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Commuting and self-employment in Western Europe*

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Abstract

This paper explores the commuting behavior of workers in Western European countries, with a focus on the differences in commuting time between employees and the self-employed in these countries. Using data from the last wave of the European Working Conditions Survey (2015), we analyze the commuting behavior of workers, finding that male and female self-employed workers devote 14% and 20% less time to commuting than their employee counterparts, respectively. Furthermore, differences in commuting time between employees and self-employed females depend on the degree of urbanization of the worker's residential location, as the difference in commuting time between the two groups of female workers is greater in rural areas, in comparison to workers living in urban areas. By analyzing differences in commuting time between groups of European workers, our analysis may serve to guide future planning programs.

Keywords: Commuting time, European Working Conditions Survey, Self-employed workers, Employees.

JEL Codes: R40; O57

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1. Introduction

This paper examines the commuting behavior of workers in seventeen European countries, focusing on differences in the time spent commuting to/from work between employed and self-employed workers. Commuting to/from work is a habitual activity for many, with millions of workers devoting time to the task, worldwide. For the specific commuting behavior of workers in Europe, in 2015 82% of workers lived in urban areas different from their respective workplaces (European Parliament Resolution 2014/2242 INI). Workers in Europe must cover the direct daily costs associated with commuting; costs in terms of time investments (time devoted to commuting, that cannot be devoted to other activities, such as leisure) and monetary costs (e.g., gasoline, fares on public transport), which may condition job and residence locations.

Commuting behavior has been found to have an impact on various dimensions of worker daily lives. For instance, Ross and Zenou (2008), van Ommeren and Gutierrez-i-Puigarnau (2011), Gimenez-Nadal, Molina and Velilla (2018b), and Grinza and Rycx (2018) all found a negative correlation between commuting and worker productivity, in terms of sickness absenteeism or shirking behaviors. Kahneman et al. (2004) and Kahneman and Krueger (2006) reported that commuting time ranks among the lowest worker activities in terms of “instant enjoyment”, and some authors have found that commuting has a significant impact on wages and labor supply (Leigh, 1986; Rupert, Stancanelli and Wasmer, 2009; Gershenson, 2013; Mulalic, van Ommeren and Pilegaard, 2014). Several authors have also found negative links between commuting and worker health outcomes, including subjective wellbeing, psychological problems, increased stress, and subjective health (Gottholmseder et al., 2009; Wener et al., 2003; Stutzer and Frey, 2008; Hansson et al., 2011; Roberts, Hodgson and Dolan, 2011; Dickerson, Hole and Munford, 2014; Kunn-Nelen, 2016; Simón, Casado-Díaz and Lillo-Bañuls, 2018; Gimenez-Nadal and Molina, 2019).

For the self-employed, prior research has found that such workers display different behaviors in comparison to employees. For instance, van Ommeren and van der Straaten (2008) consider that self-employed workers have less imperfect information about the job-search market than do employees, finding that self-employed workers commute around 40-60% less than their employee counterparts. More recently, Gimenez-Nadal, Molina and Velilla (2018a) studied differences in the time devoted to commuting by US employees and self-employed workers, finding a difference of about 17%. Also, Albert, Casado-Díaz and Simón (2018) analyzed the case of Spain, using information about commuting time from the

Quality of Life at Work Survey, and found a difference between employees and the self-employed ranging from 13% to 19.5%. Analyzing differences in the commuting behavior between employee and self-employed workers is important in the case of Europe, since self-employed workers represent a significant proportion - between 7% and 29% - of the working-age population.

Within this framework, we analyze differences in the commuting behavior of self-employed workers in comparison to employed workers, using the last wave of the European Working Conditions Survey (EWCS), for the last wave corresponding to the year 2015. In the analysis of the seventeen available countries, we find that female self-employed workers spend about 7.29 fewer minutes per day commuting than do their employee counterparts, while the difference for males is about 5.83 minutes per day. These results point to the existence of a significant gap in commuting time in Europe, with self-employed workers devoting less time to commuting. This difference in commuting does not depend on the country of reference, as we find statistically significant differences in the time devoted to commuting when the analysis is done for groups of countries (Nordic countries, Mediterranean countries, Anglo-Saxon countries, and Continental countries). These results are consistent with the results reported by Gimenez-Nadal, Molina and Velilla (2018a) for the United States, and Albert, Casado-Díaz and Simón (2019) for Spain. Furthermore, the difference in commuting time varies according to the urban characteristics of the areas where workers live, especially for females, as the commuting gap between employees and self-employed decreases in urban (intermediate) areas, relative to rural areas.

The main contributions of the paper are twofold. First, we contribute to the scarce literature on the differences in commuting behavior between employees and self-employed workers (van Ommeren and van der Straaten, 2008; Gimenez-Nadal, Molina and Velilla, 2018; Albert, Casado-Díaz and Simón, 2019). Prior research is based on the analysis of single countries, and their conclusions cannot be generalized to other countries. Our research extends the evidence to a set of countries that have, among other differences, different labour market structures and institutions, different social norms and different welfare regimes. The fact that we find differences in commuting behavior in a set of countries with different characteristics points to such differences being motivated by workers' behavioral differences, rather than by labour market structures or institutions.

Gimenez-Nadal, Molina and Velilla (2017) develop a theoretical model for commuting, where self-employed workers behave differently than employees. Despite that we find a gap in the time devoted to commuting between employees and self-employed workers, our

results show cross-country differences in this gap. Specifically, while the self-employed have shorter commutes in all the regions analyzed, the role played by urban characteristics seems to differ from one region to another. Limited sample sizes prevent us from doing a detailed analysis by country, and further research should investigate these potential differences using different sources of data (such as time use surveys as done by Gimenez-Nadal, Molina and Velilla (2018a) for the US).

