Traveling on Uneven Ground: Analyzing Inequities in Federal Lodging Rates

Alexander Calafiura & Mark Leschinsky

Datasci 112 Winter 2025

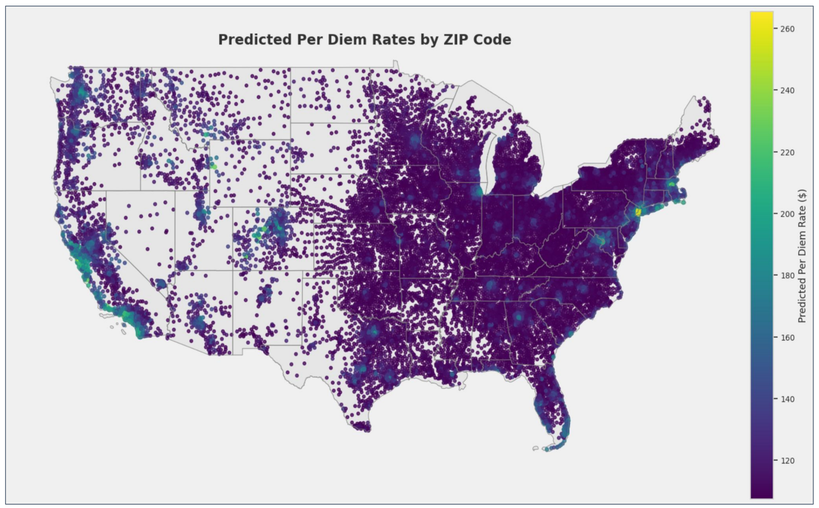
Abstract

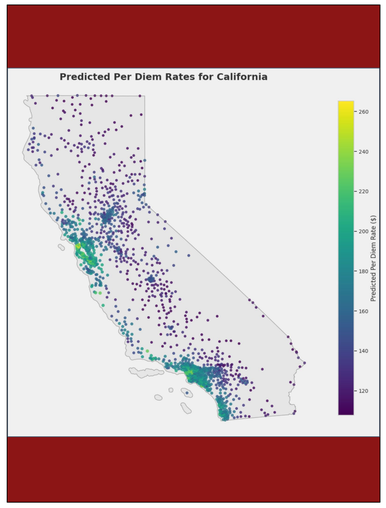
Every year, the GSA adjusts per diem rates affecting 3 million federal employees who depend on these allowances for official travel expenses, shaping over $2.5 billion in annual spending. For 2024, the standard daily rate was $110 for lodging, with 296 non-standard localities receiving higher rates to reflect regional cost variations [1, 2, 3]. Our analysis examines if policies adequately compensate workers in high-cost or historically disinvested areas, or if shortfalls leave millions of employees with disproportionate personal expense burdens that exacerbate existing inequities.

Research Question

While on work trips, are federal workers in high-cost or historically disinvested areas receiving adequate lodging compensation that truly accounts for the local cost of living?

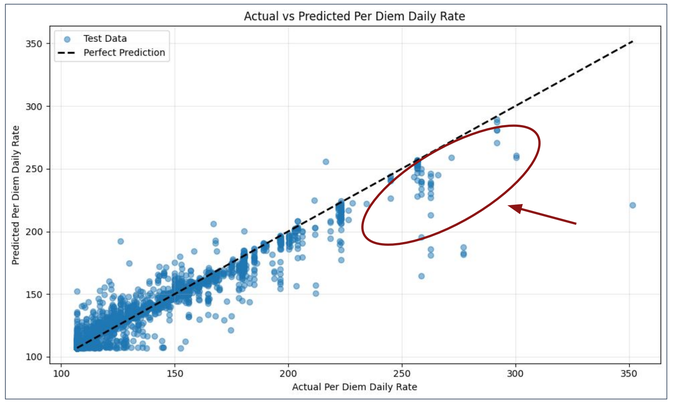
Predicting Per Diem Rates Across 26,321 Zip Codes with Regression





We used a gradient-boosted regression model, based on median home price, population density, and population size, to predict per diem rates for 26,321 zip codes, visualized on both national and state-level maps. Dots are colored by predicted rates; missing areas indicate insufficient population data.

Data Analysis - Regression



- **Gradient Boosting** - leveraged `GradientBoostRegressor` with built-in early stopping, custom scoring, and hold-out validation fraction for adaptive refinement.
- **Randomized Hyperparameter Search** - explored learning rates, maximum depth/iterations, L2 regularization, and bin discretization parameters (`max_bins`) using `RandomizedSearchCV` (5-fold CV).

