



Consumer Survey & Use Preliminary Results

PRESENTED TO LADPU BOARD

Y. YANG, Z. OLSZOWKA, J.M.CHERMAK

DEPARTMENT OF ECONOMICS

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Overview

Objective: Estimate the effect of household characteristics, residence characteristics, attitudes, preferences, and weather on consumption patterns using:

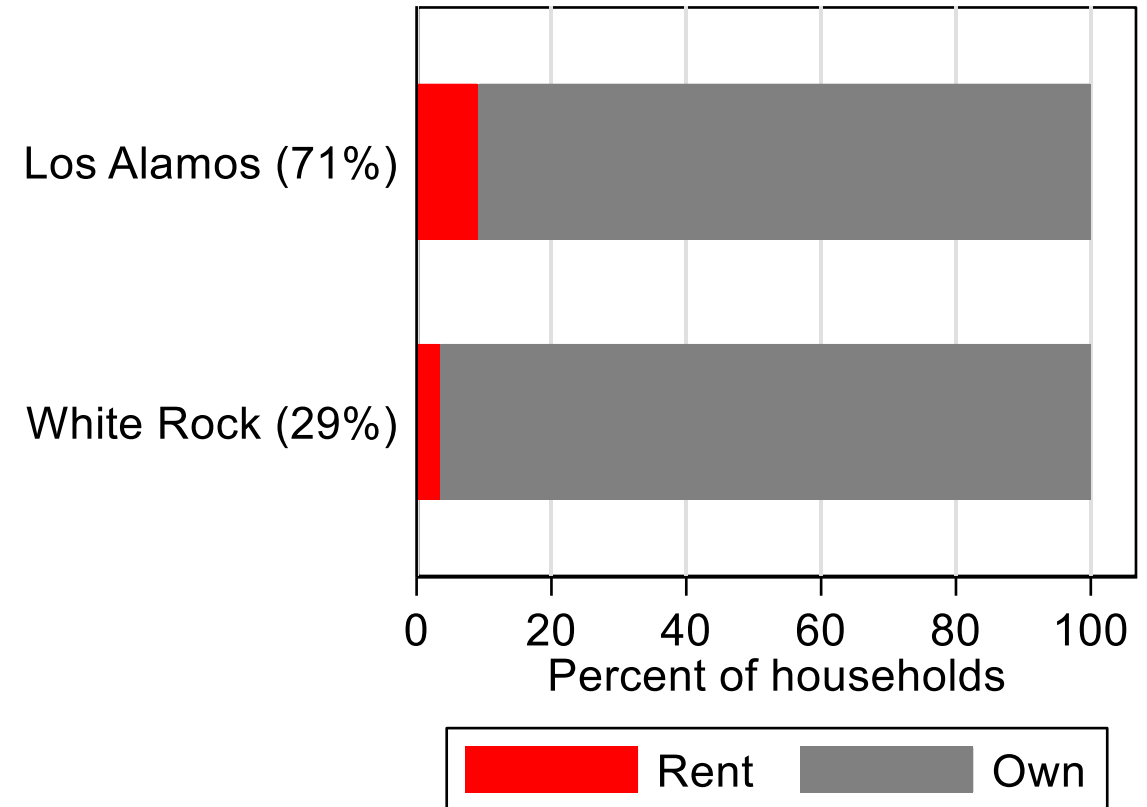
- Survey data
- Electricity consumption data
- Weather data

Survey data

Survey administered Aug 2023 to Jan 2024

All consumers were invited by LADPU to participate

- 612 started the survey
- 294 completed and could be matched to their use data (by address)



Electricity consumption data

LADPU provided hourly consumption data from Nov 2021 to Jan 2023 that we matched to survey results and weather data

- 294 survey respondents
- Approx. 9,500 observations per respondent (some less)
- >2.8 million observations in data set



Today's Focus

- Average consumption patterns
- Preliminary data patterns showing variation in consumption based on survey-obtained variables
- Overview of econometric model

Baseline consumption patterns

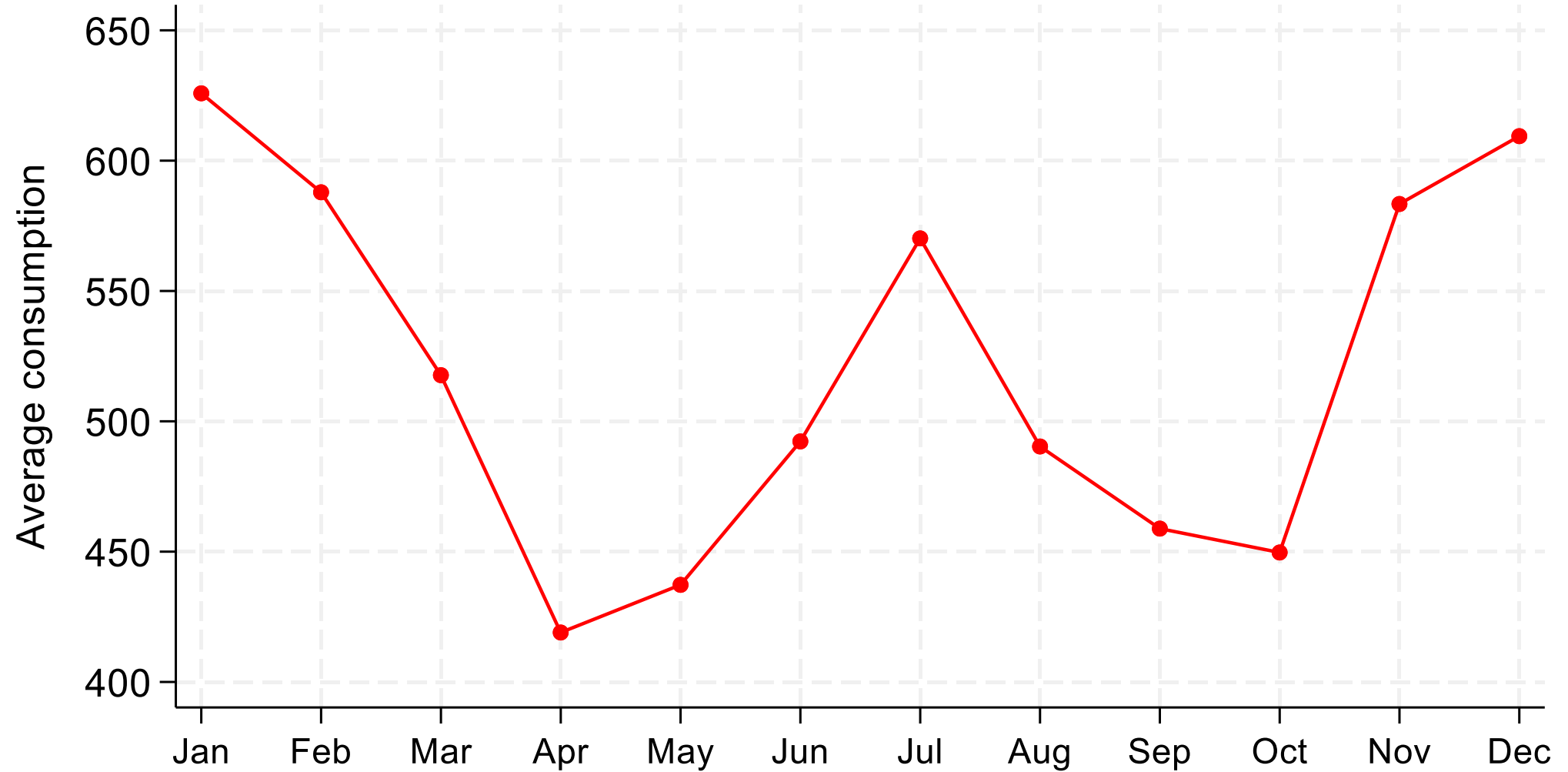
Baseline consumption

Survey respondents' average consumption by:

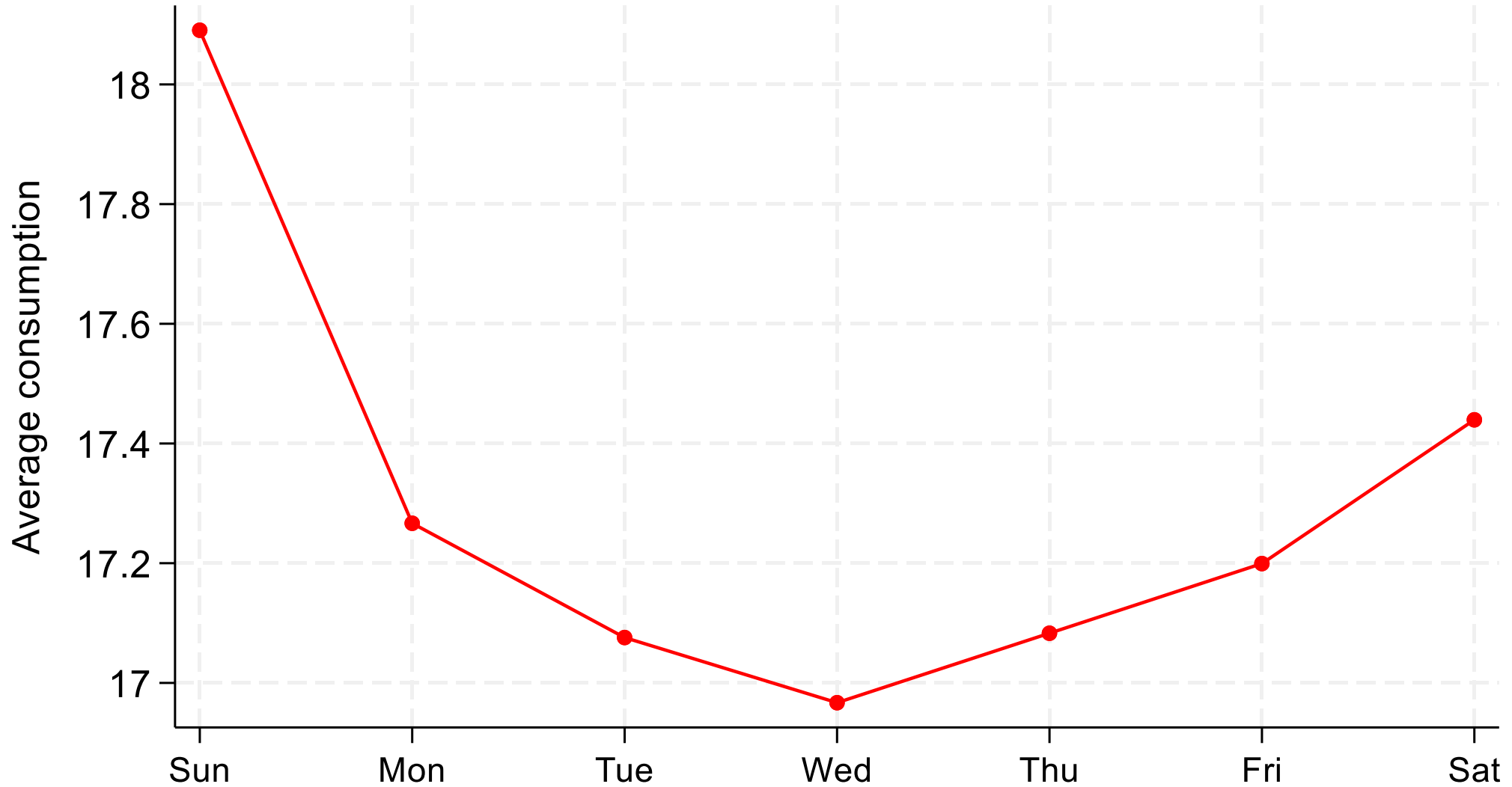
- Month of the year
- Day of the week
- Hour of the day

Consumption pattern comparison between all LADPU customers and survey respondents

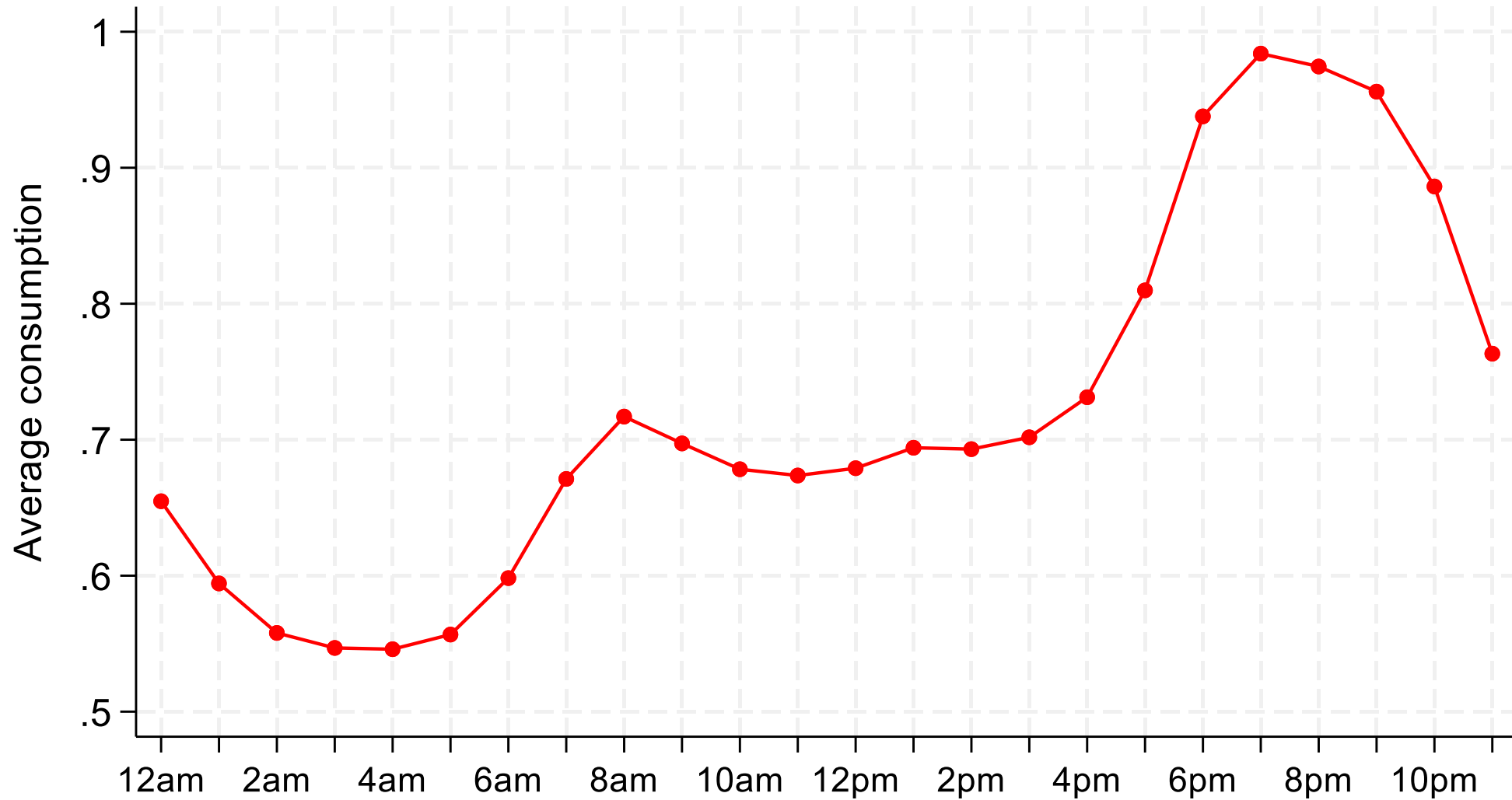
Average monthly consumption (kWh) by month