The remainder of the paper is organized as follows. Section 2 describes the data and the variables. Section 3 describes the econometric strategy, and Section 4 shows the main results. Section 5 sets out our main conclusions.

2. Data and variables

We use data from the European Working Conditions Survey (EWCS), for the year 2015. The EWCS is a cross-sectional micro-database conducted every five years by Eurofound, since 1990. The survey is based on stylized questionnaires and includes information for the 28 European Union members, along with the five candidate countries, Switzerland, and Norway. The main purpose of the EWCS is to provide researchers and institutions with harmonized and cross-country information about the conditions of workers in their respective workplaces. Furthermore, the EWCS includes specific sociodemographic information for sampled individuals.

The sample used in our analysis is restricted to employees and self-employed workers in Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Norway, Portugal, Spain, Sweden, Switzerland, the Netherlands, and the United Kingdom (UK).¹ Since we are interested in workers, we restrict the analysis to individuals between 16 and 65 years old (inclusive) who report being employed or self-employed. Workers with missing information on the relevant variables, namely commuting time, age, gender, occupation, education, household composition, and urban status, are omitted, which leaves 20,721 workers in the sample, of whom 10,386 are females and 10,335 are males. See Table A1 in the Appendix for a summary of sample sizes, by country.

¹ Countries are classified in terms of their social welfare regimes as: Nordic countries (Denmark, Finland, Sweden, Norway), Mediterranean countries (Greece, Italy, Portugal, Spain), Anglo-Saxon countries (Ireland, the UK), and Continental countries (Austria, Belgium, France, Germany, Luxembourg, Switzerland, the Netherlands). For this clustering of countries we follow the Esping-Andersen and Fenger classification. See: http://www.learneurope.eu/files/6713/7526/7222/Welfare_State_models_in_Europe_en.jpg

The EWCS contains information about the employment status of individuals, and asks respondents the following question: “Are you working as an employee or are you self-employed?”; self-employed workers include “people who have their own business or are partners in a business as well as freelancers”, “respondents who work as an employee for their own business”, and “members of producers’ cooperatives”. Thus, the EWCS allows for a clear identification of self-employed workers. Based on this information, we define a dummy variable that takes value 1 for the self-employed, 0 otherwise (employees). In our sample, 14.0% (2,904 individuals) are self-employed, while the remaining 17,817 individuals are employees.

Commuting time in the 2015 EWCS is measured in minutes per day, from the following question: “In total, how many minutes per day do you usually spend travelling from home to work and back?”. It is important to acknowledge that time is, in general, more accurate than distance in measuring commutes, which leads to a reduced error term, and collects some aspects that distance alone cannot capture, such as traffic density, accessibility, or speed (van Ommeren and van der Straaten, 2008; Jara-Díaz and Rosales-Salas, 2015; Gimenez-Nadal, Molina and Velilla, 2018a).

Figure 1 shows the average commuting time in the analyzed countries, computed using the EWCS data.² This figure shows that there is some degree of homogeneity, depending on the country. For instance, average commuting time in Mediterranean countries is below 30 minutes per day in Italy and Portugal, and between 30 and 37 in Greece and Spain, with this group of countries showing the shortest commutes. On the other hand, commuting time in both Ireland and the UK is between 43 and 50 minutes per day. In Nordic countries, average commutes are also high, with Denmark, Finland, and Sweden between 43 and 50 minutes, and Norway between 37 and 43 minutes per day, on average. In Belgium, Germany, and Luxembourg, average commutes are between 43 and 50 minutes per day, while in France and the Netherlands average commutes decrease to between 37 and 43 minutes. The average commuting time in Switzerland and Austria is between 30 and 37 minutes per day.

Table 1 shows the average time devoted to commuting, for both self-employed and employees in the pooled sample. It also shows the difference in average values, and the p-value of the difference based on a t-type test of equality of means. We observe that self-employed workers devote 26.8 minutes per day, on average, to commuting, while employees

² For the computation of average commuting, we use the population weights included in the survey.

devote 42.8 minutes per day to this activity, with the difference of 16 minutes being statistically significant at standard levels.

We consider several socio-demographic characteristics that may be correlated with commuting time, among which is the age of respondents, measured in years. The 2015 wave of the EWCS includes information about respondents household composition, and we use this information to compute the number of household members (including the respondent), the presence of a married or unmarried couple (a dummy that takes value 1 for individuals who cohabit in a couple, 0 otherwise), the employment status of this couple (1 for employed couples, 0 otherwise), the number of children under 5 years old, and the number of children between 5 and 17 years old (inclusive). It is important to consider these household composition variables when studying commuting behaviors, as prior research has documented a significant relationship between commuting time and workers' marital status and household responsibilities (see Roberts, Hodgson and Dolan, 2011; McQuaid and Chen, 2012; Gimenez-Nadal and Molina, 2016).

We also consider the maximum level of education achieved by individuals, as worker human capital has been found to be positively correlated to commuting times (Ross and Zenou, 2008). The EWCS defines education in terms of 7 codes, including: 0) "pre-primary education", 1) "primary education or first stage of basic education", 2) "lower secondary or second stage of basic education", 3) "(upper) secondary education", 4) "post-secondary non-university education" 5) "first stage of university education", and 6) "second stage of university education". We define three dummies to characterize the maximum level of formal education achieved by workers: primary education (value 1 for individuals whose education category is 0 or 1), secondary education (value 1 for individuals whose category is 2, 3 or 4), and University (value 1 for individuals whose education category is 5 or 6).

