Improvement of Public Transport Services and Raising the Cost of Travel by Private Vehicle as Tools For Dealing with Road Congestion

- As a result of the increase in the standard of living in parallel with the growth of employment and dispersal of the population, the growth rate of private vehicular travel in the past two decades has been rapid—about 4 percent per year. Roughly 65 percent of workers travel to their jobs by private vehicle, and in the past five years, their percentage has increased by about one percentage point per year.
- The COVID-19 crisis may lead to some decline in the volume of travel due to increased work from home, but it is likely that following a one-off adjustment, the growth rate of private vehicular use will remain rapid.
- The way to encourage a transition from traveling to work by private vehicle to traveling to work by public transit is to improve public transit services and make traveling by private vehicle more expensive. Improving public transit services includes shortening overall travel time, increasing reliability, and improving travel convenience.
- In order to improve public transit infrastructure—designated public transit routes, preference at traffic lights, underground rail, convenient parking (for vehicles and bicycles) at central bus and train stations, and more—a massive increase in investment is needed.
- The ratio between the cost of traveling to work by private vehicle and the cost of travel by public transport is currently slightly higher than it was 20 years ago, but taking into account the increase in per capita income, this gap has become less significant. The gap is particularly low for individuals who in any case own a private vehicle and do not bear the cost of parking at their place of work.
- As current technological changes make it possible to collect tolls based on road usage and travel time without interrupting traffic, this seems to be the proper course of action.

Israel's roads are growing increasingly crowded, and a significant change is needed in order for the transport situation in all its aspects not to worsen. As a result of the increase in the standard of living, in parallel with the increase in employment and the dispersal of the population, the growth rate of travel by private vehicle has been rapid in the past 2 decades—about 4 percent per year (the growth rate in the past decade is even higher—4.6 percent per year). The rapid growth rate of private-vehicle kilometers traveled reflects, in part, the high growth rate of the population in Israel, as well as the fact that the number of vehicles per thousand adults is relatively low, and is still not close to saturation.[1] Therefore, looking forward, the transportation problem that is afflicting all advanced economies is more acute in Israel's metropolitan areas.[2]

[1] See, for instance, Figure 3.5 in *Research Department Special Report: Raising the Standard of Living in Israel by Increasing Labor Productivity*, August 2019.

[2] For a discussion of the factors, and particularly the policy factors, that have contributed to the increase in private vehicle travel in Israel, see "Private Transportation in Israel: An Analysis of Developments in the Past Two Decades", *Selected Research and Policy Analysis Notes*, Bank of Israel, February 2019.

Currently, about 65 percent of workers travel to work in private vehicles. In the past five years, the increase in this rate has been about one percentage point per year (Figures 1 and 2).[3] The rapid increase in private-vehicle kilometers traveled increases the load on transport infrastructure, and the volume of investment in infrastructure is not matching the increase in use (Figure 3).

The COVID-19 crisis led to a reduction in travel to work, but at the same time, it increased the rate of those traveling to work by private vehicle, at least temporarily. It is difficult to assess the extent to which the changes in travel-to-work patterns are permanent. However, we must assume that without encouraging the use of public transit, the growth rate of private-vehicle kilometers traveled to work will return to its previous pace once the new equilibrium is found.

The way to encourage a transition from traveling to work by private vehicle to traveling to work by public transit is a combination of improved public transit service and making private vehicle travel more expensive. Improving service includes shortening overall travel time, increasing reliability, and improving travel convenience. Together, these will help public transit offer a good alternative to traveling by private vehicle. In this context, Suhoy and Sofer (2019) showed that when there is an alternative of commuting by rail, a form of travel that is considered more pleasant and faster than travel by bus, the rate of those with access to a private vehicle who travel to work by train is similar to the rate among those who do not have access to a private vehicle.[4] Without a change in policy that includes the diversion of some private vehicle travelers to use of public transit, the roads in crowded areas will become less efficient during more hours of the day, and the negative impact to well-being will intensify.

Potential ways to shorten overall travel time by public transit include providing right-of-ways for public transit (public transit lanes—PTL), reducing wait times at stations, and improving service and infrastructure for "last kilometer" travel.[5] Data on travel on regular bus routes indicate an increase in service frequency over the past 15 years (Figure 4). The increase in travel by train also apparently reflects improved service (Figure 5). However, the continued expansion of private vehicle travel at the expense of travel by public transit, particularly for those living in Gush Dan, which is a congested area with the potential for efficient public transit, shows that more must be done in order to generate a trend of transition from private vehicle travel to travel by public transit.[6]

[3] These figures are from prior to the COVID-19 crisis.