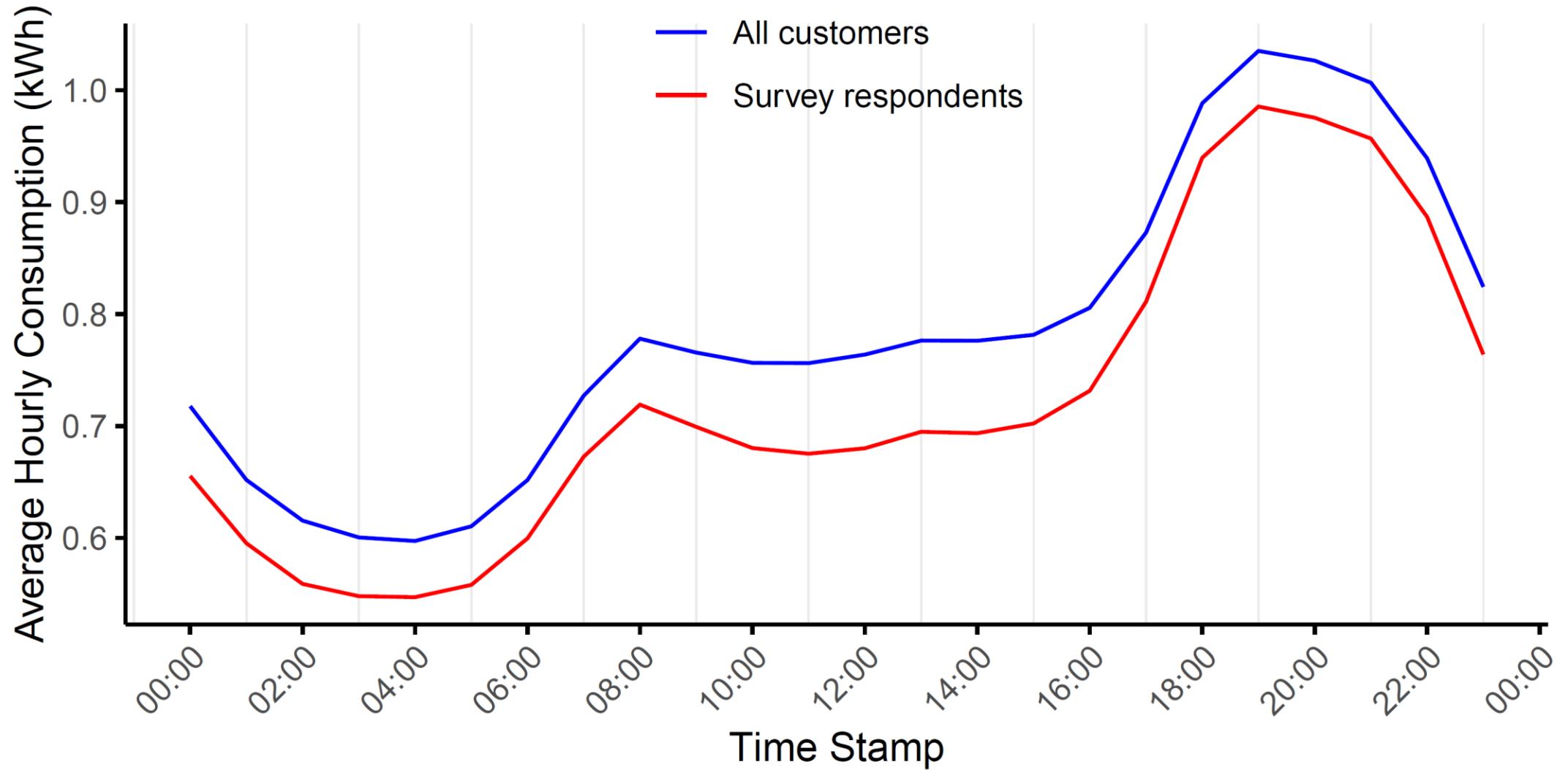


Average daily consumption (kWh) by day of the week



Average hourly consumption (kWh) by hour of day





Consumption pattern by survey questions

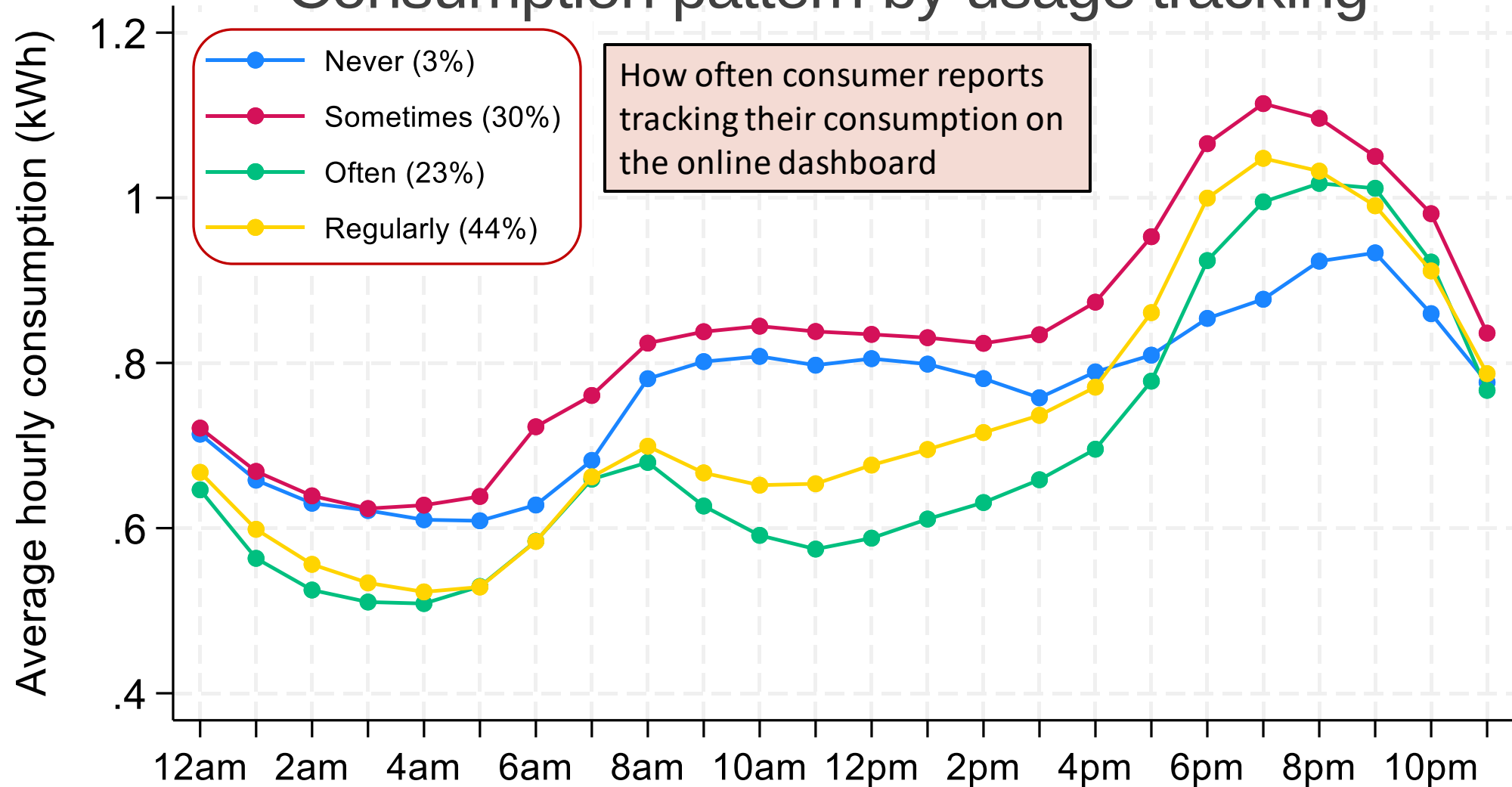
Survey

- Usage awareness
- Household characteristics
- Dwelling characteristics
- Attitudes and preferences

Usage awareness

- How often the consumer reports tracking their consumption on the online dashboard