The 2015 EWCS includes information about the urban/rural status of the region where respondents live, which has been found to be a significant predictor of commuting time in general (Gordon, Kumar and Richardson, 1989; Cropper and Gordon, 1991; Small and Song, 1992; Mieszkowski and Mills, 1993; Kahn, 2000).³ Furthermore, Gimenez-Nadal, Molina and Velilla (2018a) show, for the US, that the difference in commuting time between employees

³ This information is not available in previous waves of the EWCS data. The urbanization information is based on the DEGURBA classification, that defines three degrees of urbanization in terms of the "Local Administrative Units" (NUTS 2 in the case of the EWCS), as: 1) urban areas (cities, densely populated areas), 2) urban intermediate (towns and suburbs, intermediate density areas), and 3) rural areas (thinly populated areas). See https://ec.europa.eu/eurostat/ramon/miscellaneous/index.cfm?TargetUrl=DSP_DEGURBA.

and the self-employed varies according to the size of the area of residence. To that end, the EWCS identifies workers residing in “urban areas”, “urban intermediate” areas, and “rural areas”, so we define three dummy variables, in terms of the urbanization level, identifying these three categories.

Table 1 shows the proportion of workers living in rural areas, urban intermediate areas, and urban areas, by self-employment status. We observe differences between employees and self-employed workers’ locations, and employees appear to live more in urban areas than in rural areas, relative to the self-employed. We observe that 37.8% of the self-employed reside in urban areas, and 32.4% in urban intermediate areas, vs 41.4% and 36.0% of employees, respectively, with these differences being significant at standard levels. This leaves 29.7% of the self-employed and 22.6% of employees living in rural areas, with these percentages being also statistically significant at standard levels. Table 2 shows the average time devoted to commuting by both employees and self-employed workers, by urban/rural status. We observe that employees in urban areas spend about 46.2 minutes per day commuting to/from work, while self-employed workers in urban areas commute about 34.5 minutes (i.e., a raw difference of about 12 minutes, which is statistically significant at standard levels). Similarly, the average employee residing in an urban intermediate area commutes 40.6 minutes, vs 24.9 minutes for the average self-employed worker. This difference, of about 16 minutes per day, is also highly significant. Differences between employees and self-employed workers increase more in rural areas, where employees commute on average 40.1 minutes, vs 18.9 minutes for the self-employed, with a significant difference of more than 21 minutes per day.

Differences in workers’ occupation and economic activity (industry) have been found to be linked with worker commuting behavior (Hanson and Johnston, 1985; Gordon, Kumar and Richardson, 1989). Thus, we also define variables measuring occupation and economic activity of workers. The EWCS includes information about the occupation of workers, defined in terms of the International Standard Classification of Occupations, ISCO 88 (1 digit) codes, and about the economic activity of workers, in terms of the NACE 1 (the “statistical classification of economic activities in the European Community”). The ISCO 88 includes the following occupations: 0) “armed forces”; 1) “managers”; 2) “professionals”; 3) “technicians and associate professionals”; 4) “clerical support workers”; 5) “service and sales workers”; 6) “skilled agricultural, forestry and fishery workers”; 7) “craft and related trades workers”; 8) “plant and machine operators, and assemblers”; and 9) “elementary occupations”. As only 65 employees are found to work in armed forces occupations, the combination of armed forces and elementary occupations is taken as reference category for

the analysis. For the economic activity of workers, the EWCS collapses the NACE 1 into 11 categories: A-B) “agriculture, hunting, forestry, fishing”; C-D) “mining, quarrying, manufacturing”; E) “electricity, gas, and water supply”; F) “construction”; G) “wholesale and retail trade; repair”; H) “hotels and restaurants”; I) “transport, storage and communications”; J) “financial intermediation”; K) “real estate activities”; L) “public administration and defence”; and M-N-O-P-Q) “other services”, which is taken as reference activity for the analysis. Table 1 shows the rates of self-employed and employees in these occupations and economic activities.

3. Empirical strategy

We follow van Ommeren and van der Straaten (2008) and Gimenez-Nadal, Molina and Velilla (2018a), and analyze the differences in the log-of commuting time between self-employed workers and employees, net of observed heterogeneity. In doing so, we estimate Ordinary Least Squares (OLS) models on the time devoted to commuting, in terms of the self-employment status of workers, and a series of control variables.⁴ We estimate by OLS the following equation:

$$\log(1 + C_i) = \beta_0 + \beta_{SE}SE_i + \beta_X X_i + \varepsilon_i. \quad (1)$$

where C_i represents the daily minutes devoted to commuting to/from work for a given individual “ i ”. The variable SE_i is a dummy indicating whether individual “ i ” is self-employed (value 1), or an employee (value 0). Let X_i be a vector of socio-demographic and job characteristics, and ε_i the error term, which represents unmeasured factors.

Equation (1) is estimated separately by gender, given that female workers have, in general, shorter commutes than male workers (White, 1986; Crane, 2007; Gimenez-Nadal and Molina, 2016).⁵ We also include country fixed effects, in order to partially capture

⁴ So long as commuting time may take value 0 for home-based workers (i.e., telecommuters), alternative analysis could make use of tobit models (Tobin, 1958). However, prior research has compared tobit and OLS when studying time use, and results are similar (Frazis and Stewart, 2012; Gershuny, 2012; Foster and Kalenkoski, 2013). Thus, we rely on OLS for the analysis. Tobit estimates are shown in Columns (1) and (2) of Table A2 in the Appendix, and show similar results.

⁵ The average commuting times of female and male workers are 38.3 and 42.8 minutes per day to/from work, respectively, with the difference being statistically significant at standard levels. When we focus on differences in commuting time between employees and the self-employed, by gender, female self-employed commute about 20.7 minutes per day vs 40.2 minutes per day for their employee counterparts, while self-employed males commute, on average, 30.1 minutes, vs 45.4 minutes per day for their employee counterparts. The differences between employees and self-employed workers are statistically significant at standard levels.

potential differences among countries. Furthermore, robust standard errors are clustered at the country level, and estimates include sample weights

Since variables measuring urban characteristics of worker residence may be relevant in explaining commuting time, we re-estimate the model including a vector U_i of urban variables of the municipality where individual “ i ” lives. The augmented equation is as follows:

$$\log(1 + C_i) = \beta_0 + \beta_{SE}SE_i + \beta_U U_i + \beta_{SEU}SE_i U_i + \beta_X X_i + \varepsilon_i, \quad (2)$$

where the interaction between the self-employment status of workers and the vector of urban characteristics, $SE_i U_i$, is included, to capture any potential correlation between commuting time and the self-employment status of workers, depending on the urbanization level of residence, beyond the raw conditional correlations between commuting and self-employment, and between commuting and urban characteristics.

