How Do Incentive Policies Affect the Adoption of Electric Vehicles in the Ride-Hailing Industry? Evidence from Chicago

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Abstract

Vehicles used by transportation network companies (TNCs), such as Uber and Lyft, travel roughly three times as many miles annually as the average private passenger vehicle, making their electrification particularly promising for reducing local air pollution and global carbon emissions. Yet many EV incentive programs do not account for differences in vehicle utilization, and little is known about how ride-hailing drivers respond to broad-based purchase rebates. This paper examines how the Illinois EV Rebate Program—a $4,000 purchase rebate launched in July 2022—affected electric vehicle adoption among ride-hailing drivers in Chicago, the third-largest U.S. TNC market.

Using monthly administrative data from the City of Chicago, I first observe a significant increase in the battery electric vehicle (BEV) share among ride-hailing vehicles through descriptive evidence and event-study estimates. I then use a difference-in-differences design to examine how EV adoption following the rebate's launch differs between ride-hailing vehicles and private passenger vehicles. I also outline plans to examine the equity implications of the policy and the distribution of the associated urban air quality impacts. Finally, I propose a BLP-style model of ride-hailing drivers' vehicle choices and potential alternative incentive designs.

Motivation

- Transportation accounts for roughly **28% of total U.S. greenhouse gas (GHG) emissions**, making it the single largest source of emissions in the US (EPA, 2025).
- **Global** - Widespread adoption of electric vehicles (EVs) is critical to decarbonizing the transportation sector (Rapson and Muehlegger, 2023).
- **Local** - Reduction of harmful air pollutants (e.g., NOx, PM) from passenger vehicles in densely populated cities such as Chicago (Jacqz and Johnston, 2024).
- A prominent feature of ride-hailing vehicles is their **high annual mileage**: at roughly 40,000 miles per year, their high annual mileage means that electrifying one TNC vehicle generates three times the emissions reductions of electrifying an average private passenger vehicle (Mohanty, 2023).
- Incentive policies' income cap and priority for low-income applications may have **equity** implications for EV adoption and urban air quality.

Policy Background

- Most electric vehicle (EV) incentive programs are designed for the general public and apply to ride-hailing and private drivers under the same eligibility rules. Yet ride-hailing drivers' high mileage can make access to public charging and per-mile operating costs especially important to their adoption decisions. To date, only a few states (i.e., California and Massachusetts) have implemented policies specifically for TNCs (AFDC, 2025).
- The Illinois Environmental Protection Agency (IEPA) offers rebates to residents for the purchase of a new or pre-owned EV at or below $80,000. Rebate amounts are available according to the following schedule:

Purchase Timeframe	Rebate Amount
July 1, 2022 – June 30, 2025	$4,000
July 1, 2025 – June 30, 2027	$2,000
Beginning July 1, 2028	$1,500

Table 1: Rebate amount by purchase timeframe.

Data

- Monthly Transportation Network Providers (TNP) data from the City of Chicago, including each vehicle's make, model, year, number of trips, etc.
- Monthly Chicago gasoline prices from the Energy Information Administration and electricity prices from the U.S. Bureau of Labor Statistics.
- EPA Fuel Economy: make-model-year level vehicle attributes, such as powertrain, fuel economy, total range, all-electric range, battery capacity, etc.
- MarketCheck: vehicle-level daily sales data, including prices and vehicle characteristics.

Event Studies and DiD

For month t, with s_t = BEV share of entering TNC vehicles:

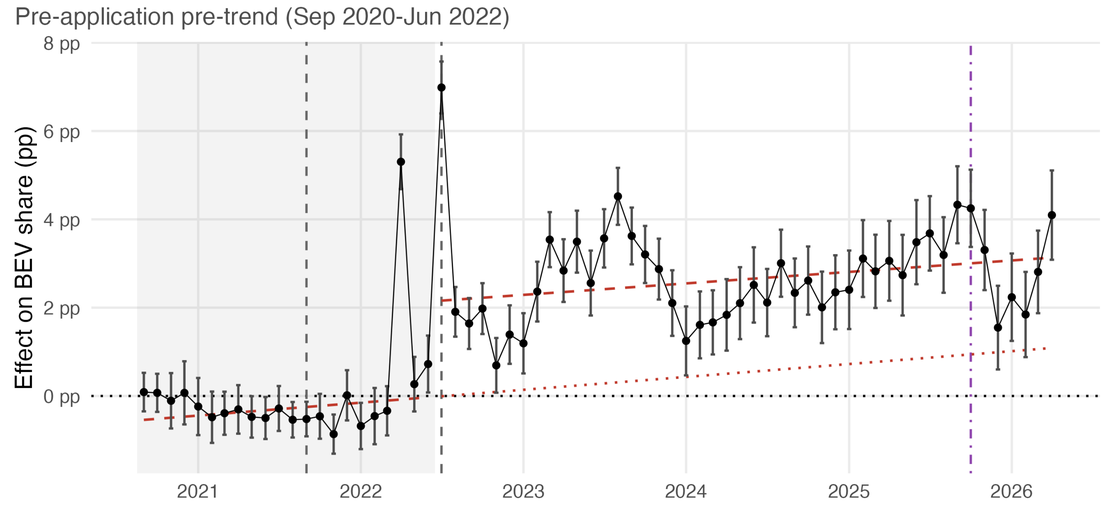
$$s_t = \sum_{k \in \mathcal{W}} \beta_k \mathbf{1}[t = k] + \gamma\tau(t) + \mu_{m(t)} + \hat{\theta}\,\text{Saving}_t + u_t, \quad \mathcal{W} = \{t \notin \mathcal{B}\}$$

