Road Rationing and Economic Gains
Assessing Delhi’s Odd–Even Formula

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The Delhi government’s move to allow only alternate use of cars with odd and even registration numbers from 1 January 2016 is a step in the right direction. However, even as such command and control measures will be difficult to sustain, the gains made from these measures will only wane over time. Long-term measures with strong economic incentives to ensure favourable outcomes are imperative for better quality of air and environment. This involves strengthening public transportation systems.

The recent decision of the Delhi government to permit private vehicles with odd or even registration numbers to run on alternate days has created a stir. The policy envisages reducing the number of vehicles on Delhi roads by about 50%, which is expected to reduce the level of air pollution in the city. The policy attracted appreciation from quite a few quarters on grounds of improvement in environmental quality. However, many looked at it with dismay as they did not have an inkling of how to manage commuting when the new policy comes into effect. The magnitude of the problem can be imagined if we visualise a scenario where about 42.4 lakh private vehicles will be banned from plying on road1 on any given day. People commuting in these vehicles needed to be accommodated in existing alternative modes of transport such as buses and the metro. The alternative to private vehicles, that is, the public transport system in Delhi, is inadequate, irregular, and overcrowded as usual.

Against this backdrop, this article examines the economic gains of the new policy decision and explores the possibility of attaining the policy objective through alternative means.

Private Vehicle Externalities

Undeniably, commuting in private vehicles provides autonomy to people and enhances their productivity by saving on travel time. In addition, it saves them from jostling with the crowd, provides a sense of security—more so at odd hours—and at times enhances their social status. Excessive number of vehicles, however, leads to congestion on roads as road space becomes a scarce commodity and adds costs to the economy (Small and Verhoef 2007). In such a situation, the positive aspects of owning a vehicle, considered a private virtue, turn out to be a social vice. Expectedly, the adverse effects are too many. First and foremost, it adds to air pollution and global warming. In the case of Delhi, the contribution of vehicles to air pollution is quite high. Certain studies estimate it to be up to 80% of the total (Gurjar et al 2004). Second, base noise levels in the city have exceeded acceptable standards. According to Banerjee et al (2008: 165), motor vehicles are the main source of urban noise emission:

The growing vehicle population gives rise to unrestrained noise pollution and associated health effects and can cause both short term as well as long term psychological and physiological disorders.

Third, delays due to traffic jams and uncertainty in reaching destination on time give rise to considerable stress in human beings with many instances of road rage being noticed in recent years. Fourth, seen from an economic perspective, congestion on roads results in loss of man-hours as travel time gets longer. Fifth, slow-moving traffic leads to higher fuel expenditure at the household level and larger imports of crude oil at the macro level, which has implications for valuable foreign exchange.

It is discernible that the use of a private vehicle could have a bearing on the costs borne by others, popularly known as “negative externalities” in economic terminology. While costs to the owner/user of the vehicle are limited to expenses on fuel and maintenance, costs to society are rise in health expenditure and economic wastages. This results in a divergence between social cost and private cost, the former being greater than the latter. Such a scenario gives rise to the classic “free-rider problem,” where the economic agents causing negative externalities do not bear the full cost of their action.

Policy Options

In order to deal with the free-rider problem, existing literature suggests three policy options, namely, moral suasion,
command and control (CAC), and economic incentives. Moral suasion usually means persuading people to carry out environment-friendly practices. Through several advertisements and awareness campaigns, the government aims at educating people. Campaign for use of public transport (Ab Bus Karein—let us take a bus) and creating awareness about carpooling are two prominent examples that fall into this category. A limitation of this approach is that it leaves decision-making to the good sense of individuals; no penalty is imposed for non-compliance. The CAC measures are direct regulation by the government concerning controlling vehicle speed, traffic movement, fuel use, emission levels and safety norms. Unlike moral suasion, CAC measures are coercive and invite penalties. The economic incentives pertain to the use of taxes and subsidies to attain the set objectives and leave decision-making to economic rationality of the person concerned.

For reduction of air pollution, several CAC-type measures—such as the use of lead-free fuel, conversion to compressed natural gas (CNG) and tightening of emission standards—have been introduced. In addition, penalties for violation of traffic rules have been hiked manifold. Road tax and parking charges, which are one-time payments at the time of registration of vehicles, have been increased to make private vehicles costlier and discourage people from opting for private vehicles. Studies show that certain parameters of air pollution witnessed a decline after conversion to CNG (Kathuria 2005) but the benefits have waned over the years. In a recent noting, the Delhi High Court observed that air pollution levels in Delhi have reached “alarming proportions” and it is akin to living in a “gas chamber.”

The signals given by the policy measures, however, have not been strong enough to discourage people from buying private vehicles. The number of vehicles per 1,000 people in Delhi has gone up to 487, implying approximately one vehicle for every two persons. Two factors appear to have more than offset the gains of the policy measures followed so far. First, Delhi has a very high per capita income—Rs 2,40,849 in 2014–15. Such purchasing power allows most households to buy a vehicle. Second, public transport systems are weak, thereby compelling people to fend for themselves. As per the Government of Delhi (2015), there are 88,27,431 vehicles as of March 2015. Of these, 64.36% are motorcycles and scooters, while 31.61% are cars and jeeps—together they make up 96%. The share of buses is a meagre 0.22%, while taxis and autorickshaws comprise nearly 1% each. It is worth mentioning that there is a consistent decline in the share of buses in Delhi over the years. During 1991–92 there were 20,201 buses which increased to 41,483 by 2000–01, and subsequently declined to 19,729 in 2014–15. The decline is not only for private buses; the fleet size of Delhi Transport Corporation (DTC) has also declined. The DTC has always been running on losses—to be funded by the state government—and the expansion of the corporation’s fleet has not been a priority. Introduction of metro rail has improved public transport systems to an extent. But the metro has become very crowded of late.