4. Results

Table 3 shows the results of estimating Equation (1) for male and female workers, respectively. These estimates include country fixed effects, in order to study the raw conditional correlation between commuting time and self-employment, net of country differences. Columns (1) and (2) show the results when only the dummy for self-employment status is included, and we observe a negative and highly significant correlation between self-employment and commuting time, for both female and male workers. Specifically, female self-employed commute on average 18% less time than their employed counterparts, while male self-employed devote 13% less time than their employed counterparts. These differences represent a conditional difference in the time devoted to commuting between female and male self-employed workers, and their employee counterparts, of about 7.29 and 5.83 minutes per day. Furthermore, the coefficient for male and female self-employed workers are not statistically different from each other at standard levels, according to a t-test ($p = 0.109$).

Columns (3) and (4) of Table 2 show estimates of Equation (1) for women and men, when we include workers’ sociodemographic and family characteristics (age, education, and household composition), but no labor attributes. Estimates reveal that these variables barely change the conditional correlation between log-of commuting time and self-employment, as the coefficients of interest are still negative and significant at standard levels and remain quantitatively unchanged from estimates in Columns (1) and (2). Finally, Columns (5) and

(6) include the complete set of sociodemographic and job characteristics (age, education, household composition, full time status, a dummy for public sector workers, and occupation and economic activity fixed effects). Estimates of the main coefficient are again qualitatively and quantitatively unchanged from estimates in Columns (1) and (2). Results suggest that female self-employed workers commute about 19.8% less time than their employee counterparts, while male self-employed devote 14.2% less time commuting than their employee counterparts. These results are in line with prior research for the Netherlands (van Ommeren and van der Straaten, 2008), the US (Gimenez-Nadal, Molina and Velilla, 2018a), and Spain (Albert, Casado-Díaz and Simón, 2019).

For the rest of the coefficients, estimates suggest that age is negatively related to commuting time for females, while the associated coefficient is positive and not significant for males. For education, women with secondary education commute about 2.5% less than women who only have primary education, whereas the analogous coefficient for males is not significant at standard levels. However, both female and male workers with University education commute more (about 4.2% and 7.0% more, respectively) than their counterparts with only primary education. Living in couple is not found to be correlated with commuting time at standard levels, while the couple's labor status is not significant for males, but working females in a couple commute 2.6% less. Similarly, family size is only significant for females, suggesting that female workers in larger households have shorter commutes, in line with the "household responsibilities hypothesis" (Gimenez-Nadal and Molina, 2016). The number of children is estimated not to be significant for both males and females. Regarding job characteristics, full time female (male) workers spend 4.5% (2.9%) more commuting time than their non-full-time worker counterparts, while working in the public sector is negatively correlated with commuting time, but is only significant among males, where public sector male workers spend about 2.7% less commuting time than their female counterparts.

It is important to note that the R-squared associated with commuting models is typically estimated to be low (van Ommeren and van der Straaten, 2008), that is, between 0.057 in Column (1), and 0.103 in Column (5), in the case of the current analysis. This result suggests that commuting is a process that depends on stochastic or non-observable factors, such as the weather, traffic congestion, or communication infrastructures.

Results by country groups

Table 4 shows estimates of Equation (1) by country groups, that is to say, for Nordic countries (Denmark, Finland, Sweden, Norway) in Columns (1) and (2), Mediterranean countries (Greece, Italy, Portugal, Spain) in Columns (3) and (4), Continental countries (Austria, Belgium, France, Germany, Luxembourg, Switzerland, the Netherlands) in Columns (5) and (6), and Anglo-Saxon countries (Ireland, the UK) in Columns (7) and (8). Estimates show some quantitative differences among country groups, although qualitatively the correlation between self-employment and commuting is negative and highly significant in almost all the countries. Specifically, in Nordic countries, female and male self-employed workers commute 27.5% and 15.1% less time than their employed counterparts, while in Mediterranean countries the differences are 12.6% and 13.1% for females and males, and 25.3% and 21.2% for females and males in Continental countries. In Anglo-Saxon countries, however, differences are only significant for female workers, as female self-employed commute about 17.6% less than female employees, but the difference between self-employed and employee male workers is not significant at standard levels.

Differences in commuting, by urbanization characteristics

Results in Tables 3 and 4 suggest a negative correlation between commuting time and self-employment, indicating that self-employed female and male workers commute about 7.29 and 5.83 minutes less than their employed counterparts. However, these differences may be due to different urban characteristics of residence, as found by Gimenez-Nadal, Molina and Velilla (2018a) for the US. For instance, Table 2 shows the average commuting time of female and male self-employed and employed workers, depending on the degree of urbanization of their residence location (urban areas, urban intermediate areas, and rural areas). The female self-employed and employed workers devote 28.5 and 42.9 minutes to commuting, 17.7 and 38.0 minutes in urban intermediate areas, and 14.6 and 34.1 minutes in rural areas. The differences in commuting time between female self-employed and employed workers indicate that the former devote less time to commuting in urban areas (14.42 minutes), urban intermediate areas (20.29 minutes) and rural areas (24.33), with these differences being statistically significant at standard levels (Column 4).

