Journal of Transport Geography 66 (2018) 19–29

Contents lists available at ScienceDirect

Journal of Transport Geography

journal homepage: www.elsevier.com/locate/jtrangeo

# The commuting behavior of workers in the United States: Differences between the employed and the self-employed☆

J. Ignacio Gimenez-Nadal[a,b,*], Jose Alberto Molina[a,b,c], Jorge Velilla[a]

[a] University of Zaragoza, Spain
[b] Institute for Biocomputation and Physics of Complex Systems (BIFI), Zaragoza, Spain
[c] IZA, Germany

ARTICLE INFO

*Keywords:*
Commuting
Urban cores
American time use survey
Self-employed workers
Employed workers

ABSTRACT

In this paper, we analyze the commuting behavior of workers in the United States, with a focus on the differences between employees and the self-employed. Using the American Time Use Survey for the years 2003–2014, our empirical results show that employees spend 7.22 more minutes per day commuting than their self-employed counterparts, which represents a difference of 17% of the average commuting time of employed workers. This is especially prevalent in non-metropolitan areas, and it also appears to depend on the size of the population of the area of residence. Our results suggest that there is a complex relationship between urban form and the commuting behavior of workers.

## 1. Introduction

In this paper, we analyze the commuting behavior of workers in the United States, with a focus on the difference between employees and the self-employed. The analysis of commuting behavior is important for several reasons. Kahneman et al. (2004) and Kahneman and Krueger (2006) show that time spent in commuting ranks among the lowest activities in terms of the "instant enjoyment" obtained by individuals. There are also psychological costs associated with travel (Koslowsky et al., 1995; Evans et al., 2002; Kahneman et al., 2004), and commuting and health outcomes are negatively related (Walsleben et al., 1999; Jansen et al., 2003; Hämming et al., 2009; Hansson et al., 2011; Roberts et al., 2011). Furthermore, longer commutes are systematically associated with lower levels of well-being (Frey and Stutzer, 2008; Novaco and Gonzalez, 2009), and long commutes create stress for workers (Schaeffer et al., 1988; Hennessy and Wiesenthal, 1999; Wener et al., 2003; Gottholmseder et al., 2009; Novaco et al., 1990). Recent studies have shown that the time devoted to commuting has increased in recent years, in developed countries such as Germany (Gimenez-Nadal and Molina, 2014), the Netherlands (Susilo and Maat, 2007; Gimenez-Nadal and Molina, 2014) and the United States (Kirby and LeSage, 2009; McKenzie and Rapino, 2009; Gimenez-Nadal and Molina, 2016), leading to commuting time being a significant part of the total time devoted to the labor market (Kenworthy and Laube, 1999).

The commuting behavior of individuals has been extensively analyzed (see Ma and Banister, 2006, for a chronological review), and it has been incorporated into a range of theoretical models. According to job search models (van den Berg and Gorter, 1997; van Ommeren, 1998; Rouwendal, 2004), commuting is considered a source of labor mobility that allows workers to access geographically-dispersed labor markets without the need for migration (Cameron and Muellbauer, 1998). From the point of view of transport economics, commuters choose a mode of transport to minimize the monetary and opportunity costs of travel (DeSalvo and Huq, 1996). In urban economics, the focus is on household location, where commuting is generally assumed to confer disutility, and households are located to maximise the utility obtained from housing and all other goods (see the "monocentric city model" in Alonso (1964), Mills (1967) and Muth (1969), and the "polycentric city model" developed by Muller (1981), Garreau (1991), and Knox and McCarthy (2005)).

In this paper we use the American Time Use Survey (ATUS) for the years 2003–2014 to examine the time devoted to commuting by employees and self-employed workers, with a focus on the difference between the two groups. We find that employees devote around 7.22 more minutes per day commuting, compared to self-employed workers, which is a difference of 17% of the average commuting time of employed workers. Our results are robust to selection into employment and into working from home, and to differences in the quality of jobs as

☆ This paper was partially written while Jose Alberto Molina was Visiting Fellow at the Department of Economics of Boston College (US), to which he would like to express his thanks for the hospitality and facilities provided. This paper has benefited from funding from the Spanish Ministry of Economics (Project ECO2012-34828).

* Corresponding author at: Department of Economic Analysis, Faculty of Economics, C/Gran Via 2, 3rd floor, 50005 Zaragoza, Spain.
*E-mail address:* ngimenez@unizar.es (J. Ignacio Gimenez-Nadal).

http://dx.doi.org/10.1016/j.jtrangeo.2017.10.011
Received 11 September 2016; Received in revised form 29 August 2017; Accepted 14 October 2017

measured by income. This difference in commuting time is present in individuals working at least 20 h per week. Furthermore, when we take into account the geographical differentials across workers, we find that the difference in commuting time between the employed and the self-employed is present in the fringe zones of metropolitan areas, and in non-metropolitan areas, but not in the core metropolitan areas. Furthermore, we find that this difference also depends on the size (i.e., population) of the area where workers are located. Thus, the difference in commuting time between the employed and the self-employed does not exist in areas of greater employment density, and also depends on the size of the population of the area of residence, indicating the presence of a complex relationship between urban form and the commuting behavior of workers.

