Drivers of U.S. Household Energy Consumption, 1980-2009

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## Overview

## In 2012, the residential sector accounted for 21percent of total primary energy consumption and about 20 percent of carbon dioxide emissions in the United States. Because of the importance of residential sector energy consumption to the environment and the economy, this study is undertaken to help provide a better understanding of the factors affecting energy consumption in this sector. The paper focuses on quantifying the effects of changes in several key factors over the study period.

## Methods

The analysis is based on the Log Mean Divisia Index (LMDI) which provides exact decompositions and is easy to compute. We analyze three energy consumption concepts: total site energy, total electricity, and total natural gas for space heating. Growth in these three concepts is isolated into five effects: the number of buildings, size of living area, housing type, U.S. Census region, and energy intensity. The U.S. Energy Information Administration, Residential Energy Consumption Survey (RECS) estimates from 1980-2009 provide the data for our analysis.

## Results

The preliminary results show that change in intensity was the dominant reducing effect for total energy and natural gas consumption over the total interval, ceteris paribus. The reduction in energy consumption accounted for by the decomposed total energy intensity was more than 80 percent of total electricity consumption by U.S. households in 2009. Weather was the only reducing effect for total natural gas.

## Conclusions

Analysis of decomposition for three sub-periods indicates that an increase in the average size of living area in the 1990-2000 sub-period had the largest increasing effect on energy consumption in the decompositions for all three energy concepts. Energy intensity per square foot also declined faster during this sub-period, which may be affected by the increasing prevalence and effectiveness of energy efficiency standards and other information programs. Electricity intensity increased during all sub-periods except for the 1990-2000 sub-period.

## References

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