USA
• Tolled express lane in Orange County, USA
• Social experiment of congestion pricing, Stockholm
• PierPASS in Los Angeles
• Toll rings in Norwegian cities
Goals of Congestion Pricing

• Economists alone could not determine which goals that should be pursued in congestion pricing
• Economists are or should be good at: optimize the resources needed to realize various goals agreed upon
• Commonly-seen or agreed-upon goals: efficiently allocate existing road resources, redistribute income, reduce unemployment, decrease inflation (decided via a political process)
Distributional Effects

• Mobility is a basic right of people
• Congestion pricing affects the right of people from all walks of life
• Congestion pricing also affects different sectors
• The English literature has done more research on the effects from different perspectives, categorizing people and sectors into meaningful groups
Performance Evaluation

About 40% of the literature is evaluating the performance of congestion pricing

- Political process
- Economic costs and benefits
- Evolution of congestion pricing and performance
- Performance evaluation is related to: political, economic and policy milieu as well as framework applied
- Continued evaluation is required for evaluation to be useful
## More Cases of Congestion Pricing

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<td>比利时</td>
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<td>西级政府如何实施城市交通</td>
<td>2005</td>
<td>改革的目标应定位于社会福利的最大化：停车费和其它交通收费包括拥挤收费必须配合使用；不同层次的政府之间应分工合作</td>
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<td>Proost and Sen 2006</td>
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<td>美国</td>
<td>达拉斯</td>
<td>基于信用的交通拥挤收费项目研究</td>
<td>2005</td>
<td>通过政府的信用分配，确保合格的出行者能够承受交通拥挤收费</td>
<td>模型预测绝大多数出行者将受益，交通拥挤有所缓解</td>
<td>Gulipalli and Kockelman 2008</td>
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<td>橙县，河滨县</td>
<td>城际高速公路的收费车道</td>
<td>1995</td>
<td>在高度拥堵的公路上，额外建立收费车道</td>
<td>越来越多的出行者愿意使用付费车道；整条道路交通状况有所改善；道路沿线事故减少；</td>
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<td>洛杉矶</td>
<td>PierPASS</td>
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<td>对在高峰期进出港口的、公路运输集装箱收取交通拥堵费：延长港口作业时间，对非高峰期进出港口的集装箱免</td>
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<td>挪威</td>
<td>奥斯陆等</td>
<td>Urban Toll Rings (城市环形收费)</td>
<td>1986</td>
<td>在城市各主要进出口，对高峰车辆进行收费，获取资金用于补助交通项目建设</td>
<td>获得了支持城市交通建设的资金</td>
<td>Ieromonachou et 2006</td>
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<td>瑞典</td>
<td>斯德哥尔摩</td>
<td>对城市中心交通拥挤收费进行半年期实验</td>
<td>2006</td>
<td>在获取公众支持后，大规模试验交通拥挤收费；对实验前后的数据进行系统收集、科学分析</td>
<td>公众能感受到出行时间节省；试验的经济效益和环境效益也非常显著</td>
<td>Eliasson et al 2009</td>
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<td>法国</td>
<td>巴黎</td>
<td>对大巴黎地区实施道路拥挤收费进行模拟</td>
<td>2006</td>
<td>利用数学模型对交通拥挤收费进行分析</td>
<td>模拟结果显示出，在路段或者划片进行道路拥挤收费，社会福利增加不明显；基于出行时间的交通拥堵收费经济效果更大。</td>
<td>de Palma and Lindsey 2006</td>
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<td>英国</td>
<td>伦敦</td>
<td>伦敦内城交通拥挤收费</td>
<td>2003</td>
<td>对于高峰期进入伦敦内城的小汽车进行收费；项目实施前后开展大量基础研究</td>
<td>内城交通明显改善；公共交通乘客增加；项目在技术和政治上取得了成功，但对于项目实施的经济效益估算，学者尚有争议</td>
<td>Prud'homme and Bocaarejo 2005; Raux 2005; Schmocker et al 2006; Dix 2002; Quddus et al 2007</td>
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<td>爱丁堡</td>
<td>市中心区交通拥挤收费对购物者的影响研究</td>
<td>2005</td>
<td>研究市中心区交通拥挤收费后，购物者行为有何变化</td>
<td>购物者最关心的是停车问题；交通拥挤收费可能减少拥挤，改进公共交通服务</td>
<td>Hu and Saleh 2005</td>
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<td>新加坡</td>
<td>新加坡</td>
<td>对高峰期进入市中心的车辆收费</td>
<td>1976</td>
<td>采纳多项最新技术</td>
<td>城市道路交通拥挤始终处于低水平；大量出行使用公共交通</td>
<td>Barter 2005</td>
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Implications from Existing Studies/Cases

Benefits of congestion pricing:

• Economic efficiency and curb congestion
• Fewer real engineering projects, relocation of residents, and less relocation compensation
• “Revenue” for the tolling authority
• Speed/option for people who have emergent needs
• Adjustments of spatial, temporal, and modal distribution of trips, which could produce positive effects on energy use, resource allocation, environment, and public health
• Employment (minor, though) and political reform
Implications from Existing Studies/Cases

Disadvantages of congestion pricing:

• Public acceptance: personal benefits Vs social benefits (Recent studies of the failed NY case)
• How to allocate the “revenue” generated?
• New agencies established to implement congestion pricing: Their efficiency, costs, and relationships to governments
• It needs supporting/systematic policies and countermeasures to be efficient and effective
• It may require sophisticated technologies
• It may involve infringement of privacy
Policy Recommendations

• “Basic studies” prior to policy proposals or implementation
• Customized congestion pricing according to local conditions/situations
• Treat congestion pricing as a component of the comprehensive system of transport-land use-environment sustainability
• Innovation: e.g., congestion pricing is not just about passenger transport; credit-based “pricing”
• Economic incentives from central governments
• Public acceptance Vs. mathematic models
Comments and Questions?

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