[4] For a discussion of the marginal impact of the frequency of service and the duration of travel to work by public transit on the choice of how to get to work, see T. Suhoy and Y. Sofer (2019), "Getting to Work in Israel: Locality and Individual Effects", Bank of Israel Research Department, Discussion Papers Series 2019.02.

[5] "The Last Kilometer" is the segment connecting the point of departure to the nearest station serving the public transit vehicle traveling to the destination, and the segment between the station closest to the destination and the destination itself. A long travel duration in "the Last Kilometer" may have a dire effect on the worthwhileness of using public transit.

[6] For more on the relatively low choice of using public transit in Gush Dan, see Box 2.1 of the Bank of Israel *Annual Report* for 2017.

In order to improve public transit infrastructure—designated PTLs, preference at traffic lights, an underground railway (with its own level), convenient parking (for vehicles and bicycles) at central bus and train stations, and more—a massive increase in investment is necessary. In recent years, there has been some increase in investment in transport infrastructure, particularly in rail infrastructure (Figure 6), but this is a moderate increase that is not sufficient to provide for the rapid increase in demand.

The Metro project in Gush Dan, which is comprised of three lines that will connect residential areas in Gush Dan with employment centers and will integrate with the Tel Aviv light rail system, is currently in planning, and will be a significant anchor for investment in transit infrastructure in the area. The overall estimated cost of the project is about NIS 150 billion, and it is expected to be spread out over about 15 years. This represents an annual investment of more than 0.5 percent of GDP. Synchronizing the metro lines with the other components of the public transit network, and the location of the stations, are important to the success of the project. It is therefore proper that maximum attention be paid to these elements. From this standpoint, it is preferable to vest authority in a metropolitan authority (or similar body) that will consolidate the needs of all residents of the region and streamline the decision-making process that currently depends to a great extent on the agreement of the localities through which the metro is planned to pass.

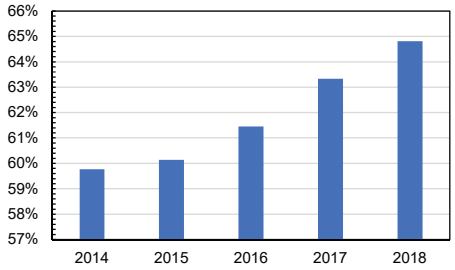
Financing for the project is a separate question, but it is relevant for the decision-making regarding the project. Since this is an expensive undertaking that has positive externalities, it is neither possible nor desirable to finance its construction only through its users (in the form of cost of travel). The distribution of the burden is a fiscal decision, and requires an all-encompassing view of government investments in infrastructure, including a comprehensive determination of how progressively the government wishes to finance the project.[7] One of the recommended options is to require businesses in Gush Dan and residents who are expected to benefit from the project to finance part of it. This was the method used, for instance, when the new Crossrail line was built in London. A significant part of its construction was financed through a designated tax on businesses in London, and by the municipality and Transport for London.[8]

When it comes to investment in road infrastructure for public transit, it is difficult to quantify the investment in designated public transit lanes (PTLs), since at the investment stage, there is no need to distinguish between a PTL and a lane intended for general travel. The division of travel lanes by designation is possible on the existing

[7] Given a fixed investment budget, investment in one place comes at the expense of investment in another place. As such, the government must determine an order of priorities for investment, relating in part to geography as well. If the investment decision increases the investment budget, the government must decide how it is to be financed. The distribution of the financing burden between the citizens is also an important government decision.

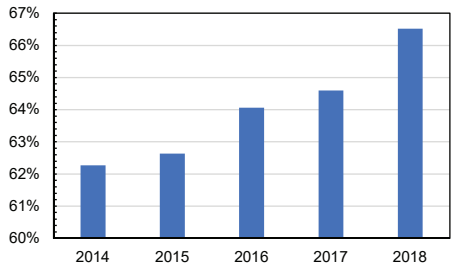
[8] In countries with federal systems of government, it is common that infrastructure projects serving residents are financed to a large extent through taxes on local residents. In Israel, where the central government is concentrated and metro lines are expected to pass through numerous local authority areas, the distribution of the financing burden is managed by the central government.

