

# Housing Market Institutions Drive Race and Ethnicity Differences in Energy Consumption

Michael Edwards

James Woods

March 14, 2015

## Abstract

When socio-demographic factors are considered in any kind of analysis of household electric and gas utility data, it is common to observe differences in energy use between households with different self-reported race and ethnicity compositions. These differences persist controlling for structure type, e.g., single family dwelling, age and size of housing units, and, other common control variables. Without the information necessary to better explain these differences, they are commonly summarized simply as cultural differences. This paper demonstrates that these differences can be partially explained by differential sorting by structure and ownership, i.e., endogenizing housing choice and rental decisions. We will show that these differences in energy consumption may be because of housing market institutions and restrictions.

## 1 Introduction

[12]

### 1.1 Race and Ethnicity in Conditional Demand

### 1.2 How Race and Ethnicity are Interpreted

## 2 RECS

### 2.1 Race and Ethnicity Differences in Equipment and Structure

### 2.2 Differences in Reported Behavior

## 3 Conditional Demand Estimation

### 3.1 Orthodox Results

### 3.2 Single Equation Methods

### 3.3 Multiple Equation Methods

## 4 Summary and Conclusions

## References

- [1] Joseph M Burgett and Abdol R Chini. Using building and occupant characteristics to predict residential residual miscellaneous electrical loads: a comparison between an asset label and an occupant-based operational model for homes in florida. *Journal of Building Performance Simulation*, (ahead-of-print):1–17, 2015.
- [2] Lucas W Davis. Evaluating the slow adoption of energy efficient investments: are renters less likely to have energy efficient appliances? In *The Design and Implementation of US Climate Policy*, pages 301–316. University of Chicago Press, 2011.
- [3] DOE EIA. Residential energy consumption survey (recs), 2008.
- [4] Hossein Estiri. 21 percent: The role of socioeconomics and housing characteristics on co2 emissions from the us residential sector. *Available at SSRN 2196984*, 2012.
- [5] Hossein Estiri. Building and household x-factors and energy consumption at the residential sector: A structural equation analysis of the effects of household and building characteristics on the annual energy consumption of us residential buildings. *Energy Economics*, 43:178–184, 2014.
- [6] Hossein Estiri. A structural equation model of energy consumption in the united states: Untangling the complexity of per-capita residential energy use. *Energy Research & Social Science*, 6:109–120, 2015.

- [7] Hossein Estiri, Ryan Gabriel, Eric Howard, and Li Wang. Different regions, differences in energy consumption: Do regions account for the variability in household energy consumption? *Differences in Energy Consumption: Do Regions Account for the Variability in Household Energy Consumption*, 2013.
- [8] Chao Li. *HOME ENERGY CONSUMPTION ESTIMATION BY END USE AND ENERGY EFFICIENCY UPGRADE RECOMMENDATIONS*. PhD thesis, Duke University, 2014.
- [9] Kelly Hellman Miller, Francesca Colantuoni, and Christine Lasco Crago. An empirical analysis of residential energy efficiency adoption by housing types and occupancy. 2014.
- [10] U.S. Department of Housing and DC Urban Development, Washington. Annual report of fair housing, fy 2010, 2010.
- [11] Gary Pivo. Unequal access to energy efficiency in us multifamily rental housing: opportunities to improve. *Building Research & Information*, 42(5):551–573, 2014.
- [12] R Core Team. *R: A Language and Environment for Statistical Computing*. R Foundation for Statistical Computing, Vienna, Austria, 2013.
- [13] Thomas F Sanquist, Heather Orr, Bin Shui, and Alvah C Bittner. Lifestyle factors in us residential electricity consumption. *Energy Policy*, 42:354–364, 2012.
- [14] DC U.S. Energy Information Administration, Washington. Residential energy consumption survey, doe/eia- forms eia 457a-g, 2009.