

To trade or not to trade?

Tradable parking permits and rationality: evidence from an experiment.

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Fully transferable property rights were first introduced into economics by Dales (1968) as an efficient economic solution for the regulation of externalities in water use. Since then, the idea of tradable permits has been operationalized in multiple environmental settings of which the EU Emission Trading Scheme is a famous example. Verhoef et al. (1997) already proposed to use tradable permits to regulate road transport externalities, but real-world applications in a transport setting have remained absent. As imposing congestion tolls is often politically infeasible and rewarding travellers to avoid the peak can be costly due to limited budgets, tradable permit schemes can be a good intermediate, budget neutral solution. However, one important difference between the conventional environmental and the transportation setting is the fact that firms are the level at which choices are usually made in the former setting, whereas individuals decide in the latter.

Conventional economic theory predicts that, when freely tradable, peak permits will in equilibrium be efficiently allocated to travellers with the highest marginal benefits for a peak trip. An important assumption for this to be the case, however, is that the trading agents make rational choices. This assumption of rational agents may be more realistic for firms, as the stakes are higher and they have more trading experience. Evidence from empirical studies focussing on trading individuals (e.g., Kahneman et al., 1990, Baldursson & Sturluson, 2011) indicates that actual outcomes may deviate considerably from the standard theoretical predictions. This paper therefore investigates empirically to what extent individuals choose and trade rationally within a tradable mobility permit scheme. It also investigates which characteristics and variables affect whether individuals trade and choose rationally and to what extent. The insights from this paper will be valuable for the design and set-up of tradable permit schemes in which trade takes place at the level of the individual.

In order to provide new evidence on this, we carried out an experiment in December 2017 in which participants had to make virtual choices on a mobile website. In particular, they would have to make a daily parking decision for which they could choose to either pay a regular parking fee, or to pay using a tradable parking permit. Each participant received a starting budget and a number of tradable parking rights. The participants were instructed that the remainder of their personal budget would be paid out at the end of the experiment, providing them a clear genuine

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incentive to maximize their final budget. The experiment consisted of two separate weeks for which participants were invited to make one parking choice on each working day, which they could do on their phone whenever it suited them best. The parking choice thus comprised two alternatives: (1) using a parking permit to pay for parking; (2) paying a parking tariff. Parking permits could be traded with a bank against a single price, that varied over time based on the total number of permits currently owned by participants and the policy goal. The parking tariff remained constant within a day, but varied over the days of the week. Participants knew beforehand which tariff they would face on which day of the week. Furthermore, they were informed about the initial allocation of permits over all participants, enabling them to determine the expected equilibrium price of permits.

We investigate to which extent participants traded in a rational way during the experiment. We distinguish two types of rationality in our analysis: instantaneous and intertemporal rationality. Instantaneous rationality refers to rationality of the parking choice, in particular whether, at the moment the parking choice is made, the chosen alternative is indeed the one maximizing the final budget. Intertemporal rationality refers to trading behaviour and whether participants take their remaining daily tariffs into account and rationally anticipate price changes when making trading decisions, such that their final budget is maximized.

Initial analysis of the collected data suggests a high degree of instantaneous rationality. In both weeks, more than 90% of the choices were instantaneously rational. Intertemporal rationality will be analysed by estimating the probability of making a rational trading choice. Intertemporal rationality requires more mental effort than instantaneous rationality, because it requires participants to formulate expectations of the permit price and also take the choices that are still to come into account, which are both not needed for instantaneous rationality. The probability of making a temporally rational choice is therefore expected to be smaller than or equal to the probability of making an instantaneously rational choice. This finding would be in concordance with results from our conducted survey in which participants in general indicated that determining the best parking choice was easier than determining the best trading strategy.

References

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