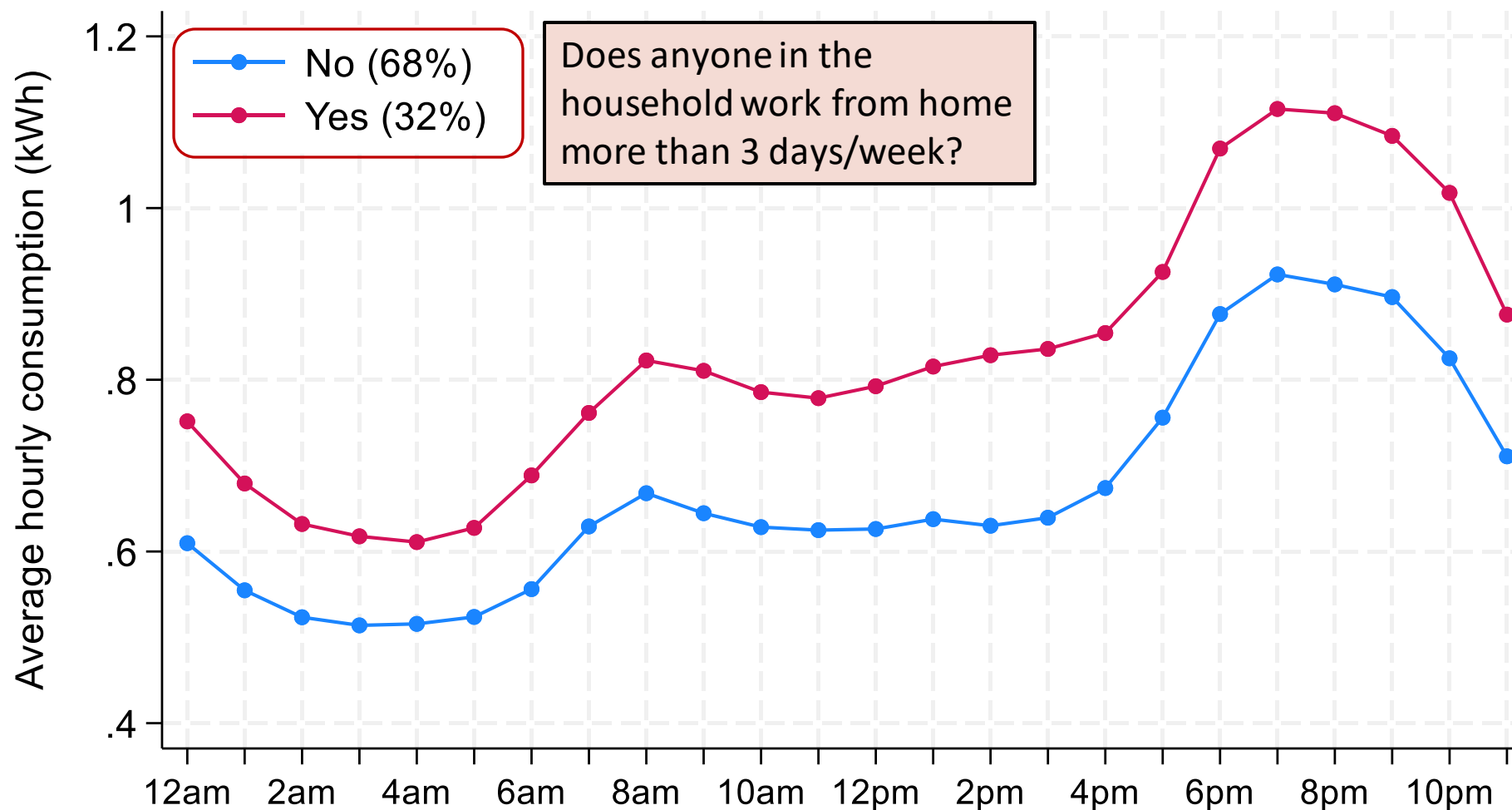
Consumption pattern by usage tracking



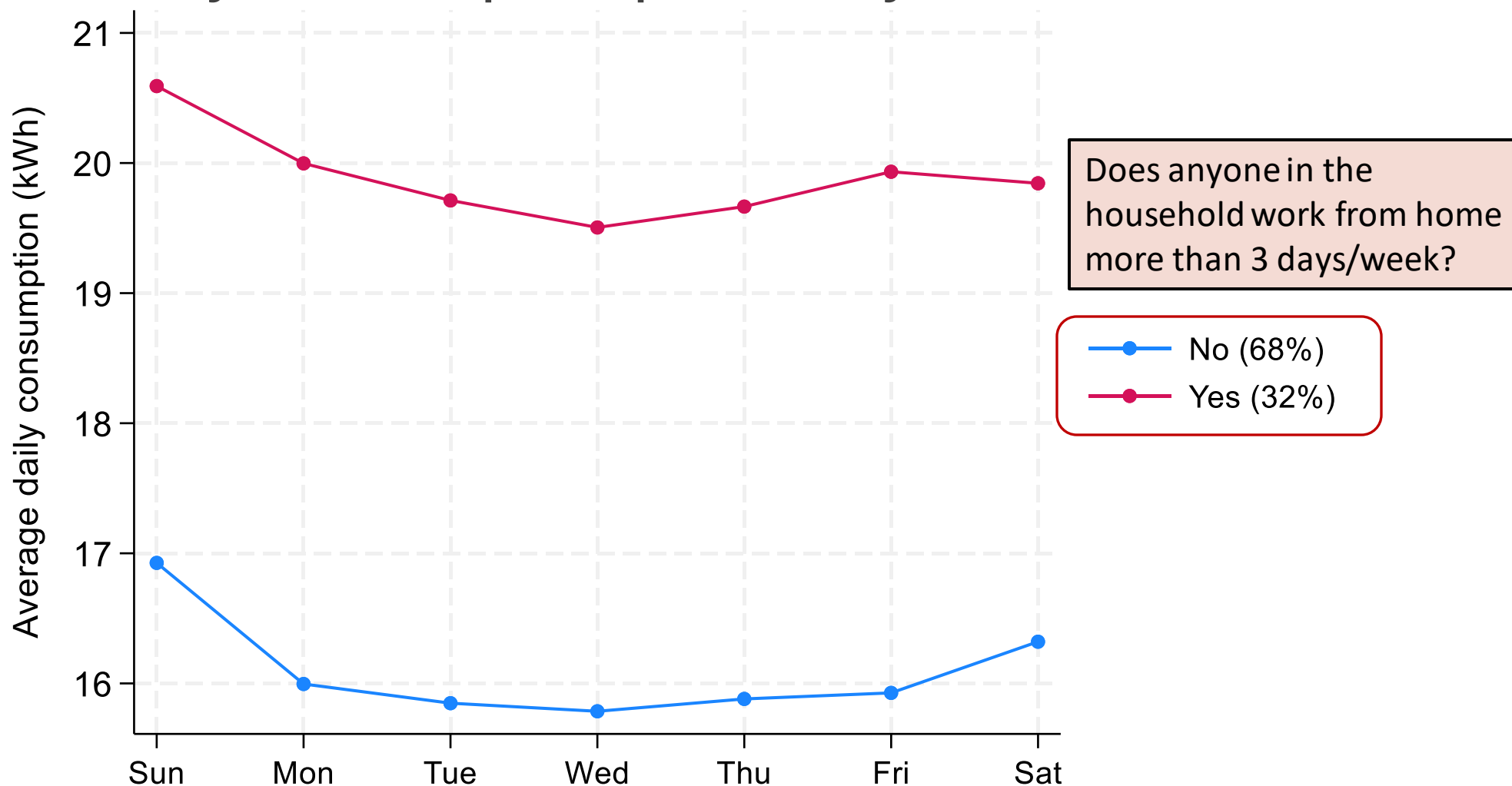
Household characteristics

- Work from home status (WFH)
- Number of children (<18 years)
- Household income

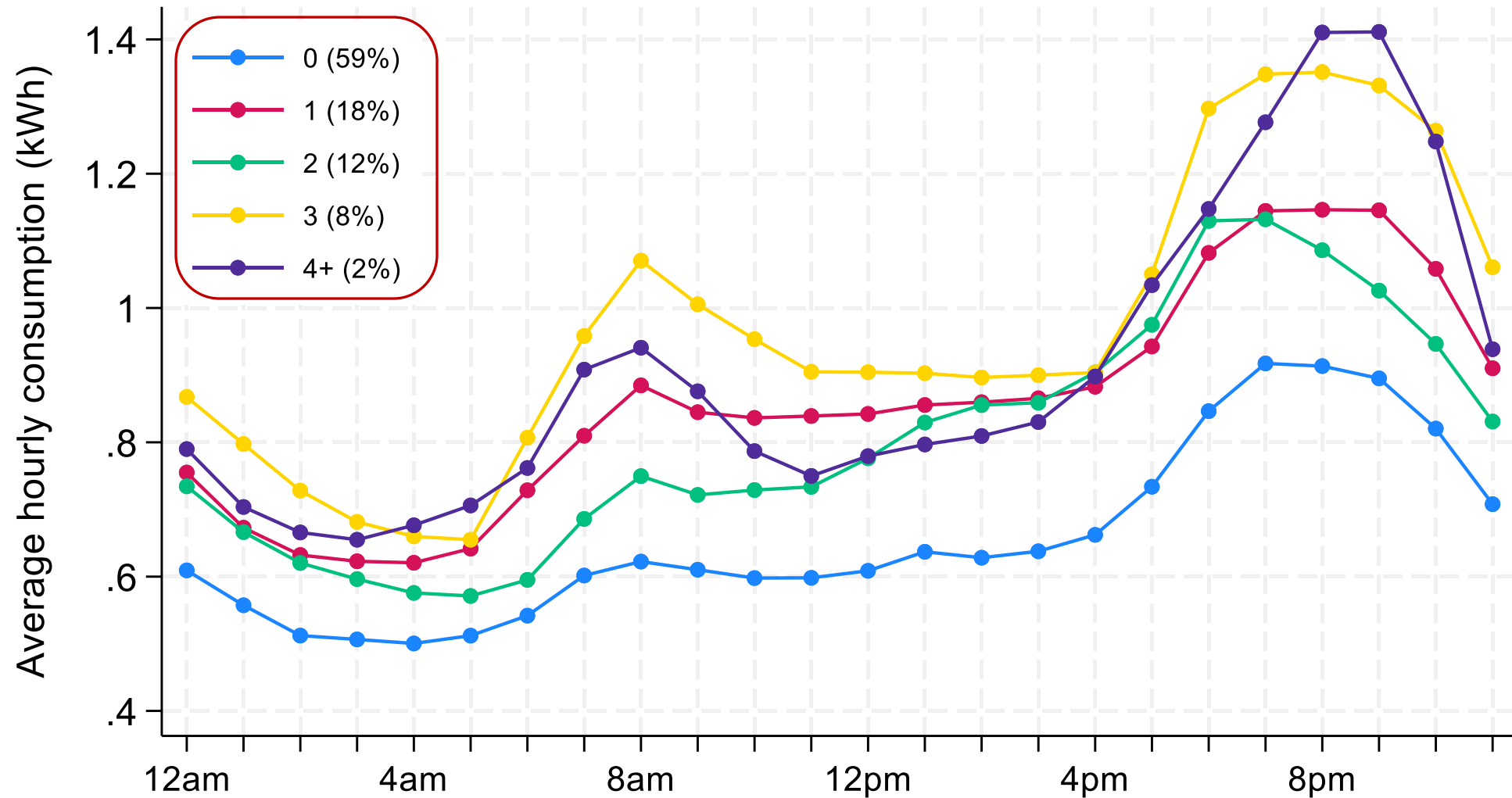
Hourly consumption pattern by WFH status