For males, results are similar. Male self-employed workers commute, on average, 37.7, 29.1, and 21.3 minutes in urban areas, urban intermediate areas and rural areas, respectively,

while male employees devote 49.2, 43.3, and 41.3 minutes in the same areas, respectively. This leads to differences in commuting time between male self-employed and employed workers of 11.51, 14.13, and 20.05 minutes in urban areas, urban intermediate areas and rural areas, respectively, with these differences being statistically significant at standard levels. These magnitudes suggest that the differences arise from urban characteristics, as the difference in commuting time between self-employed and employed workers seems to be larger in rural areas in comparison to urban (intermediate) areas.

Table 5 shows estimates of Equation (2). Columns (1) and (2) show estimates for women and men, respectively, where all the countries are considered and country fixed effects are included.⁶ Results show a statistically significant negative correlation between the self-employment status of female and male workers and commuting time, showing that female and male self-employed workers devote 25.4% and 18.0% less time to commuting than their employed counterparts. Regarding the location of worker's residence in urban or rural areas, and considering that living in rural areas is the category of reference, for female workers there are no statistically significant differences between the degree of urbanization and their commuting time. In the case of male workers, those living in urban areas devote 4.74% more minutes to commuting than workers living in rural areas.

When we analyze differences between self-employed and employed workers according to the degree of urbanization, the interaction terms between commuting time and degree of urbanization are significant at standard levels for female workers only. Specifically, despite the negative correlation between commuting and self-employment in general terms, differences between the self-employed and employees are smaller for female workers in urban and urban intermediate areas. While female self-employed workers living in rural areas devote 25.36% less time to commuting time than their employed counterparts, those living in urban intermediate areas and urban areas devote 20.01% and 15.45% less time to commuting than their employed counterparts. In the case of male workers, the interactions between self-employment and urban characteristics are not statistically significant at standard levels, indicating that differences between male self-employed and employed workers does not depend on the degree of urbanization.

These results contrast with the findings reported in Gimenez-Nadal, Molina and Velilla (2018a) for the US, who find that while self-employed workers in non-metropolitan and

⁶ Table 5 shows only the main coefficients of interest, but estimates also include the same control variables as Columns (5) and (6) of Table 3. Additional coefficients are available upon request.

fringe-metropolitan areas commute 24% and 9% less than their employed counterparts living in similar areas, differences in commuting time between self-employed and employed workers in metropolitan center areas (densely populated areas) are not significant. The results reported here may indicate that European workers have a different commuting behavior regarding urban characteristics, despite that the relationship between self-employment status and commuting is similar when the degree of urbanization is not explored. On the contrary, differences between the US and Europe in the relationship between commuting time, self-employment, and urban structure may be due to a range of factors, including differences in the definition of variables (e.g., urbanization characteristics in the EWCS, and metropolitan information in the ATUS), different urban structures between the US and European countries, such as the location of urban and employment cores (Brueckner, Thisse and Zenou, 1999; Brueckner and Rosenthal, 2009) or unmeasured factors (e.g., the EWCS does not allow us to control for the commuting mode, such as commuting by car, commuting by public transport, or active commuting) among others. If anything, these results are in line with prior research suggesting the existence of a complex relationship between commuting behaviors and urban structure (e.g., Manning, 2003; Rodríguez, 2004; Gimenez-Nadal, Molina and Velilla, 2018a).

Columns (3) to (10) show estimates of Equation (2) by country groups, analogously to Table 3. Results show that estimates are, in general terms, similar to those in Columns (1) and (2) for the whole sample. The conditional correlation between commuting time and the self-employment status of workers is negative and significant at standard levels for all Columns. However, the conditional correlations between commuting time and urban characteristics are not the same across groups of countries, which may be due to real differences in urban characteristics that impact commuting time, but also to the limited sample sizes of some of the country groups included in the analysis. Results for Nordic and Continental countries are mostly analogous to the general case (Columns (1) and (2) of Table 5), as coefficients are qualitatively unchanged. In the Mediterranean countries, while female self-employed workers living in rural areas devote 12.93% less time to commuting than their employed counterparts, those living in urban areas devote 7.54% less time to commuting than their employed counterparts; this difference between rural and urban intermediate status is statistically significant at the 90 percent level. Anglo-Saxon countries show some differences in the estimated relationship between commuting time and self-employment.⁷

⁷ It must be remarked that this group of countries shows the most limited sample size, so these results should be interpreted cautiously.

While female and male self-employed workers living in rural areas commute 23% and 20% less than their employed counterparts, female and male self-employed workers living in urban intermediate areas devote 5% and 6.63% less time to commuting, while male self-employed workers living in urban areas devote only 2.85 % more time to commuting time than do their employed counterparts.

Robustness tests

We have computed several robustness checks. Columns (3) and (4) in Table A2 in Appendix A show estimates of Equation (1), restricted to private sector workers, and results are qualitatively similar, although differences between employees and self-employed increase to 19% and 14% for women and men, respectively. Columns (5) and (6) show estimates controlling for some additional regressors, namely weekly working hours, the level of responsibility in the current occupation (measured with two dummies that identify workers who are in charge of between 1 and 9 workers, and workers who are in charge of 10 or more workers), and monthly earnings. As these explanatory variables may lead to endogeneity issues, they have not been included in the main analysis. Results are, however, similar to estimates in Table 2. We have re-estimated the models, excluding workers who report zero commuting time. The distribution of zero commuters, by occupation, is shown in Table A3 in the Appendix, and estimates are shown in table A4. Results are similar to those estimated in Table 5.

5. Conclusions

This paper analyzes the relationship between self-employment and the commuting behavior of male and female workers in seventeen Western Europe countries, using the 2015 European Working Conditions Survey. We show a negative and significant correlation between commuting time and the self-employment status of workers, relative to employees, with differences ranging between 14% and 20%. Specifically, female self-employed workers are found to commute 7.29 fewer minutes per day than their employee counterparts, while male self-employed workers commute 5.83 fewer minutes per day than employees. These results are in line with prior research analyzing the Netherlands, the US, and Spain. Furthermore, results suggest that urban characteristics are important in such differences in

commuting time, which seem to be smaller in urban areas than in rural areas, especially among female workers.