Our contribution to the literature is twofold. First, we contribute to the literature by offering up-to-date evidence of the commuting behavior of workers in the US, with a focus on location differences in commuting behavior. Following prior research on this topic (see Cropper and Gordon, 1991; Small and Song, 1992; Manning, 2003, and Rodriguez, 2004), we show that there is a complex relationship between urban form and the commuting behavior of US workers, which may be important for researchers and employers, and it warrants a more thorough investigation. Our results may also be of interest for policy makers, as transportation plans (e.g., highway construction, availability of public transport) may consider the geographical differences in commuting behavior. Second, we use information from a nationally-representative time use survey, which has been underused in the literature on commuting (National Travel Surveys have traditionally been used for the analysis of commuting patterns of households). Time is generally more accurate than distance, which presumably leads to a reduced error term (Small and Song, 1992; van Ommeren and Van der Straaten, 2008; Jara-Díaz and Rosales-Salas, 2015; Gimenez-Nadal and Molina, 2016), and thus the use of a time use survey can serve as a complement to National Travel Surveys (Kitamura and Fuji, 1997; Gimenez-Nadal and Molina, 2014; Gimenez-Nadal and Molina, 2016). There are alternative ways of looking at commuting (according to the effort/cost involved, the time spent, or the distance travelled), and this approach directly collects a number of aspects related to the cost of commuting, such as the condition and traffic density of roads and urban highways, among others, which may result in slower speeds, longer trip times, and increased vehicular queueing. Prior literature using the ATUS to analyze the commuting behavior of workers includes Yang and French (2013), Kimbrough (2016), Stone and Schneider (2016) and Gimenez-Nadal et al. (2017).

The rest of the paper is organized as follows. Section 2 describes the data, Section 3 describes our econometric strategy,Section 4 presents the results, and Section 5 lays out our main conclusions.

## 2. Data and variables

### 2.1. Data and sample

We use the 2003–2014 American Time Use Survey (ATUS) to measure the commuting time of workers in the US. Respondents are asked to fill out a diary summarizing episodes of the preceding day, and thus the ATUS provides us with information on individual time use, based on diary questionnaires in which individuals report their activities throughout the 24 h of the day. The ATUS includes a set of activities, defined as the activity individuals were engaged in throughout the day, and thus we are able to add up the time devoted to any given reference activity (e.g., paid work, leisure, TV watching). The ATUS is administered by the US Bureau of Labor Statistics, and is considered the official time use survey of the country. More information can be found at http://www.bls.gov/tus/.

The advantage of time-use surveys over stylized questions, such as those included in the European Community Household Panel (ECHP), the British Household Panel Survey (BHPS), and the German Socio-Economic Panel (GSOEP), where respondents are asked how much time they have spent, for example, in the previous week, or normally spend each week, on any activity, is that diary-based estimates of time use are more reliable and accurate than estimates derived from direct questions (Juster and Stafford, 1985; Robinson, 1985; Bianchi et al., 2000; Bonke, 2005; Yee-Kan, 2008). Thus, in the same way that money-expenditure diaries have become the gold standard in the consumption literature, so have time-use diaries become the preferred method of gathering information about time spent on market work, non-market work, and leisure. Most studies documenting how individuals use their time are now based on these data sets (Aguiar and Hurst, 2007; Guryan et al., 2008; Ramey and Ramey, 2010; Sevilla et al., 2012).

We restrict the sample used throughout our analysis to workers between the ages of 21 and 65 (inclusive). Furthermore, given that workers may have reported their activities during non-working days, thus having no commuting time that day, we restrict the analysis to working days, defined as those days when individuals devoted at least 60 min to market work activities excluding commuting. We additionally exclude those workers who reported no time in commuting during the day of the survey, which represents 12% of the self-employed in our initial sample. We finally exclude those observations that can be considered outliers. To that end, we have identified the outliers in multivariate data using the blocked adaptive computationally efficient outlier nominators algorithm proposed by Billor et al. (2000).

Regarding the time devoted to commuting, we consider the activity "commuting to/from work", with the activity code "180501". Fig. 1 shows the average time devoted to commuting, during the years of the survey, for the selected sample. We have added a linear trend based on the average values, to gain an idea of the trends in commuting time. We observe that commuting time has increased during the years of the survey, consistent with prior studies finding that commuting time in the US has increased (Kirby and LeSage, 2009; McKenzie and Rapino, 2009; Gimenez-Nadal and Molina, 2016). Furthermore, when we focus on the measurement of the difference in the time devoted to commuting between employees and the self-employed, Table 1 shows the average time devoted to commuting by employees (42.27 min) and the self-employed (39.70 min) during their working days. We find a statistically-significant difference of − 2.57 min between the self-employed and employees, representing a difference in commuting time of 5.95%.

### 2.2. Geographic information

The ATUS includes several variables of the demographic location of

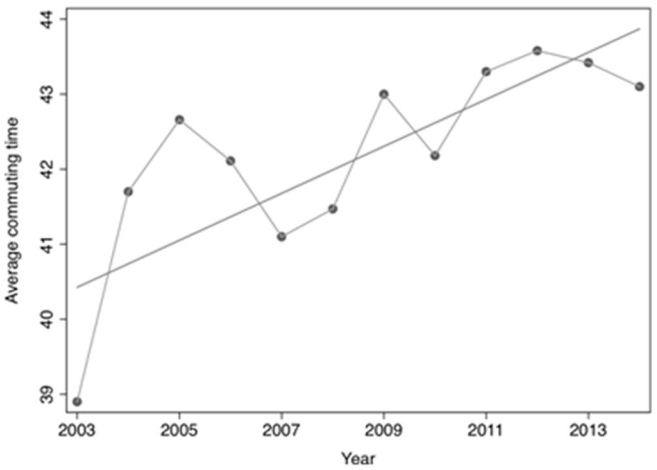


**Fig. 1.** Average commuting time, by year.
Note: The sample is restricted to individuals between 21 and 65, who are not students and are not retired, working as self-employed or employed, and who work and commute on the diary day, from the ATUS 2003–2014. Commuting time is measured in minutes per day.