

## MEMORANDUM

**To:** Carole Voulgaris, Course Instructor, SES 5215  
**From:** Jane Doe, Student, SES 5215  
**Date:** October 28, 2022  
**Subject:** Assignment 5, Multiple regression

The purpose of this memo is to present the results of a linear regression model that addresses the question:

### **What is the effect of a person's income on their typical travel time to work, after accounting for the effects of transportation mode and population density?**

This analysis draws on census microdata from the 2015-2019 American Community Survey, which I accessed through IPUMS<sup>1</sup>. My dataset includes survey all Survey respondents from California who indicated a usual commute time of more than zero minutes and a non-zero annual income (804,299 people). The variables in my data set are:

- Commute time (outcome): The self-reported typical time (in minutes) it took to get from home to work in the week prior to the survey.
- Commute mode (predictor): The most common mode of transportation used to reach work in the week prior to the survey.
- Income (predictor): The person's pre-tax income in the year prior to the survey.
- Population density (predictor): The number of people per square mile of land area in the public-use microdata area (PUMA) in which the person lives.

### **Regression results**

I estimated a linear regression model predicting commute time based on income, population density, and commute mode. All continuous variables are log-transformed. The results are shown Table 1. The model has an R-squared value of 0.11, which indicates that 11 percent of the variation in commute duration can be explained by the variation in population density, commute mode, and income. Higher incomes are significantly associated with longer commute times, controlling for differences in commute mode and population density.

**Table 1: Results of regression model predicting commute time based in travel mode**

Coefficient	Estimated value	p-value
Population density	0.05	<0.01
Income	0.08	<0.01
<i>Commute mode (relative to car)</i>		
Bike	-0.303	<0.01
Transit	0.644	<0.01
Walk	-0.927	<0.01
Other	-0.000	0.998

<sup>1</sup> Steven Ruggles, Sarah Flood, Ronald Goeken, Megan Schouweiler and Matthew Sobek. *IPUMS USA: Version 12.0* [dataset]. Minneapolis, MN: IPUMS, 2022.  
<https://doi.org/10.18128/D010.V12.0>