The results found in this paper may be relevant for researchers and policy makers. Results should encourage further research on the relationship between commuting behaviors, occupational choices, and urban structures and communication infrastructures, which appear to be interconnected in a complex way. The use of different data sources, such as detailed time use diaries, panel databases, or specific regional surveys, with detailed information at the urban level, may be enlightening. Furthermore, the results suggest that the commuting gap between the self-employed and employees is smaller in rural areas, so policy makers should target densely populated regions, as workers in those areas appear to be more prone to longer commuting, with the corresponding impact of such commutes on their daily lives. For instance, reduction of housing costs or policies favoring housing rentals may help to improve workers' residence location and, consequently, reduce their commuting trips. Similarly, improvements in communication infrastructure and public transport services may also reduce worker commuting costs and help workers to re-orient their residence and/or workplace choices. Besides that, reduced commutes would be beneficial for the whole society through their impact on traffic congestion, agglomeration, and air pollution, which is a matter of current concern for policy makers, especially in several urban areas of Europe such as London ("LEZ" and "ULEZ"), Paris ("clean air" stickers and "Paris breathes" campaign), Berlin ("Environmental Zone"), Madrid ("Madrid Central"), Lisbon, Amsterdam, and several Italian cities ("Traffico Limitato" zones).

The analysis has certain limitations. First, the data used throughout the analysis is cross-sectional, and therefore estimates must be interpreted as conditional correlations, and no causal results can be derived from the analysis. Similarly, we cannot control for individual unobserved factors, nor for selection into employment, as the data used in this research has no longitudinal dimension. Further research should focus on the use of databases with panel structure to overcome these issues. Third, despite the use of a harmonized database, limited sample sizes at the country level prevent us from a detailed analysis for each of the countries in the sample.

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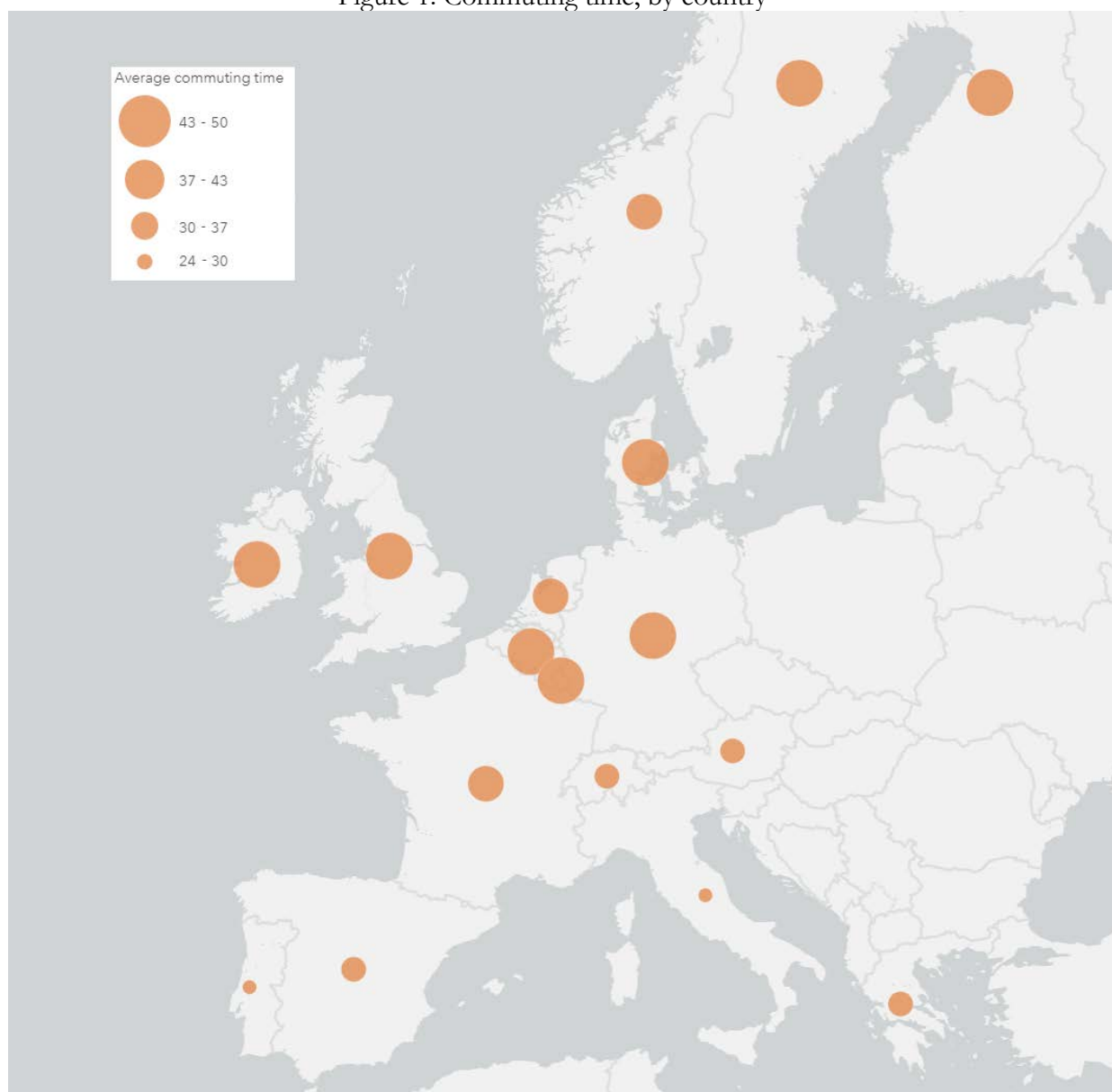
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Figure 1: Commuting time, by country



Source: Authors computation, using the 2015 EWCS.

