CBA Exercise 3: London Congestion Charge

Why is Congestion a Problem?
During peak times (e.g. rush hour) roads become congested. Roads have limited capacity and at peak times increases in the use of the road towards this capacity by motorists results in congestion. Road users impact upon each other. Each additional road user creates more congestion, slowing the speed of travel for other road users. The decision to travel during peak time clearly has an external impact on other road users.

Congestion thus is a negative externality associated with excess consumption of a limited resource, namely roads. Externality effects of congestion include both economic costs and pollution. Transport accounts for 51% of carbon monoxide, and 45% of nitrogen oxide produced. This externality is not considered by the transport provider and user, who are only concerned with private costs, including fuel, wear and tear, tax etc. However, pollution imposes wider social costs including emissions and noise. The economic costs associated with congestion include, undermining competitiveness; reducing the attractiveness of an area to businesses and individuals; imposition of financial costs such as delays in deliveries, and; the imposition of time costs, such as slowing commutes and also leisure journeys. The Eddington Transport Study (2006) estimated the economic cost of congestion at up to £25bn per year by 2025. At the local level, Nottingham City Council estimated the current cost of congestion in Nottingham at up to £160m per year (Nottingham City Council, 2012). The major cause of congestion is that motorists only consider private costs, and do not take into account the wider social impact of their choice of travel method. This can be explored using the theory of urban traffic congestion (Griffiths and Wall, 2007).

The theory of urban traffic congestion is focused on the division between the private costs associated with car use, which are considered by motorists, and the broader social costs, which are not. The diagram in Figure 1 outlines the theory of urban traffic congestion. Figure 1 considers the flow of vehicles per hour (x-axis) against the cost of travel. Between 0 and flow F_1 the road is uncongested. The cost curve between these points is horizontal indicating that costs remain static for each motorist as additional cars join the road. During off-peak times demand is D_1. At this level of demand there is a flow of F_0 on the road and no congestion. Note that the demand curves are downward sloping, denoting that drivers will reduce their travel if cost increases.

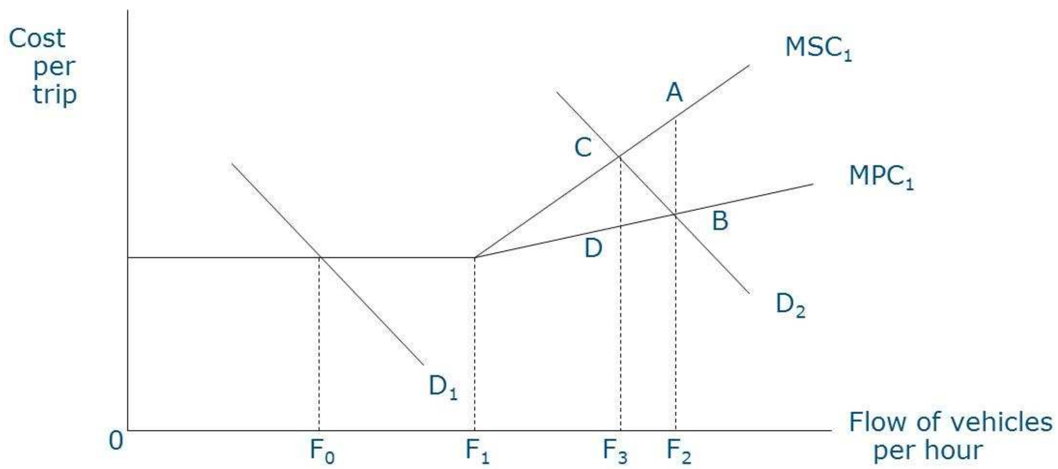

Figure 1: Theory of Urban Traffic Congestion (Source: Griffiths and Wall, 2007)

Beyond point F_1 congestion occurs, as additional road users begin to impact on each other. Social costs are incurred on other road users, including externalities: congestion, pollution (emissions and noise). This causes costs to increase. Motorists only consider marginal private costs (MPC), including the cost of fuel, opportunity cost of time etc. Costs diverge between MPC and marginal social cost (MSC). MSC includes increasing social cost of congestion. This is a problem as at peak time demand shifts outward to D_2. As motorists only consider their private costs this results in a traffic flow equal to F_2 (F_2B represents the private cost per trip to the motorist). The real or social cost of congestion, represented by AB, is not accounted for by the private motorist, resulting in allocative inefficiency.