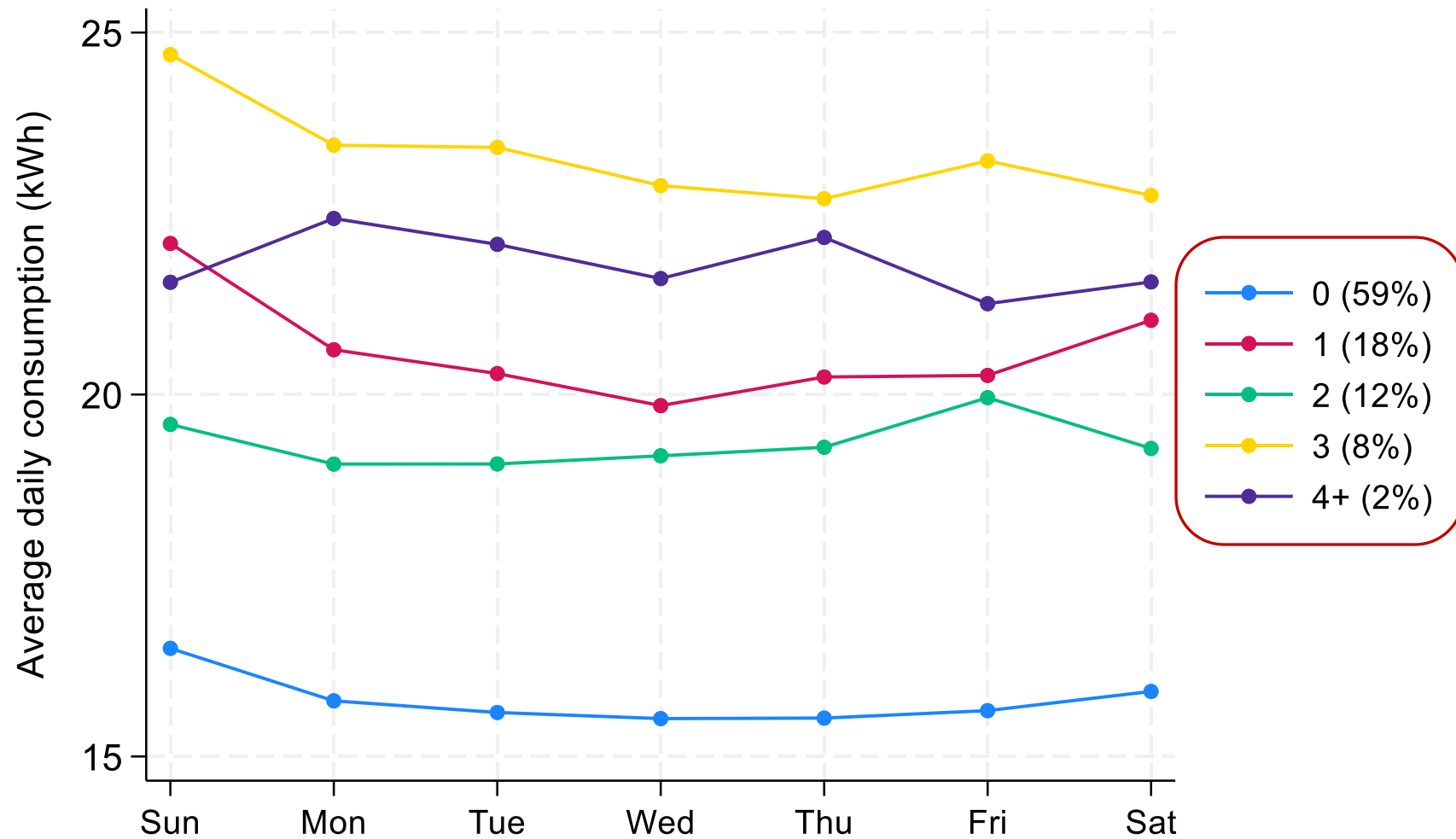
Daily consumption pattern by WFH status



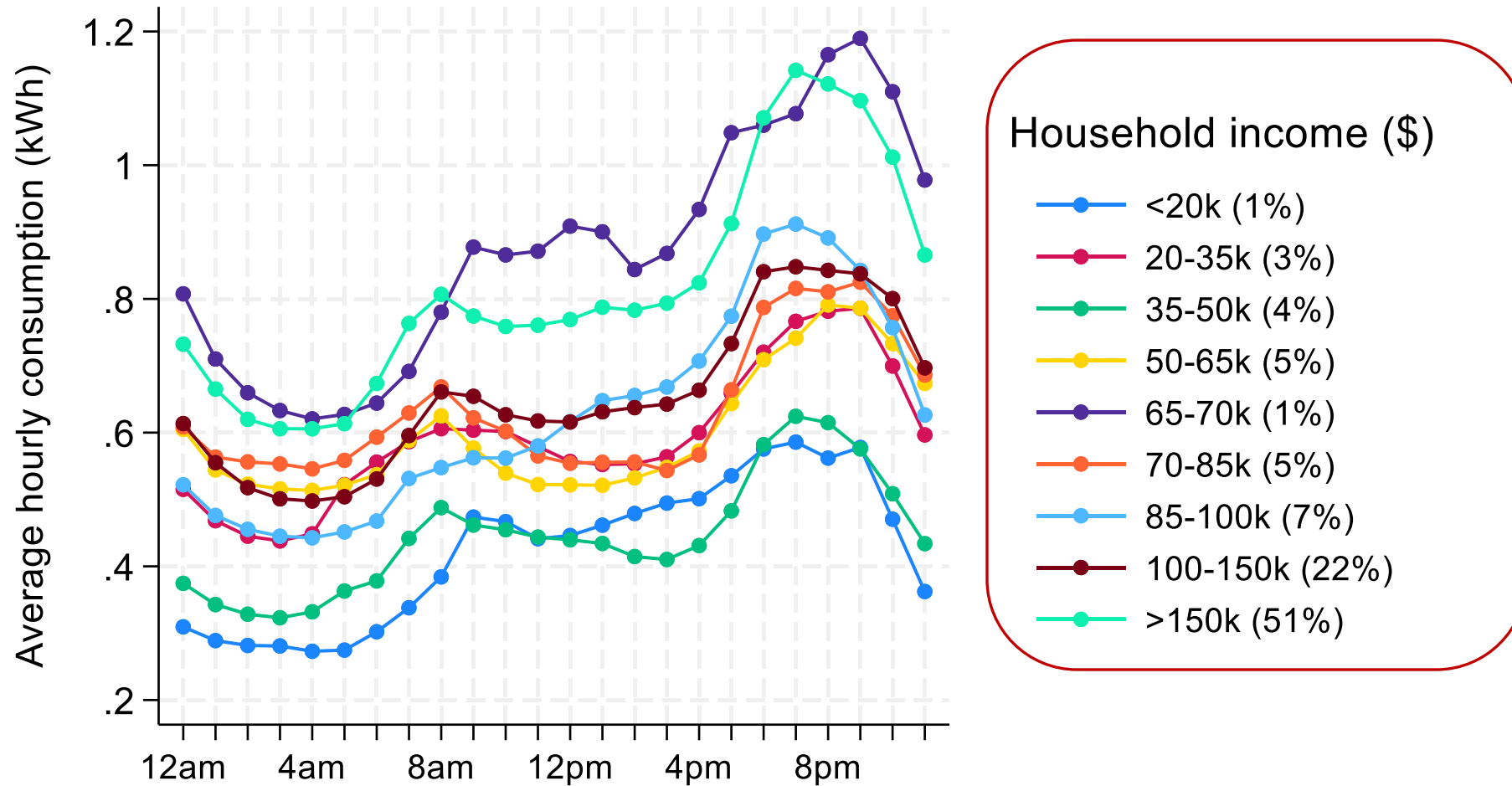
Hourly consumption pattern by number of children