Figure 1: Those travelling to work by private vehicle*, 2014–2018 (percentage, nationwide)



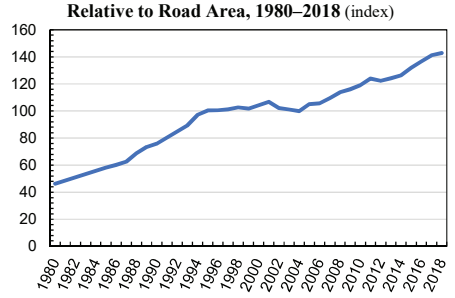
* Including commercial vehicles and motorcycles.
SOURCE: Based on Central Bureau of Statistics Social Survey.

Figure 2: Those travelling to work by private vehicle*, 2014–2018 (percentage, Gush Dan)



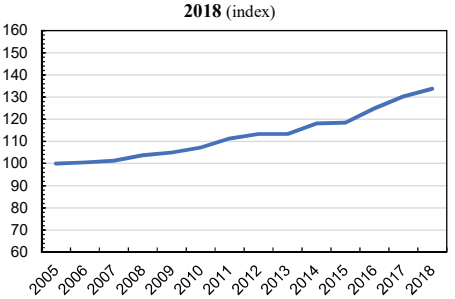
* Including commercial vehicles and motorcycles.
SOURCE: Based on Central Bureau of Statistics Social Survey.

Figure 3: Private-Vehicle Kilometers Traveled Relative to Road Area, 1980–2018 (index)



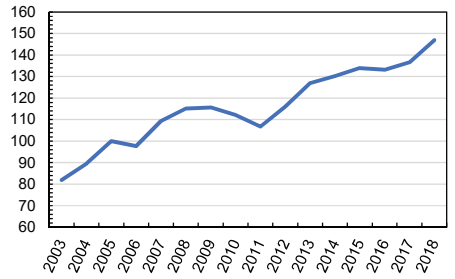
SOURCE: Based on Central Bureau of Statistics data.

Figure 4: Bus Kilometers Traveled Per Capita, 2005–2018 (index)



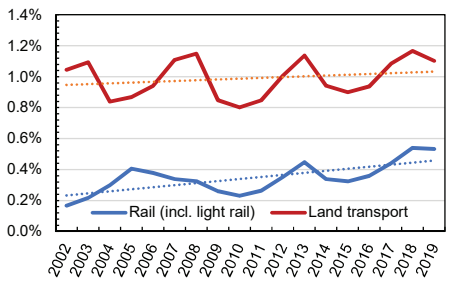
SOURCE: Based on Central Bureau of Statistics data.

Figure 5: Train Kilometers Traveled Per Capita, 2005–2018 (Index)



SOURCE: Based on Central Bureau of Statistics data.

Figure 6: Investment in Land Transport Infrastructure as a Share of GDP, 2002–2019



SOURCE: Based on Central Bureau of Statistics data.

road network, as was done in setting aside the 2+ lane on the Coastal Highway. Converting existing lanes that are open to general traffic to PTLs can reduce the gap in travel time between public transit and private vehicle travel through a combination of shortening the public transit travel time and increasing the private vehicle travel time.[9]

The other tool for balancing demand between public transit and private vehicle travel is monetary. It involves widening the gap between the cost of traveling by private vehicle and the cost of public transit. It is important to use both tools together—shortening time and improving quality of travel by public transit and widening the

[9] Prohibiting the travel of taxis in crowded PTLs may also ease the congestion in those lanes.

price gap—because the use of just one tool will make it necessary to set a very high price for travel by private vehicle or drastically slowing such travel (and negatively impacting the utilization of road infrastructure).

The ratio between the cost of traveling to work by private vehicle and the cost of travel by public transit is currently slightly more than it was 20 years ago, but taking into account the increase in per capita income, we can say that the gap has become significantly smaller. It becomes especially narrow when individuals own a private vehicle for other reasons and don't bear the cost of parking at their place of work. Under varying assumptions, we estimate that the average daily gap in the variable costs between travel by private vehicle and travel by bus is between 10 and 15 shekels per day.[10]

Private vehicle owners currently pay a number of taxes: (1) purchase tax, import tax, and VAT; (2) licensing fee; and (3) excise on fuel (gasoline and diesel) based on their vehicle's fuel consumption. Purchase tax, import tax, and VAT (excluding VAT on fuel), and the licensing fee are paid regardless of the vehicle's use. The tax's dependency on the value of the vehicle, its pollution level, its safety accessories, and its country of manufacture greatly reduces the link between the total tax payment and the owner's use of infrastructure, thereby lowering the efficiency of taxes as a tool for reducing the use of private vehicles. The same is true of the licensing fee, which is a fixed amount irrespective of use. The tax on fuel is, to a large extent, a usage tax, except that it does not take into account the time of day or area of the country in which the road is being used, and it depends on the vehicle's fuel consumption. With the entry of hybrid and electric vehicles into the market, the variance between the fuel consumption of different vehicles has increased greatly, and as the share of such vehicles increases, the excise tax per kilometer driven declines. Thus, fuel excise tax is having less of an effect on the choice to travel by private vehicle as opposed to travel by public transit.

