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Promoting Public Transport with Modern Pricing Schemes

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One-Sentence Summary

Flat-rate ticketing should be replaced by dynamically priced, affordable fares for public transport, coupled with dynamic road pricing.

Summary

Accelerated by surging inflation, policymakers in many countries have introduced cheap, flat-rate access to public transport. Such measures serve two aims: to cushion the social repercussions of inflation by reducing energy expenses, and to promote more sustainable mobility. Spain, for instance, has introduced a program that allows commuters free access to public transport for regular trips. Austria offers a nationwide ticket for 1,095 Euros per year and a regional ticket for the city of Vienna for 365 Euros per year. Luxembourg, Malta, and some cities in Europe and the United States have already introduced free public transport. This global trend towards flat fares or free public transport is based on arguments such as simplification, uniformity, and ease-of-control.

Germany recently followed suit with an unprecedented reduction in public transport fares. From June to August 2022, the German government granted nationwide access to public transport for just 9 Euros per month. Germany's experience with the so-called 9-Euro Ticket provides new insights on the impact of cheap flat-rate access to public transport. Based on our evaluation of the 9-Euro Ticket, experiences with similar programs in other European cities, and insights from economic theory, we call for a cheap and dynamic public fare system that prices peak times higher than off-peak times to avoid overcrowding during peak hours. To finance a subsidized public transport system, we propose dynamic road pricing. This would reduce the externalities of car usage by levying a per-kilometer fee that varies by congestion levels of the respective roads.

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1. The experience with the 9-Euro Ticket in Germany

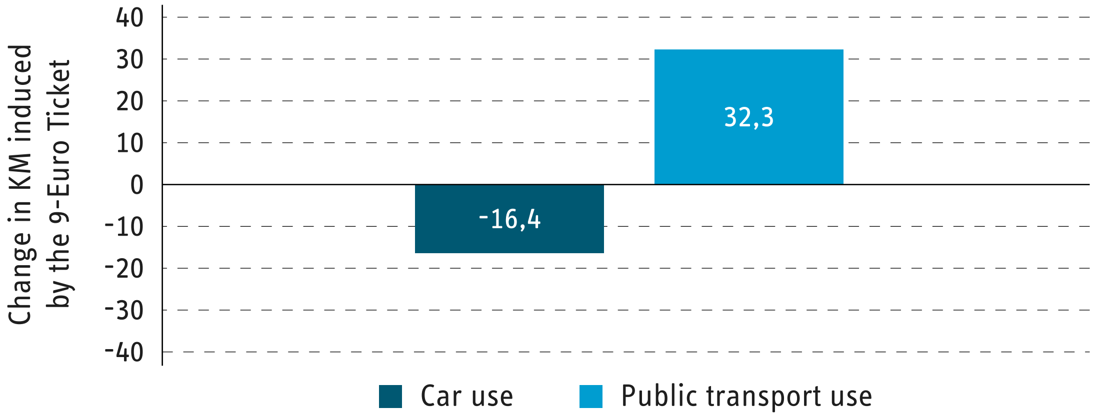
Leveraging two large-scale surveys on mobility behavior in Germany before and after the introduction of the 9-Euro Ticket, our analysis reveals decreases in car use by 16 kilometers per week (see Figure 1). Considering average car use of about 151 kilometers (prior to the policy), this implies a reduction of about 10 percent. Extrapolating this finding to the total saving of greenhouse gases in Germany, it results in a total saving of 886,000 tons of CO_2 by the policy.[1]

While this is a considerable carbon reduction, there are some major drawbacks of the policy from a cost-benefit perspective. First, overall expenditures of the policy amount to € 2.5 billion, which indicates short-run abatement costs of € 2,800 per ton of CO_2 (see Section 2 of the supplementary material (SM) for details). Compared to alternative policies to mitigate carbon emissions, this number is exceptionally high and leads to questions about the cost-effectiveness of the policy (see Section 2.1 of the SM for details). Second, the 9-Euro Ticket induced an increase of public transport use by 32 kilometers, nearly doubling the decline in driving (Figure 1). This high utilization led to overcrowding on public transport at peak times, reducing the quality of the service (see Hille & Gather 2022, Thoms & Nürnberger 2022, and our survey results in Section 3 of the SM). Overcrowding could possibly require costly capacity expansions in the long run. Yet, the 9-Euro ticket enjoyed great popularity, not least because it provided an equal opportunity for mobility irrespective of income.[2]

1 For further details on the survey, the analysis, and underlying assumptions, see Section 1 of the supplementary material.

2 See the discussion of transportation poverty in Lucas, Mattioli, Verlinghieri & Guzman (2016), the evidence on increased affordability of mobility due to the 9-Euro Ticket in Hille & Gather (2022), and our analysis on the monetary savings due to the 9-Euro Ticket in different income groups in Section 4 of the SM.

Figure 1: Effects of the 9-Euro Ticket on car and public transport use (see Section 1 of the SM for details)



Source: RWI – Leibniz Institute for Economic Research.