Table 1: Summary statistics

| VARIABLES | Self-employed | | Employees | | Difference | |
|-------------------------------|---------------|--------|-----------|--------|------------|----------|
| | Mean | S.D. | Mean | S.D. | Diff. | P-value |
| Commuting time | 26.760 | 37.281 | 42.793 | 36.162 | -16.033 | (<0.001) |
| Male | 0.643 | 0.479 | 0.500 | 0.500 | 0.143 | (<0.001) |
| Age | 46.388 | 10.682 | 41.935 | 11.601 | 4.454 | (<0.001) |
| Primary education | 0.229 | 0.420 | 0.168 | 0.374 | 0.061 | (<0.001) |
| Secondary education | 0.417 | 0.493 | 0.494 | 0.500 | -0.078 | (<0.001) |
| University education | 0.354 | 0.478 | 0.338 | 0.473 | 0.017 | (0.004) |
| Living in couple | 0.742 | 0.438 | 0.692 | 0.462 | 0.050 | (<0.001) |
| Couple's employment status | 0.748 | 0.434 | 0.785 | 0.411 | -0.037 | (<0.001) |
| Family size | 2.884 | 1.249 | 2.828 | 1.236 | 0.056 | (0.023) |
| N. children under 5 | 0.127 | 0.397 | 0.146 | 0.413 | -0.019 | (0.003) |
| N. children between 5 and 17 | 0.479 | 0.821 | 0.471 | 0.811 | 0.007 | (0.919) |
| Full time worker | 0.822 | 0.383 | 0.745 | 0.436 | 0.076 | (<0.001) |
| Public sector worker | 0.034 | 0.181 | 0.250 | 0.433 | -0.217 | (<0.001) |
| Urban area | 0.378 | 0.485 | 0.414 | 0.493 | -0.035 | (<0.001) |
| Urban intermediate area | 0.324 | 0.468 | 0.360 | 0.480 | -0.036 | (<0.001) |
| Rural area | 0.297 | 0.457 | 0.226 | 0.418 | 0.071 | (<0.001) |
| Occupations | | | | | | |
| Armed forces | 0.000 | 0.000 | 0.004 | 0.060 | -0.004 | (<0.001) |
| Managers | 0.243 | 0.429 | 0.057 | 0.231 | 0.187 | (0.001) |
| Professionals | 0.161 | 0.367 | 0.190 | 0.393 | -0.030 | (<0.001) |
| Technicians | 0.121 | 0.326 | 0.140 | 0.347 | -0.020 | (<0.001) |
| Clerical support workers | 0.016 | 0.125 | 0.128 | 0.334 | -0.112 | (<0.044) |
| Service and sales | 0.120 | 0.325 | 0.190 | 0.392 | -0.070 | (<0.001) |
| Agric., forestry, fishery | 0.089 | 0.285 | 0.011 | 0.106 | 0.078 | (<0.001) |
| Craft and trade | 0.152 | 0.359 | 0.092 | 0.290 | 0.060 | (<0.001) |
| Operatos and assemblers | 0.040 | 0.195 | 0.073 | 0.260 | -0.033 | (<0.001) |
| Elementary occ. | 0.059 | 0.235 | 0.115 | 0.319 | -0.056 | (<0.001) |
| Economic activity | | | | | | |
| Agric., hunting, forestry | 0.124 | 0.329 | 0.018 | 0.133 | 0.105 | (<0.001) |
| Mining, quarrying, manuf. | 0.094 | 0.291 | 0.135 | 0.341 | -0.041 | (<0.001) |
| Electricity, gas, water supp. | 0.002 | 0.045 | 0.009 | 0.093 | -0.007 | (<0.001) |
| Construction | 0.095 | 0.294 | 0.054 | 0.226 | 0.041 | (<0.001) |
| Trade | 0.190 | 0.392 | 0.130 | 0.336 | 0.060 | (<0.001) |
| Hotels and restaurants | 0.073 | 0.260 | 0.052 | 0.221 | 0.021 | (<0.001) |
| Transport, storage, comm. | 0.043 | 0.203 | 0.071 | 0.257 | -0.028 | (<0.001) |
| Financial | 0.017 | 0.130 | 0.034 | 0.181 | -0.017 | (<0.001) |
| Real estate | 0.156 | 0.363 | 0.123 | 0.329 | 0.033 | (<0.001) |
| Public administration | 0.003 | 0.056 | 0.073 | 0.259 | -0.069 | (<0.001) |
| Other | 0.203 | 0.402 | 0.302 | 0.459 | -0.099 | (<0.001) |
| Observations | 2,904 | | 10,335 | | | |

Note: The sample (2015 EWCS) is restricted to employed and self-employed workers. All statistics computed using sample weights. Differences measured as the average value for self-employed workers, minus the average value for employees. T-type test p-values for the differences in parentheses.

Table 2: Commuting time, by urbanization

| VARIABLES | Self-employed | | Employees | | Difference | |
|--------------------|---------------|--------|-----------|--------|------------|----------|
| | Mean | S.D. | Mean | S.D. | Diff. | P-value |
| General | | | | | | |
| Urban area | 34.525 | 42.997 | 46.165 | 36.586 | -11.640 | (<0.001) |
| Urban intermediate | 24.933 | 35.060 | 40.607 | 35.899 | -15.674 | (<0.001) |
| Rural area | 18.862 | 28.997 | 40.104 | 15.305 | -21.242 | (<0.001) |
| Women | | | | | | |
| Urban area | 28.477 | 31.244 | 42.919 | 34.113 | -14.442 | (<0.001) |
| Urban intermediate | 17.748 | 25.586 | 38.033 | 32.146 | -20.285 | (<0.001) |
| Rural area | 14.635 | 26.612 | 38.972 | 34.095 | -24.337 | (<0.001) |
| Men | | | | | | |
| Urban area | 37.686 | 47.726 | 49.227 | 38.529 | -11.541 | (<0.001) |
| Urban intermediate | 29.131 | 38.973 | 43.258 | 39.221 | -14.127 | (<0.001) |
| Rural area | 21.253 | 30.022 | 41.302 | 36.512 | -20.049 | (<0.001) |

Note: The sample (2015 EWCS) is restricted to employed and self-employed workers. All statistics computed using sample weights. Differences measured as the average value for self-employed workers, minus the average value for employees. T-type test p-values for the differences in parentheses.