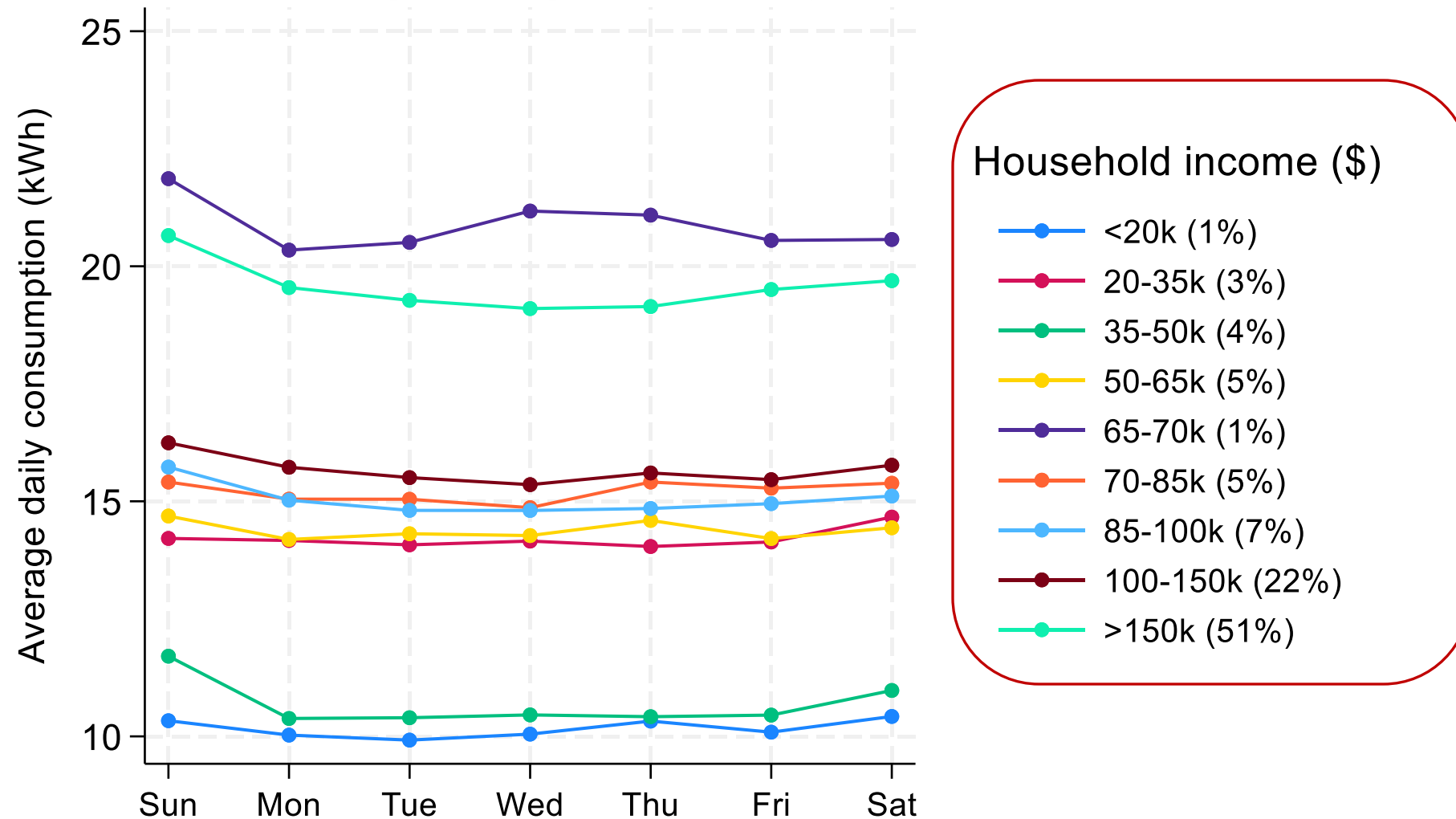
Daily consumption pattern by number of children



Hourly consumption pattern by household income



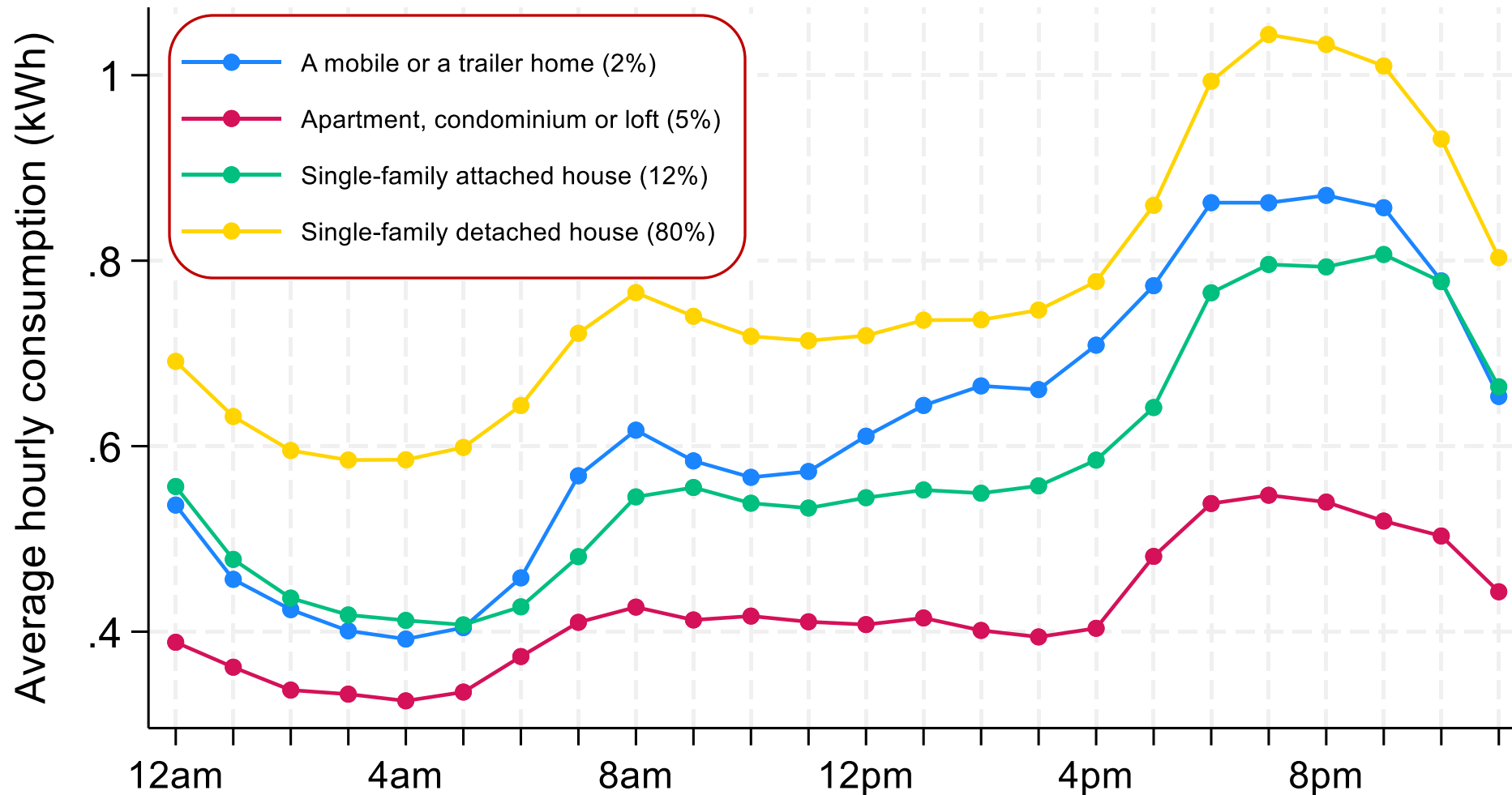
Daily consumption pattern by household income