At the same time, there are technological changes that now make it possible to collect tolls based on road usage and travel time without interrupting traffic. As such, it seems that charging for the use of a public resource while relating to the externalities of travel by private vehicle (Pigovian tax) seems more proper than in the past. Vehicle taxation, which does not depend on use, can be lowered in parallel, thereby streamlining taxation in the industry.

The cost of traveling to work by private vehicle can be increased by charging a congestion fee at the entrance to metropolitan areas. Such fees are already being charged in a number of main cities around the world, including London, Singapore,

[10] The variable costs per private-vehicle kilometer traveled are currently less than one shekel per kilometer (based on data from "Kol Natun", variable costs per kilometer for a Group 3 vehicle), and the average distance traveled to work among all workers is about 12 km (assuming 5 km travel for individuals working in their residential localities, and Social Survey Data showing that individuals working outside their residential localities travel an average of about 19 km to work). A trip of 24 km by private vehicle (12 km each direction) costs a little more than NIS 20 per day, meaning less than NIS 500 per month, while a monthly pass for travel by public transit generally costs between NIS 200 and NIS 250 per month.

Milan, and Stockholm. The advantage of these fees is that they impose on travelers during peak hours and in congested areas a cost that takes into account the external effects of those entering the city by private vehicle. However, the congestion fees are imposed only on those entering a congested area, and not on all travelers in the area, and the payment level does not depend on the volume of travel within the congested area. These lower the efficiency of the fees.[11] We emphasize that in order for the congestion fees to be more effective, it is very important that they be used in parallel to fund improvements in public transit. The success of congestion fees also depends on the construction of "Park-and-Ride" lots next to the public transit terminals at the entrances to the cities, such as the parking lot at Shappirim interchange that is currently being expanded in view of the increasing demand for its services. These will help shorten public transit travel time to work, and will increase the substitution between travel by private vehicle and travel by public transit. The higher this substitution is, the greater the elasticity of demand (relative to price) for private vehicle travel is, and the more significant the effect of the congestion fee or any other tax on private vehicle travel becomes.

Increasing the cost of parking is another means of encouraging travel by public transit. Many workers currently benefit from free parking, which is financed by their place of work. This benefit is tax-free. In contrast, the employer's payment for travel by public transit is taxable. Taxation of the parking benefit together with exempting the employer's payment for actual use of public transit will cancel this tax system support for private vehicle travel. Encouraging employers to give their employees a monetary benefit in exchange for giving up the use of parking will provide further support for public transit.[12] Another factor encouraging people to come to work by private vehicle is the current provision of low-cost roadside parking. The price difference between roadside parking and parking in a designated lot in congested areas creates extra travel in the search for a parking spot. This is another reason to correct the distortion inherent in the low price of roadside parking both for residents of the city and for commuters. Therefore, it is proposed to cancel the maximum payment under the law for road side parking, and to allow local authorities to raise the prices.

[11] For a discussion of the efficiency of various kinds of congestion fees (transition between rings, travel within an area defined as congested, travel by kilometer, and more), and their potential to reduce congestion, see OECD (2019), *Assessing Incentives to Reduce Congestion in Israel*.

[12] Many studies have found that subsidized parking has a significant effect on the choice of how to travel to work. For a summary of studies on this topic, see, for instance, R. W. Willson and D. C. Shoup (1990), "Parking Subsidies and Travel Choices: Assessing the Evidence", *Transportation*, 17(2): 141–157. For a more recent study on the effect of granting a monetary exchange for giving up parking in order to reduce private vehicle travel in Germany, see, for instance, "C. Evangelinos et al. (2018), "Pricing Workplace Parking via Cash-Out: Effects on Modal Choice and Implications for Transport Policy", *Transportation Research Part A:* Policy and Practice, 113: pp. 369–380.