2. Free or flat-rate public transport – Similar experiences from different settings

Our finding of modest car use reductions through the 9-Euro Ticket is consistent with previous experience of offering free public transport. Between 1998 and 2002, for instance, the German city of Templin provided free public transport. While its use increased by 750% after the free service began, only 10-20% of public transport users reported a shift away from car trips (Storchmann 2001). The Belgian city of Hasselt introduced free public transport in 1996. After its introduction, 37% of all public transport users were first-time users. Of these, 43% substituted car trips for public transport trips, while the remaining switchers were cyclists and pedestrians (van Goeverden, Rietveld, Koelemeijer & Peeters 2006). In the case of the Estonian capital Tallinn, the introduction of free public transport in 2013 was accompanied by a 14% increase in public transport trips. However, only 10% of this increase represents a substitution of car trips, while 40% of trips were previously made on foot (Cats, Susilo & Reimal 2017).

3. Our policy recommendations

While Germany introduced a permanent successor flat-rate ticket – the Deutschlandticket – for 49 euros per month in May 2023, we call for an alternative approach that also contrasts with the current discussion about implementing a flat-rate ticket in France and a potential pan-European ticket. Based on previous evidence, insights from economic theory and recent technological advancements, we propose a subsidized dynamic public transport ticket that prices peak times higher than off-peak times and that is linked to and (at least partly) financed by dynamic road pricing. By this means, we pursue environmental goals while reducing crowded public transport.

Specifically, the application of a dynamic road pricing scheme internalizes the external costs of car use (Cramton, Geddes & Ockenfels 2018, RWI & Stiftung Mercator 2019), thereby directly addressing congestion problems on the road. A higher relative price of car usage induces a shift to public transport (or other sustainable transport modes such as cycling or walking). In addition, road pricing generates revenues that can be used to subsidize public transport and improve its attractiveness.

The public transport subsidy should at least in part be financed through dynamic road pricing to further reduce the negative externalities of car use and to provide a stronger incentive to switch from car to public transport.

Moreover, while a flat rate ticket exacerbates overcrowding of public transit, dynamic fares alleviate this problem by shifting public transport usage from peak to off-peak times (Glaister 1974, De Borger & Wouters 1998). Fares are dynamic in the sense that they may change from hour to hour, or even from bus to bus or train to train, depending on demand. Importantly, ticket prices can still be lower than the cost of operating vehicles (see Glaister 1974, Parry & Small 2009). During off-peak times, they can be reduced even further. This allows cheap travel for low-income individuals, which in turn fosters social cohesion. Furthermore, the revenues from dynamic public transport and road pricing can be used to reduce capacity constraints and thus the number of peak times.

4. Potential concerns and skepticism

The idea of dynamic pricing was proposed in the 1960s (e.g. Vickrey 1963, Glaister 1974) and was regarded as an appealing theoretical idea but infeasible in practice. But due to technical progress and digitalization, feasibility is no longer a problem. Cities such as Singapore and Stockholm have already implemented electronic road charging systems (Cramton, Geddes & Ockenfels 2018, Börjesson & Kristoffersson 2018). Likewise, dynamic pricing for public transport has been successfully implemented in the aviation and long-distance train sector, as well as in mobility services like Uber and Lyft.

If low-income individuals are shifted away from peak hours to off-peak hours due to dynamic pricing of public transport, one might be concerned about social exclusion. However, dynamic pricing can grant low-income earners even cheaper access to public transport compared to flat-rate options. In addition, equity concerns could be further mitigated by a compensating lump-sum transfer to low-income earners that is financed by the dynamic road pricing scheme.

Politicians might nevertheless be worried about regional equity concerns that arise when car-dependent individuals in rural areas must pay more for mobility than people in cities. However, road pricing is specifically designed for areas with a lot of traffic, i.e. cities, while leaving rural areas unaffected due to lower congestion. Consequently, dynamic road prices would be low or even zero in rural areas. This is crucial from both an equity- and an efficiency perspective: While aiming to reduce congestion on roads, our proposal tackles areas with the highest marginal return in terms of "environmental" savings (Anderson 2014). To provide rural residents with access to cities via public transport, it may be useful to further develop park and ride facilities or other infrastructure.

5. What to do next?

A subsidized reduction of ticket prices is justified, but instead of a flat rate fare, dynamic pricing should be adopted to prevent overcrowding of public transport at peak times. At the same time, the public transport subsidy should at least in part be financed through dynamic road pricing to further reduce the negative externalities of car use and to provide a stronger incentive to switch from car to public transport.

This is a clear call for policy makers to start implementation, but research could still accompany this process. Important questions arise about how high the prices should be in the public transport and road pricing schemes. Thus, studies to estimate the magnitude of the external costs of driving, following Parry & Small (2009), in many different regions could be especially fruitful. Accompanying evaluations could also examine the acceptance of these measures before, during and after a certain period of implementation. A consistent application of our proposed policy has the potential to lead to significantly lower local and global emissions, less congestion, fewer accidents, quieter cities, and ultimately a better quality of life.

6. Literature

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