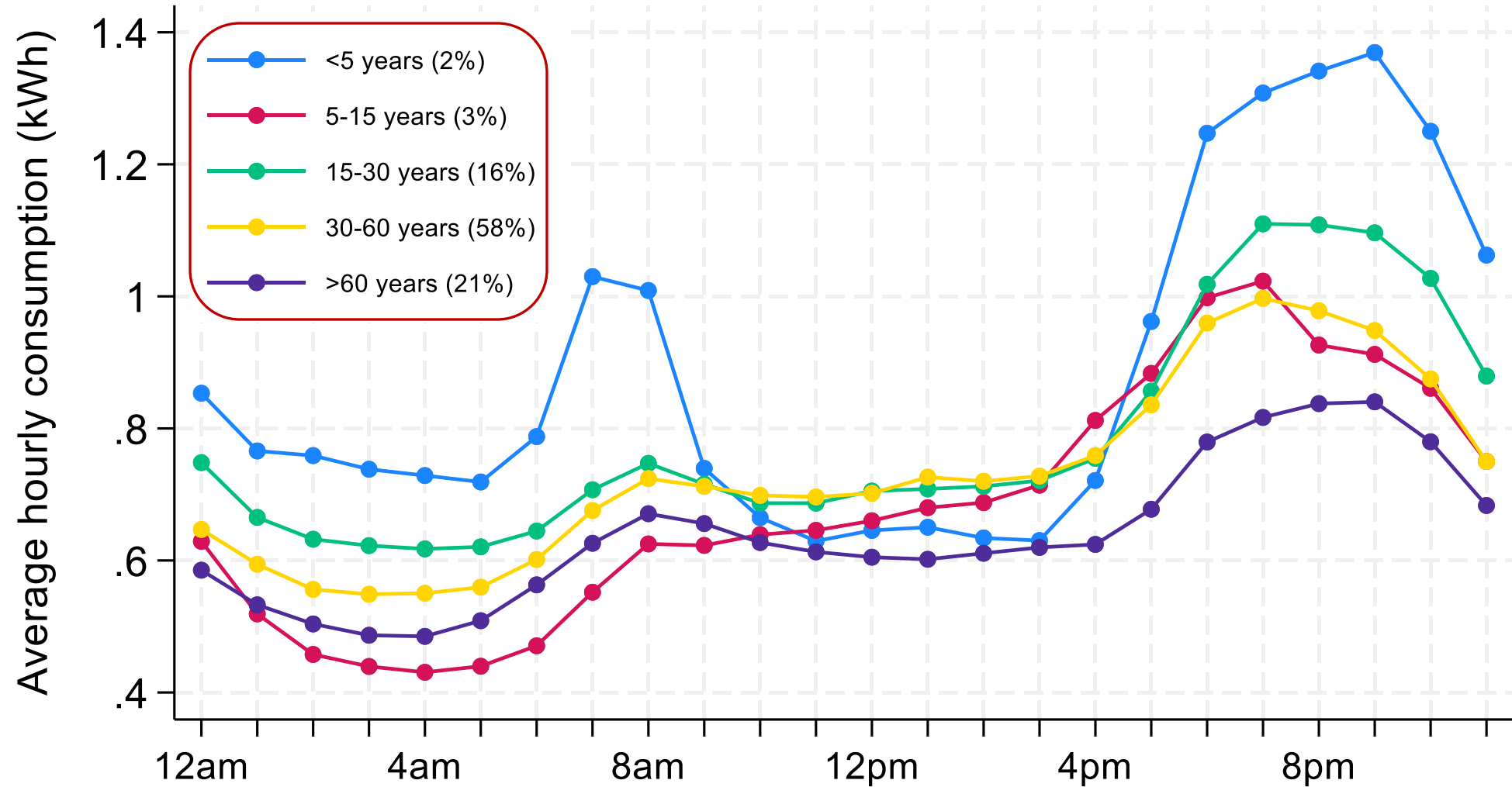
Residence characteristics

- Type of residence
- Age of residence
- Bedrooms
- Efficiency upgrades

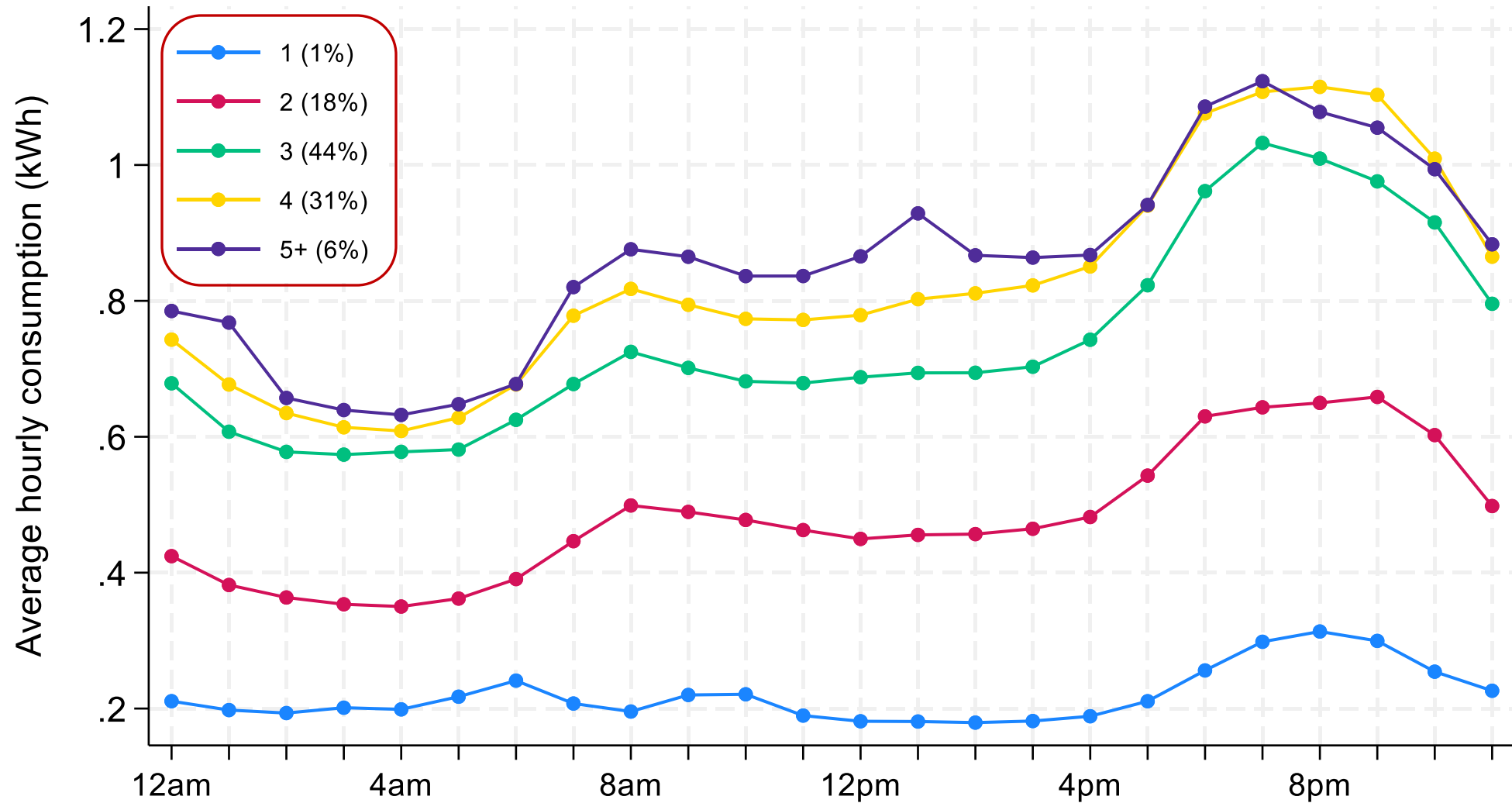
Hourly consumption pattern by type of residence



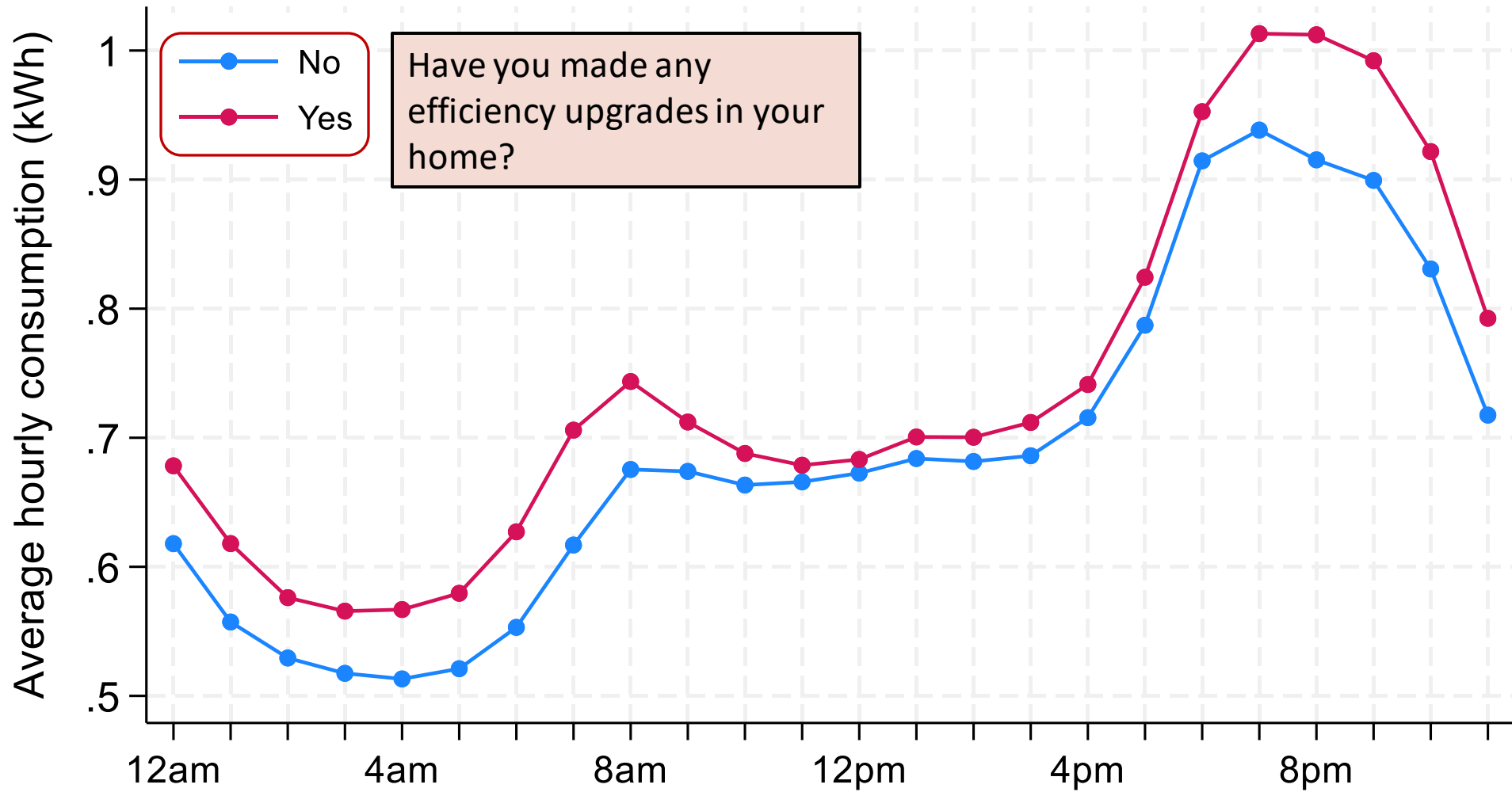
Hourly consumption pattern by age of residence