Odd–Even Logic

Over the years, the Delhi government has recognised the congestion problem emanating from an excess number of vehicles in the city. In order to ameliorate the problem, the government has emphasised expansion of roads, construction of flyovers, and streamlining traffic movements. The decision to prohibit private vehicles from running on alternate days marks a departure from the past as it implicitly recognises the presence of excess vehicles on Delhi’s roads and plans to cut down their numbers substantially.

The odd–even formula has been applied in several metropolitan cities around the world in various forms and its impact has been mixed. A regulation in 1989 by the city administration of Mexico banned each vehicle from driving on a specific day of the week. While, reviewing the impact of the policy, Eskeland and Feyzioglu (1995: 1) make the following observations:

The regulation has been both popular and controversial: some feel it is a reasonable concession from each car owner—aimed to alleviate congestion and pollution problems. Others have felt that it is inefficient and unfair; inefficient in the way most rationing devices are inefficient, unfair because it will be particularly costly to some—easily avoided or accommodated by others. Finally, some feel that the regulation may be so inefficient that it is counterproductive—increasing the levels of congestion and pollution—because some have purchased additional cars to circumvent the ban, and end up increasing their driving. The authors …find evidence in support of the latter view.

The policy of banning odd- and even-numbered vehicles on specific days has prompted households in Beijing to go for a second car with a different registration number so that they can drive the cars on alternate days. According to Hao et al (2011), about 30% car sales in Beijing is to satisfy the need for second car with the intention of avoiding the vehicle use regulations.

The odd–even formula has the advantage of reducing the number of vehicles in a city temporarily. The immediate effect of regulating odd–even vehicles in Beijing was reduction in vehicle flow by 21% and increase in average fleet speed by 27% (Hao et al 2011). The rebound effect of increase in vehicle ownership, however, partly offsets the policy’s effects on reduction of total vehicle use.

The odd–even formula is a short-term measure to reduce the number of vehicles immediately. Seen from this perspective, the decision of the Delhi government to give it a trial run for 15 days (1–15 January) is a welcome decision. Some of the nagging issues in this venture, however, are: (i) the large number of vehicles entering Delhi from neighbouring areas, (ii) concessions given to emergency situations for Delhi households, (iii) funding of additional cost to implement the policy, and (iv) perception of alienation among people. Given its coercive nature, it does not give much freedom to people and could be counterproductive. Thus the long-term solution to the problem has to be different and based on economic incentives.

Internalising Externalities

The social cost being higher than private cost in the case of private vehicles calls for internalising externalities. This could
be achieved by a two-pronged strategy of (i) imposition of congestion tax on private vehicles, and (ii) subsidy on public transport. Such a strategy will alter the cost-benefit scenarios of private and public vehicles and provide economic incentives to people to alter their mode of transport. An important advantage of economic incentives over CAAC measures is the “double dividend”—congestion tax will reduce the number of vehicles and simultaneously generate revenues which can be used for strengthening public transport and smooth flow of vehicles. It could be a win-win situation for stakeholders. The government will gain additional revenue by means of congestion tax which it can utilise for subsidy on public transport. Private vehicle users will gain by saving on time and fuel cost, as fleet speed will improve with reduction in the number of vehicles. The general public will gain through reduction in health cost as air pollution levels decline.

The tax imposed on private vehicles has to be calibrated in such a manner that it makes people perceive that the private cost of using a private vehicle is high enough and it is profitable to use public transport. The imposition of taxes on private vehicles calls for a bold decision by the government, but it could be worked into a populist measure since the move would offer two advantages to the government, namely, (i) it is progressive in nature in the sense that poorer households are exempted automatically, and (ii) public transport is made cheaper, adequate, reliable and safe. The measure may, in fact, provide adequate funds to the government to integrate bus, metro and local railway services.

The imposition of congestion tax on private vehicles provides justification for a similar tax on private vehicles entering Delhi from neighbouring areas. The green tax imposed on commercial vehicles entering Delhi could be seen as a precursor of such a tax.

A tentative calculation implying that Delhi is sitting on a goldmine can be seen from the following. If we take a conservative estimate of congestion tax of Rs 1,000 per month for cars and jeeps, and Rs 500 per month for motorcycles and scooters, it would generate a revenue of about Rs 563.12 crore per month or Rs 6,757.44 crore per annum. If we add the tax collected from vehicles entering Delhi from adjoining areas, this figure will go up substantially. One can imagine to what extent public transport can be improved with such amounts of funding, and commitment to a cleaner environment be met.

NOTES
1. The total number of vehicles in Delhi as of March 2015 is 88.3 lakh of which 96% are private vehicles (Government of Delhi 2015). Fifty percent of these private vehicles amount to 42.4 lakh.
2. The Central Pollution Control Board (CPCB) has specified norms for noise level for four different categories, namely, industrial, commercial, residential and silence zones. For residential areas acceptable standard is 55 decibels during daytime and 45 decibels during night.
3. According to Centre for Science and Environment (CSE), noise level in Delhi is in excess of 100 decibels in many areas. The adverse health effects of high noise pollution could be hearing loss, sleep disorder, heart ailments, and general annoyance (CSE 2011).

REFERENCES

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