Data Collection

1) 26,321 Zip Codes

- We scraped the U.S. Census API endpoint for a list of all of the ZCTA5 zip codes in the U.S..
- We parsed the JSON payload into a DataFrame.
- Subsetted the final DataFrame to focus only on the `Population Size`, `Population Density`, and `Zip Code` columns for concise output.

2) Per Diem Rates

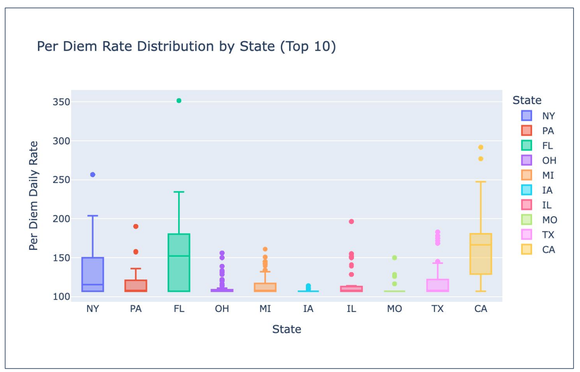
- We scraped the GSA Per Diem Rates API for the per diem rate of every zip code.
- Appended a Boolean flag (`isStandard`) to differentiate standard rate zones for immediate rate classification.
- Compiled individual month-level per diem rates into one yearly unified dataset via `pd.concat`.

3) Cost of Living Data

- Ingested house price data from Zillow into DataFrames for integrated analysis.
- Conducted a group-based aggregation (`groupby`) on `Zip Code` to derive mean per diem rates, then merged these results with house price data.

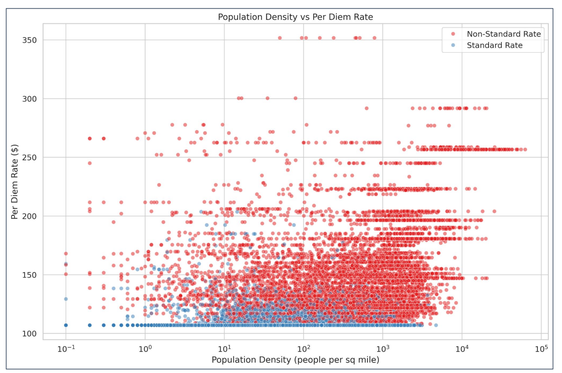
Data Exploration

Rate Distributions Across States



- **High Upper Outlier in NY** - NY's distribution extends above $250, suggesting it has outlier per diem rates.
- **Moderate Spread in CA** - California exhibits a fairly large interquartile range, featuring some higher-end values around 250.
- **Lower Range for IA and IL** - Iowa and Illinois display lower per diem rates and smaller spreads, suggesting more uniform pricing.

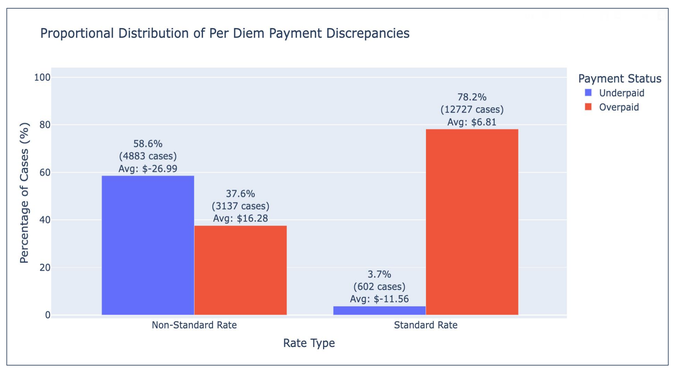
Population Density



- **Log-Scale Density** - the x-axis uses a logarithmic scale to capture a range of population densities.
- **Clusters by Rate Type** - Standard rates (blue) cluster around the lower to mid range (~$100–$150).
- **High Variability** - numerous lower-density locations also exhibit non-standard (red) outliers, indicating localized premium zones.

Conclusion

Findings and Next Steps



- While the data may give an initial impression of widespread overpayment, closer inspection reveals that underpaid individuals tend to lose substantially more money on average.
- Those who are underpaid—often in higher-cost regions—bear a heavier burden.
- Ultimately, additional investigation and policy reforms are needed to ensure equitable reimbursement for all federal employees.

[1] General Services Administration. (2024). Per Diem Rates. https://www.gsa.gov/travel/plan-book/per-diem-rates
[2] U.S. Census Bureau. (2022). ZIP Code Tabulation Areas (ZCTAs). https://www.census.gov/programs-surveys
[3] Zillow Research. (n.d.). Zillow Home Value Index (ZHVI). https://www.zillow.com/research/data/