- Baseline $\mathcal{B}$ = Jan 2018–Aug 2020 (no dummies) identifies the linear trend $\gamma\tau(t)$ (τ = months since Jan 2018) and month-of-year effects $\mu_{m(t)}$
- Saving_t: BEV fuel saving per mile (cents) in Chicago using all months, $100 \cdot \frac{\text{gas price}_t}{27\ \text{mpg}} - 100 \cdot \text{elec. price}_t \cdot 0.30\ \frac{\text{kWh}}{\text{mile}}$; $\hat{\theta}$ from the pooled model

Identifying assumption: absent the rebate, the BEV share would have continued that path.

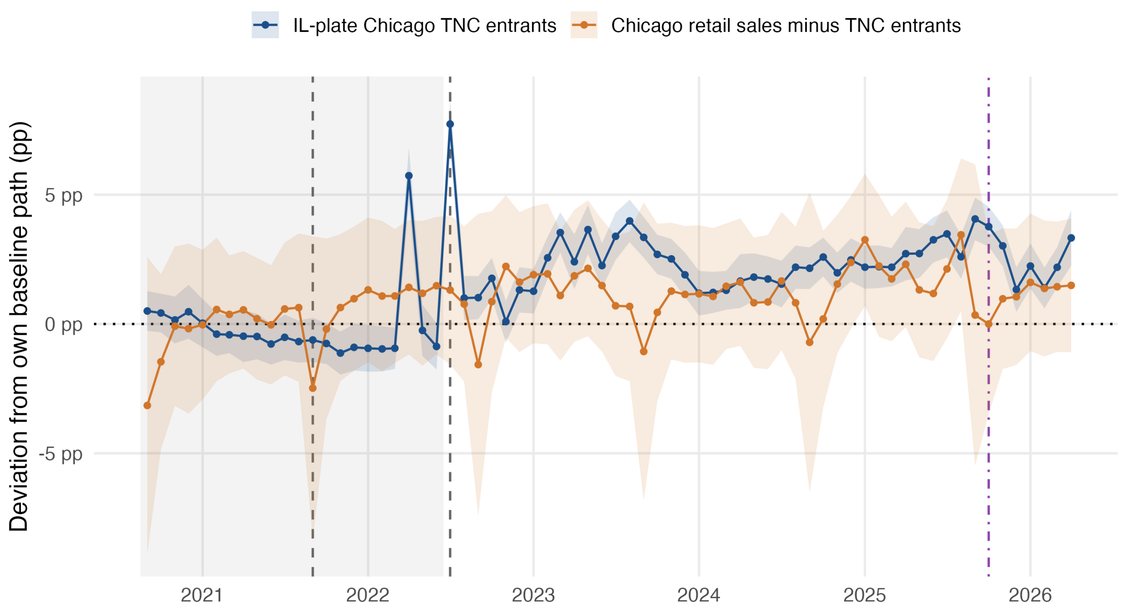
BEV share: controlling for BEV fuel saving per mile

Pre-application pre-trend (Sep 2020-Jun 2022)



Notes: Dots are monthly deviation from the Jan 2018-Aug 2020 baseline path (trend + month-of-year effects); the dotted zero line is that path. Shaded: pre-application period (Sep 2020-Jun 2022), treated as the pre-trend. Red dashed: pooled fit (pre-application level + slope; post-Jul 2022 level + slope). Red dotted: pre-application trend extended past Jul 2022 (alternative counterfactual). Dashed verticals: rebate announced (Sep 2021), applications open (Jul 2022). Dot-dashed vertical: federal EV tax credit ends (Oct 2025). 95% CIs account for uncertainty in the baseline path (Newey-West, 4 lags) and month-to-month noise.

BEV share, TNC vs. non-TNC retail: controlling for BEV fuel saving per mile



Notes: Each line: the group's monthly BEV share minus its own Jan 2018-Aug 2020 baseline path (month-of-year effects), net of that group's own response to the BEV fuel saving per mile (estimated in the pooled model of each group's share). The vertical distance between the lines is the DiD event-study coefficient for that month.

Summary and Next Steps

Summary: Following the rebate, the battery electric vehicle share among new entrants to Chicago's ride-hailing fleet rose by an estimated 2.2 percentage points, from a pre-opening average of 0.5 percent. It averaged 2.7 percentage points above its projected trend after applications opened. The difference-in-differences estimate shows a 2.1-percentage-point larger increase among ride-hailing entrants than in Chicago retail vehicle sales.

Cost-benefit and Equity Analysis: I will also compare the fiscal cost of the rebate with the monetized benefits of avoided carbon emissions and local air pollution. I will also examine if the program expands EV adoption among lower-income ride-hailing drivers and the how potential air-quality gains are distributed across Chicago neighborhoods.

Vehicle Choice Model: I am developing a model of ride-hailing drivers' vehicle choices and will use it to simulate EV adoption under alternative incentive designs, such as rebates targeted at ride-hailing drivers and tax credits.

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