Hourly consumption pattern by number of bedrooms



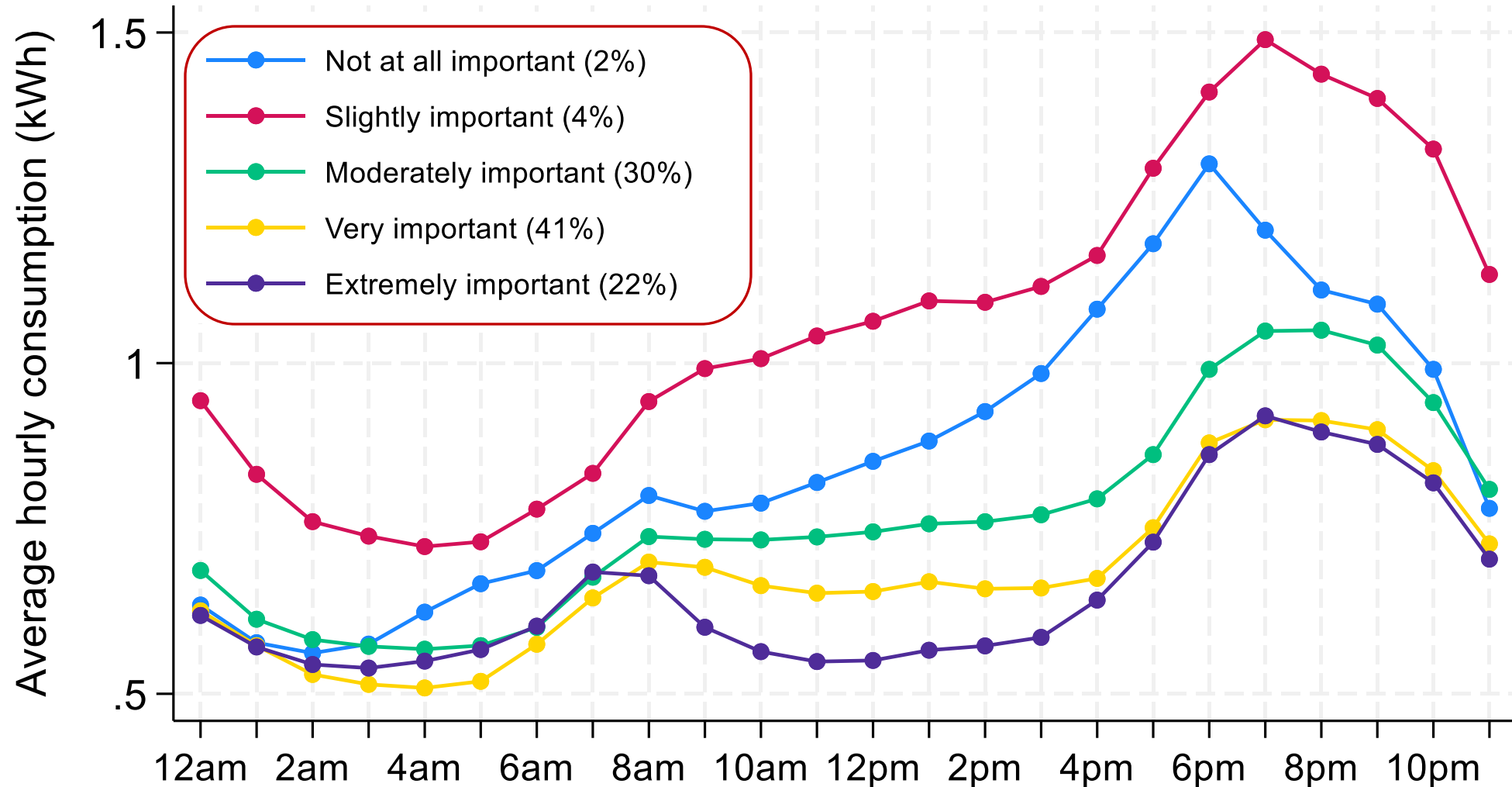
Consumption pattern and efficiency upgrades



Attitudes and preferences

- How important is energy conservation to you personally?

How important is energy conservation to you personally?



Summary

Consumption appears to be impacted by:

- **Usage habits:** tracking usage decreases consumption
- **Residence characteristics:** bigger and newer single-family detached homes use more
- **Household characteristics:** income and number of kids increases consumption
- **Attitudes and preferences:** valuing conservation decreases consumption
- **Time:** time of day, day of week, month of year

Directions of effect are consistent with other studies, but many variables are correlated

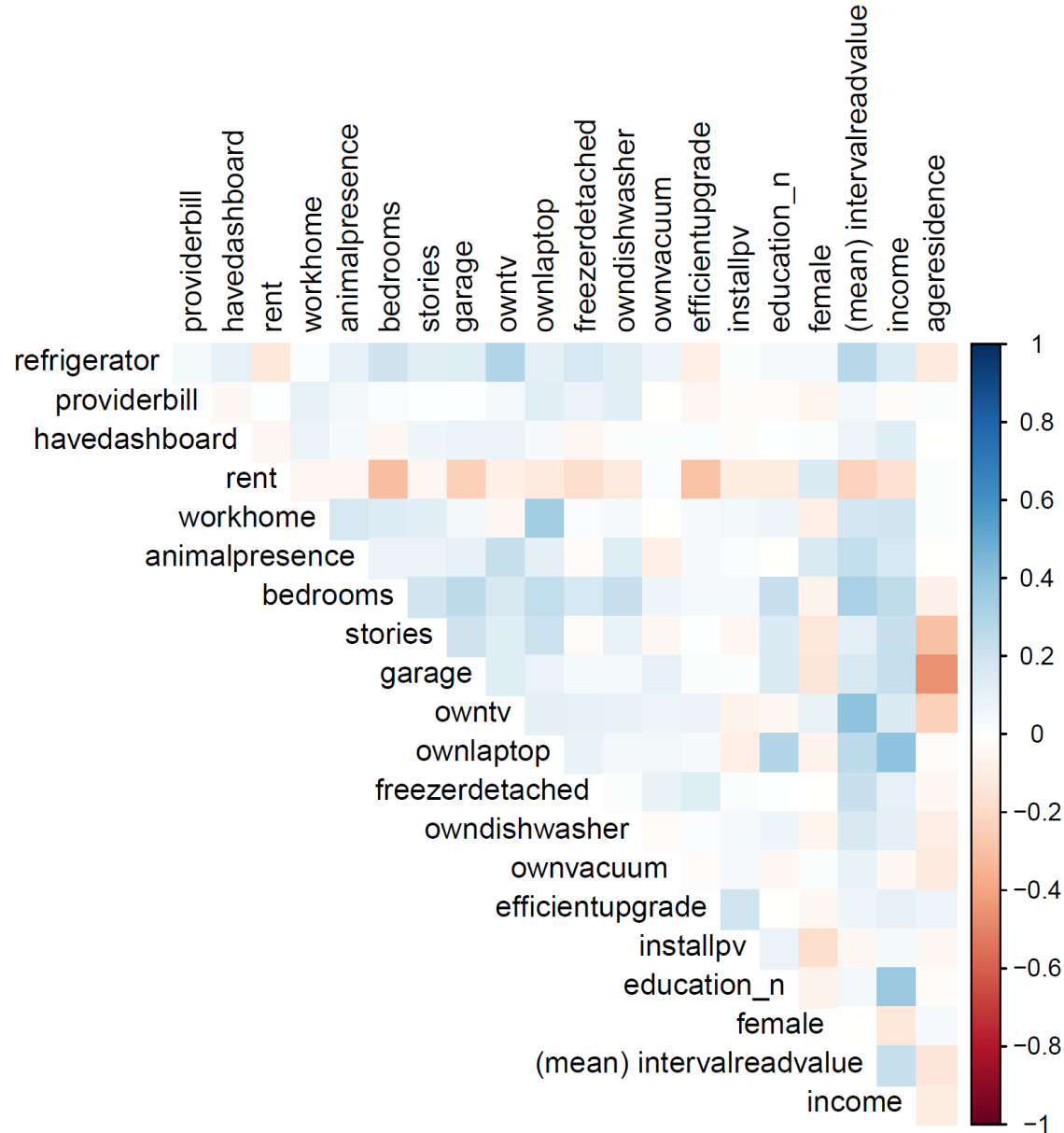


Correlation between variables

Many of the variables are correlated with each other

- Income and education
- Income and number of kids
- Number of bedrooms and type of residence
- Number of stories and age of residence

This means that some patterns seen in the raw data may be over- or under-stated



- **Blue** implies *positive* correlation. For example, income is correlated with the number of TVs owned
- **Red** implies *negative* correlation. For example, older homes are less likely to be multi-story

Because these variables are correlated, we need to develop an econometric model that takes into account the complexities of use.

Econometric model

Control for all relevant variables at the same time to isolate the effect of each variable including, for example:

- Residence/household characteristics (type of home, income, WFH, children etc.)
- Attitudes (importance of energy conservation)
- Weather (temperature)
- Time (year, month, day-of-the-week, hour)
- Lagged consumption (e.g.: how does consumption at 8am, impact consumption at 9am?)

Goal: Model hourly electricity consumption to identify statistically significant variation in patterns across types of households to improve understanding of consumption.

Questions and comments

Contact information:

- Zuzia Olszowka zuzia@unm.edu
- Dr. Yuting Yang yutingyang@unm.edu
- Dr. Janie Chermak jchermak@unm.edu