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Road Congestion Pricing with A Public Transport Cashback Mechanism

Traffic jams are a major problem in cities leading to wasted time, air pollution, reduced accessibility, and, in turn, lower economic activity. Transport economists widely agree that charging drivers fees for using busy roads during rush hours (congestion pricing) is the best answer to road congestion problems. However, such a policy is rarely used, mostly because people see it as unfair in how it affects different income groups. We propose an innovative personalized public transport cashback mechanism to make congestion pricing more acceptable. Recent surveys in Riga and Vienna show that people are more willing to support the introduction of congestion pricing when it includes a cashback component.

Road Congestion Pricing and Its Discontent

Road Congestion Pricing

Traffic jams happen when too many cars at the same place and at the same time use a road of a limited capacity. Building new roads or lanes is expensive, especially in cities, and it only provides short- and medium-term traffic improvements, with little impact on congestion in the long term (Ossokina et al., 2023; Hymel, 2019). Duranton and Turner (2011) show that when major roads are expanded, more people start using them and, over time, congestion returns to the same level as before. Meanwhile, a travel mode shift from cars to public transport and bicycles also requires investments and is difficult to implement in practice.

Dynamic congestion pricing, when road tolls vary based on the time of day, is designed to spread out traffic flow over time without the need to expand road infrastructure (Small and Verhoef, 2007). Notably, this approach does not aim to reduce the total number of cars on the road. Instead, it encourages them to spread their travel times more evenly, ensuring that the road capacity can handle the traffic without congestion.

Dynamic congestion pricing typically works as follows: there is no charge at night, the toll is small in the early morning, then it gradually increases during the morning until it reaches its peak. The toll then decreases in the afternoon before rising again during the evening. This system works in a congestion zone, which is usually the busiest areas of a city. When a car enters the zone, video cameras automatically identify it without stopping the car. There are no toll booths on the streets – an electronic system calculates the toll based on the time of day and charges the driver automatically through a linked account. Cities can tailor the system to fit their specific geography and infrastructure, offering exemptions for certain vehicles and pass-through traffic (for practical examples, visit the Swedish Transport Agency's website to learn more about congestion pricing in Stockholm and Gothenburg).

By reducing the number of cars during the congested hours, such dynamic pricing benefits both the city and its residents:

(i) Drivers enjoy faster travel times as road toll allows them to gain time in exchange for money. For example, in the morning, drivers can leave for work later as they no longer need to account for time spent in traffic jam.

(ii) Non-drivers enjoy congestion-free neighborhoods with improved air quality and overall higher quality of life.

(iii) The city can tackle congestion without making large investments in new roads. The funds collected from drivers not only cover the toll system maintenance, but also contribute to the cost of the infrastructure they use. The funds may also be used to improve public transportation.

Low Public Acceptability

In light of the benefits of congestion pricing, it seems surprising that very few cities actually use it. Notable examples include London, Singapore, Stockholm and Gothenburg. New York City introduced its congestion charge on the 5th of January 2025, the first in the US. This stands in stark contrast to paid on-street parking, another transport policy measure that has been successfully implemented in almost every large city across Europe. The disparity arises because the general public often sees congestion pricing as an additional tax, believing it unfairly affects lower-income individuals. Presumably, low-income individuals have less flexible work schedules and fewer travel choices, making it harder for them to avoid traveling during high-toll periods (Selmoune et al., 2020). Moreover, they would spend a larger share of their income on road tolls compared to wealthier drivers, which makes congestion pricing a regressive policy.

Even though congestion pricing is not a tax and is not meant to redistribute funds, it may still appear as such to the public. This perception leads to vocal public resistance to road pricing which, in turn, discourage politicians from implementing the policy. Another reason for public skepticism is a lack of trust in politicians and municipal officials to manage the collected funds effectively, with concerns that the money may not be spent in ways that benefit the city.

Public Transport Cashback

Cashback Mechanism

To address the perceived unfairness of congestion pricing and fears about the misuse of collected funds, we propose a personalized public transport cashback mechanism – a novel approach that has not yet been implemented anywhere. Instead of collecting the tolls, we suggest immediately transferring the money back to drivers in the form of public transport vouchers or cashback. That is, when a driver pays road toll, almost the entire amount is credited directly to their personal public transport account/card as cashback, while a small portion of the toll is retained to cover maintenance costs of the road pricing system. The cashback can only be used to pay for public transport. Since the road toll is returned to drivers in the form of public transport cashback, there is no need for money redistribution by public authorities.

Our pricing mechanism retains the core feature of conventional dynamic road pricing: the road toll motivates drivers to adjust their travel times, helping to prevent traffic jams. The toll values are likely to be different though, as the toll now has additional value to drivers who might use the cashback for public transport. While this feature reduces the efficiency of the toll compared to conventional congestion pricing, the cashback mechanism also introduces a new beneficial property. By motivating some drivers to occasionally switch to public transport, it further reduces car use and helps ease congestion. The interplay between these two factors ultimately determines the required congestion toll values.

