

Ask: NUS Economists

# Why Govt should use subsidies to encourage more to take public transport

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For *The Straits Times*

**Q** Are public transport subsidies in Singapore economically justifiable?

**A** Economists generally support public transport subsidies for three reasons: supply-side economies of scale, demand-side economies of scale, and the decrease in negative externalities from less car use. Our recent research studied how important these factors are in Singapore's transport system.

Economies of scale refer to production processes in which average cost falls as the quantity produced rises. This is true of public transport because it has very high fixed costs of operations.

These fixed costs are shared among more people as usage of the system rises, thus cost per person falls. Subsidies encourage more travel, thus lowering the average operation costs per person.

Demand-side economies of scale characterise public transport because as more people use it, the operator can provide more frequent service. This lowers wait times, which is a non-monetary cost incurred by users of the system.

This encourages more people to

use public transport, potentially setting off a virtuous circle of improvements. With more passengers, the operator can further increase service frequencies, once again lowering time costs to users and so on and so forth. Transport economists refer to this effect as the Mohring effect, after transportation economist Herbert Mohring.

Public transport subsidies also encourage people to leave their cars, which reduces negative externalities from car use – that is, costs borne by a party not directly involved in a decision. Cars cause congestion, air pollution and more accidents than public transport vehicles. Thus, incentivising people away from cars to public transport decreases the amount of these externalities produced.

In work with former NUS undergraduate economics students Andy Ho and Luo Siwei, I estimated the extent to which each of the aforementioned reasons justifies public transport subsidies in Singapore for four scenarios: peak and off-peak rail services, and peak and off-peak bus services.

We used data on public transit operations, revenue and costs and private vehicle usage from 2015 to calibrate a model that accounted for societal benefits and costs from increased subsidies for that year, aggregated to the city level.



For a relatively high-density city like Singapore, the writer says, subsidies are justified mainly because it is more cost-efficient to transport people by train and bus than by private vehicles. ST PHOTO: JOYCE FANG

For example, an increase in transit subsidies increases supply- and demand-side economies of scale, lowers auto externalities, but also increases income taxes and lowers congestion pricing revenue – both of which are the sources to finance transit subsidies. We found that in the year 2015, optimal public transit subsidies in Singapore should be between 16 per cent and 100 per cent of costs.

Comparing our results with a similar study by economists Ian Parry of the International Monetary Fund and Kenneth Small of the University of California, Irvine, for the cities of London, Washington and Los Angeles in 2002, they found that public transport subsidies are justifiable at very high levels – in most cases, about 80 per cent.

Relative to these three cities, in Singapore, generally, lower subsidies are warranted, particularly during peak travel periods such as weekday mornings

and evenings. We found that supply-side economies of scale are the primary justification for subsidies in Singapore. This means that trains and buses are cost-efficient modes of transport, and the Government should use subsidies to encourage such efficiency.

In contrast, Mr Parry and Professor Small found that for their three cities, some combination of the Mohring effect and auto externalities explains a major part of the optimal subsidy.

Peak rail service in Singapore serves as a good illustration of why our case for subsidies differs from those of the three other cities.

In Singapore, auto externalities are a smaller justification for subsidising public transit because Singapore already implements strong anti-car-use measures such as the vehicle quota system and Electronic Road Pricing. In fact, that auto externalities are a justification

at all suggests that existing anti-car-use measures may not be strong enough.

Also, the Mohring effect provides no justification for the subsidising of peak rail services in Singapore. The MRT system already runs very frequently during peak hours. Lowering public transport fares from existing levels will not result in higher train frequencies but will increase train crowding.

The Mohring effect does, however, justify subsidies in Singapore during off-peak hours.

In 2015, off-peak trains and buses ran relatively infrequently with low loads. Such infrequent service meant users incurred long wait times, discouraging off-peak travel. We predict large welfare gains from making off-peak service more frequent. These findings mirror those of Mr Parry and Prof Small.

In 2015, government subsidies were between 4 per cent and 42 per cent of costs, which are generally

lower than our estimated optimal levels. But under the Government's Bus Service Enhancement Programme, which it completed in 2017, the Government invested in lowering maximum headways from 30 minutes to 15 minutes. Our model found that this improved welfare.

There are a few caveats to our research. We ignored the opportunity cost of public transport subsidies in terms of other public services, such as better healthcare or education. Should such services be more or less pressing, the optimal level of public transit subsidies could be lower or higher. We also considered only operation costs; we did not consider how fixed infrastructure like stations and tracks should be financed, or how network expansion affected consumer welfare. Finally, we assumed that public transport operators are cost-efficient, a contestable assumption since the public transport industry is not perfectly competitive.

For these reasons, our results should not be used to infer a finely tuned set of optimised transit prices. Nonetheless, our findings still highlight the importance of subsidies, the source of justification for subsidies, and differences relative to other cities.

Our study is consistent with the findings in other cities – public transport subsidies are justifiable at high levels, though generally lower than in other cities. For a relatively high-density city like Singapore, subsidies are justified mainly because it is more cost-efficient to transport people by train and bus than by private vehicles.

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