Car Subscription and Flat Rate Charging: Enablers for EV Adoption?

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1 Introduction

Europe's transportation contributes 27% to the EU's CO_2 emissions, with cars causing 45% of this[1]. While **transitioning to electric vehicles (EVs) is crucial for decarbonization**, it requires a change in consumer habits. Car subscription services, offering temporary vehicle ownership, address this by appealing to those with short-term transportation needs or those interested in testing EVs. These subscriptions typically provide all-inclusive packages, excluding fuel or charging costs. Recognizing the challenges that new EV users face, **AMAG has incorporated a public charging flat rate into its subscription service**. This research aims to investigate the impact of such flat-rate charging on the adoption of EVs.

2 Methods

We employ the **Causal Impact** method[2] to assess the effect of incorporating a charging flat rate into a car subscription service on EV adoption. This approach involves training **a Bayesian structural time series model** using various control time series to replicate the known pre-treatment values of the outcome variable. It then projects the post-treatment outcome as if the intervention had not occurred. It is essential that these control time series are not influenced by the treatment.

Once we have both the actual time series and the simulated counterfactual, we compare the two. The **difference between these series** represents the **impact of introducing a charging flat rate**.
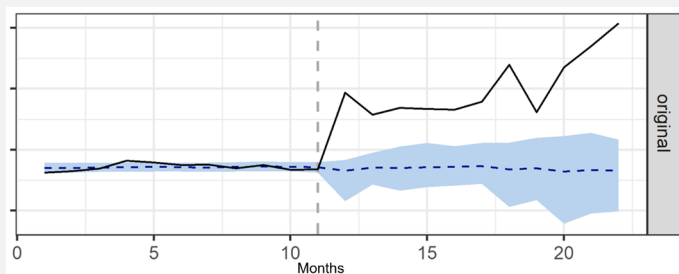

Figure 1: Showing the true time series (black line) and the constructed counterfactual time series (blue dashed line) over time. The charging flat rate was introduced at the beginning of month 12 (grey dashed line). Due to confidentiality reasons, we are unable to provide specific labels or units for the y-axis in our analysis.

3 Materials

Our study uses data from AMAG's car subscription service. When subscribing, customers have the flexibility to choose different monthly mileage packages and a minimum contract duration. Initially, subscriptions did not include a charging flat rate (months 0-11). However, from the 12th month, with the flat rate's introduction, it was **automatically included in all new orders**, with an adjusted subscription price to cover additional costs. We have **several hundred car subscriptions** in both the pre- and post-treatment groups.

Our **control time series** incorporates both **internal and external data sources**, including ICEV subscription trends, charging infrastructure data, overall vehicle count, and fuel and energy price indices.[3]

4 Results and discussion

We find that the introduction of flat rate charging **substantially extends the subscription duration and increases the contracted mileage**. This implies that flat rate charging enhances the attractiveness of electric vehicle subscriptions, thereby potentially influencing consumer behavior towards greater EV adoption. However, while our data shows an uptick in the number of new subscriptions after introducing flat rate charging, this increase is not statistically significant.
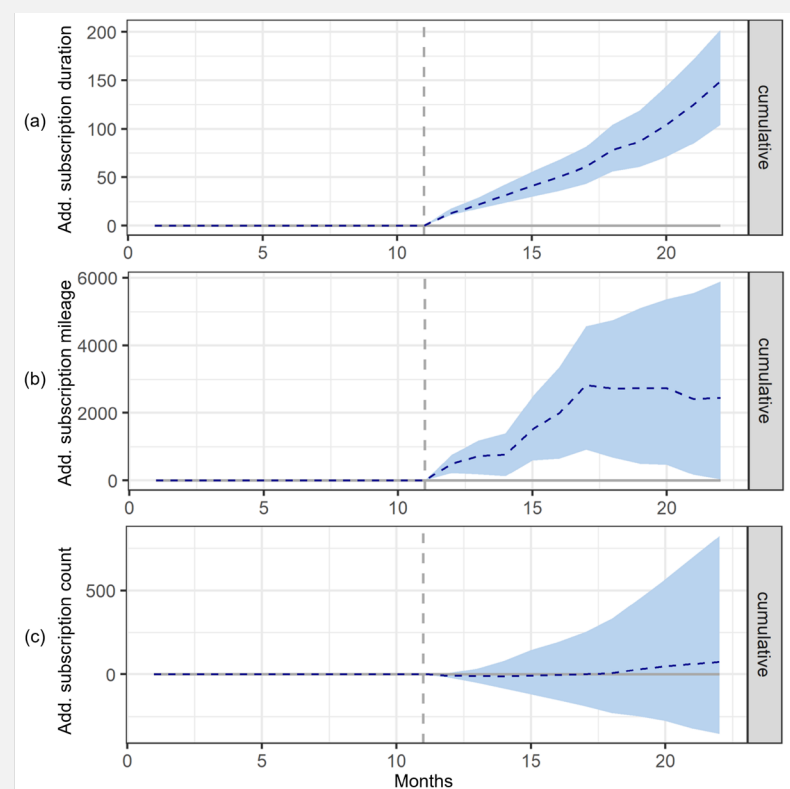

Figure 2: Cumulative impact of introducing a charging flat rate at the beginning of month 12 on (a) the subscription duration, (b) the mileage and (c) the subscription count. The light blue area represents the 95% confidence interval of the effect.

5 Conclusion and outlook

This ongoing research suggests that a charging flat rate in car subscriptions **could help boost EV adoption**. However, more analysis is needed for robust conclusions.

Our next steps include enhancing the model with more time series data, examining contract changes, and monitoring flat rate utilization. We will also incorporate an economic perspective, recognizing that sustainable initiatives need to be economically viable for long-term success.

References

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