One method of addressing this inefficiency is to apply a congestion charge. This will act to reduce demand (movement along D_2), so that motorists take account of the social impact of their choice to travel. A charge of CD, shown in Figure 1, results in a reduction in flow to F_3. Alternative policy options could include building roads (or extending existing roads), subsidising public transport, improving availability and reliability of public transport, increasing the cost of complement goods (e.g. fuel), limiting car use and/or ownership, and workplace parking levies (see Griffiths and Wall, 2007).

London Congestion Charge (LCC)

Congestion charging refers to the levying of fees for the use of particular road sections.This was first suggested as a solution to congestion in 1964 in the Ministry of Transport Smeed Report. The Transport Bill (2000) enabled authorities outside of London to introduce congestion charging schemes. On February 17th 2003 a congestion charge scheme was implemented in London. It has been suggested that "congestion charging in Central London is the most radical transport policy to have been proposed in the last 20 years and it represents a watershed in policy action" (Bannister, 2003, 259).

The congestion charge zone in London is approximately 22km^2. Between 7:30am and 6:30pm on week-days, vehicles entering this zone were initially charged £5 pounds per day. The charge has since risen to £8, and now £10 per day. The scheme was extended – the western extension – in February 2007. Figure 2 shows the original and western extension zones for the charge. The western extension has since been removed after a series of public consultations. Some 67% of respondents, including 86% of businesses, said they wanted the extended charge zone lifted. The western extension was removed in January 2011 (TfL, 2012).

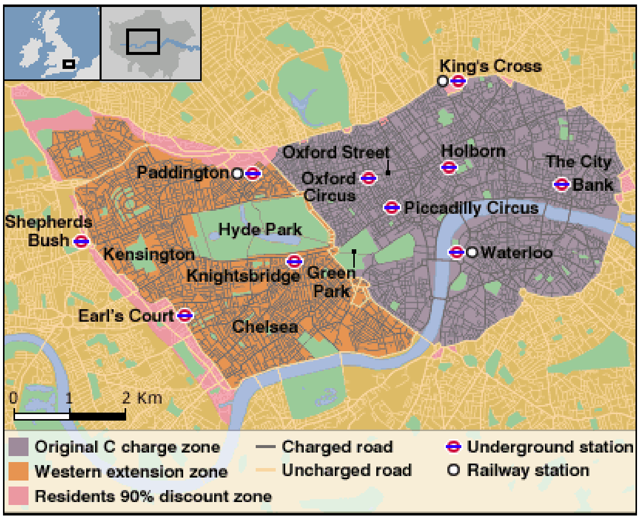

Figure 2: London Congestion Charge Zone

The London Congestion Charge is enforced using an automatic number plate recognition (ANPR) system. This involves a network of 700 video camera places around London scanning the rear number plates of vehicles. Payments can then be made by phone, internet, in shops, and in petrol stations. Information is matched against a database of motorists who have paid the charge. Failure to pay the charge before midnight results in a fine, amounting to £60 if paid within 14 days, £120 within 28 days, and £180 thereafter. The are a range of exemptions to the scheme including: gas and electric vehicles; disabled people; certain NHS staff, patients and emergency vehicles; vehicles with more than 9 seats; military vehicles; motorbikes, scooters, black cabs, licensed mini-cabs, and; residents of the congestion zone receive 90% discount.

Evidence on the impact of the LCC suggests the scheme has been successful in reducing congestion. This was measured as a 26% reduction in congestion within the charge zone by 2006 (TfL, 2006). Prud'homme and Bocarejo (2005) suggested that the scheme has been a success in reducing congestion, and has increased the availability and use of public transport. However, while substantial revenues are generated, high costs render the LCC less of a success financially. Meanwhile, evidence indicates congestion has once again increased in recent years (TfL, 2008).

Questions

1. Is congestion charging a demand or supply side instrument?

2. Explain how, by varying the charge for using roads dependent on the time of day or level of congestion, a socially optimal level of road use can be achieved.

3. Using web sources to research the LCC (including Transport for London), collect data on relevant financial costs and benefits associated with the scheme, including enforcement costs and revenues. What do these figures suggest about the relative success of the scheme?

4. Apart from financial costs and benefits, what other factors should be considered before implementing a congestion charge like that in London?

5. The congestion charge which was considered in Manchester was proposed as a variable charge. Using web sources to research the rejected Manchester scheme answer the following questions:
   (a) How would the variable charge have worked in the Manchester scheme?
   (b) Do you think the Manchester scheme would have been more successful than the London congestion charge? Explain your answer.

6. Apart from a congestion charge, what other instruments could be used to reduce congestion? Explain each option.

References

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