The cashback can be accumulated over several years and is non-transferable to prevent drivers from using their cars more often. The cashback mechanism would likely work for private cars only, though exceptions and specific features can be adjusted to local circumstances. Public transport companies are likely to benefit from additional revenue through increased ticket sales and unused, expired cashback. However, since public transport ticket prices do not always cover the full cost of providing the service, it is important to balance the additional costs of implementing the cashback mechanism with the expected revenue gains. This could potentially be done by reducing the cashback portion relative to the toll share retained for system maintenance.

However, congestion pricing with a cashback mechanism is not a standalone solution or a silver bullet. It works best when combined with improvements of the public transport network, as this encourages drivers to make regular use of their cashback.

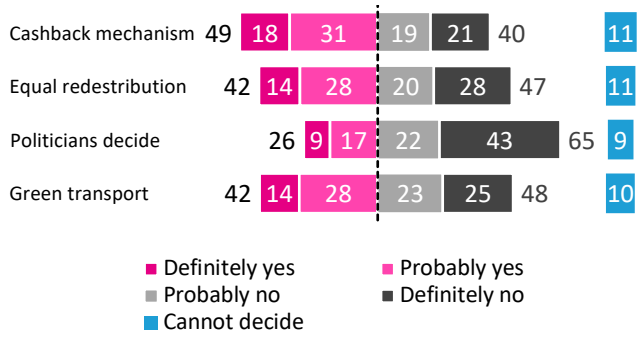
Transport Survey Data

The key idea behind the cashback mechanism is that it gives drivers direct and transparent control of their money, which is expected to make road pricing policy more acceptable. Whether this holds true or not is an empirical matter. This was tested by considering the means of a representative survey conducted in Riga (Latvia) and Vienna (Austria) in summer of 2024. The survey includes 1,000 residents in both capitals and their respective surrounding municipalities. It features questions about respondents' socio-demographic characteristics, current travel options, commute patterns (including accompanying trips with children), and their political and social attitudes. It also includes two stated-choice experiments exploring the acceptability of congestion pricing and potential changes in travel behaviour if such pricing is introduced. While detailed data analysis is still

ongoing, this policy brief highlights some intriguing preliminary insights.

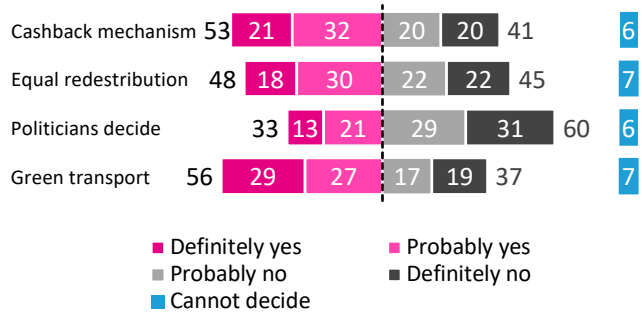
In the survey, we ask the respondents whether they would vote in a referendum in favor of congestion pricing under four different scenarios for using the collected toll funds: (i) transferring them as a public transport cashback, (ii) sharing them equally among all city inhabitants, (iii) leaving the allocation decisions to local politicians, or (iv) using them to support eco-friendly transport. Respondents were familiarized with the topic before answering the question by participating in a stated-choice experiment about congestion pricing acceptability. The experiment included a detailed explanation of how congestion pricing works, along with a potential congestion zone map. Figure 1 shows responses from Riga, and Figure 2 from Vienna.

Figure 1. Responses from Riga. "Would you support congestion pricing in a referendum if the collected toll funds were used this way?"



Source: Representative survey in Riga in summer 2024.

Figure 2. Responses from Vienna. "Would you support congestion pricing in a referendum if the collected toll funds were used this way?"



Source: Representative survey in Vienna in summer 2024.

In Riga, the cashback option is the most popular, with more participants supporting than opposing it. The overall positive attitude towards congestion pricing with the cashback option suggests that Riga might already be ready to implement it. In Vienna, the cashback ranks a close second after the green transport option. This result shows that cashback might be a viable option also in Vienna.

Conclusion

To overcome public skepticism towards road congestion pricing, we propose a cashback mechanism. It involves returning toll money back to drivers as public transport cashback. The cashback mechanism has several benefits: drivers retain some control of their money, there is no need to redistribute collected toll funds, and it helps reduce congestion without major investments in road infrastructure. Surveys in Riga and Vienna in 2024 show support for the cashback option. While the specifics of such a solution should be tailored to each city's needs, many cities struggling with congestion could benefit from implementing road congestion pricing with a public transport cashback mechanism.

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https://www.wu.ac.at/en/spatialeconomics/projects/city-tolls-that-work

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