Table 3: Baseline estimates

| VARIABLES | (1) Women | (2) Men | (3) Women | (4) Men | (5) Women | (6) Men |
|----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Self-employed | -17.972*** (1.570) | -13.048*** (2.652) | -18.160*** (1.732) | -13.104*** (2.981) | -19.767*** (2.125) | -14.215*** (2.968) |
| Age | - | - | -0.051* (0.026) | 0.020 (0.036) | -0.065*** (0.017) | 0.015 (0.040) |
| Secondary education | - | - | -1.031 (1.189) | 5.763* (2.784) | -2.468* (1.259) | 4.548 (2.900) |
| University education | - | - | 8.520*** (1.132) | 10.740*** (3.229) | 4.248*** (1.264) | 6.951* (3.518) |
| Living in couple | - | - | 1.281 (1.549) | 0.507 (1.989) | 1.523 (1.350) | 0.041 (2.022) |
| Couple's employment | - | - | -2.136 (1.426) | -0.913 (0.806) | -2.637* (1.263) | -0.800 (0.933) |
| Family size | - | - | -1.555*** (0.492) | -0.045 (0.736) | -1.063** (0.414) | 0.051 (0.757) |
| N. children under 5 | - | - | 3.858 (2.478) | -0.682 (1.589) | 3.992 (2.434) | -0.877 (1.562) |
| N. children 5-17 | - | - | -0.685 (0.657) | 1.396** (0.483) | -0.805 (0.587) | 1.336** (0.531) |
| Full time worker | - | - | - | - | 4.465*** (1.247) | 2.929** (1.181) |
| Public sector worker | - | - | - | - | -0.669 (0.864) | -2.745*** (0.780) |
| Occupation FE | No | No | No | No | Yes | Yes |
| Activity FE | No | No | No | No | Yes | Yes |
| Country FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Constant | 37.254*** (0.142) | 37.325*** (0.349) | 42.017*** (1.663) | 29.504*** (3.796) | 36.247*** (2.578) | 25.475*** (3.145) |
| Observations | 10,386 | 10,335 | 10,386 | 10,335 | 10,386 | 10,335 |
| R-squared | 0.057 | 0.071 | 0.081 | 0.080 | 0.103 | 0.096 |

Note: Robust standard errors in parentheses, clustered at the country level. The sample (2015 EWCS) is restricted to employed and self-employed workers. *** p<0.01, ** p<0.05, * p<0.1.

Table 4: Estimates, by region

| VARIABLES | Nordic | | Mediterranean | | Continental | | Anglo-Saxon | |
|----------------------|----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|----------------------|----------------------|
| | (1) Women | (2) Men | (3) Women | (4) Men | (5) Women | (6) Men | (7) Women | (8) Men |
| Self-employed | -27.454** (5.346) | -15.103*** (2.457) | -12.571*** (1.617) | -13.083*** (1.072) | -25.254*** (1.856) | -21.198*** (2.415) | -17.648** (0.978) | -3.275 (2.943) |
| Age | 0.033 (0.063) | -0.096 (0.049) | -0.129* (0.050) | 0.035 (0.048) | -0.044** (0.015) | 0.032 (0.061) | -0.116 (0.020) | 0.019 (0.014) |
| Secondary education | 3.308 (3.152) | 0.421 (1.992) | -1.410 (2.172) | 1.154 (0.941) | -1.004 (1.658) | 1.350** (0.526) | -7.580* (1.094) | 12.570* (1.728) |
| University education | 8.292 (4.295) | 7.401** (1.500) | 4.111 (3.388) | 4.593 (1.962) | 6.244*** (1.194) | 0.634 (3.258) | 1.787* (0.149) | 13.712*** (0.119) |
| Living in couple | 1.256 (3.048) | 2.610 (3.519) | 1.599 (1.224) | 0.165 (1.065) | 2.053 (3.059) | 3.479*** (0.758) | 1.680 (1.093) | -10.889* (1.106) |
| Couple's employment | -3.448 (3.302) | 0.459 (1.480) | -2.260 (2.077) | 0.467 (1.017) | -1.888 (2.656) | -0.234 (0.887) | -5.116 (1.016) | -2.448 (1.543) |
| Family size | -0.125 (1.161) | 0.484 (2.989) | -0.520 (0.685) | -0.599 (0.358) | -1.249 (0.891) | -1.121 (1.290) | -1.973 (0.764) | 1.233* (0.141) |
| N. children under 5 | 1.849 (1.940) | -1.920 (3.148) | 3.420** (0.982) | 1.797 (2.374) | 5.967 (3.907) | 1.144 (1.120) | 1.106 (0.381) | -3.663 (1.717) |
| N. children 5-17 | -0.820 (0.811) | -2.173 (4.026) | -0.964 (0.631) | 2.297* (0.847) | -1.070 (0.974) | 1.767 (0.946) | 0.594 (0.446) | 3.795** (0.099) |
| Full time worker | 0.285 (3.512) | 7.984** (2.041) | 0.382 (2.173) | 1.060 (0.860) | 6.929*** (1.134) | 4.870*** (1.062) | 4.673* (0.495) | -1.437 (0.503) |
| Public sector worker | -2.537 (1.266) | -1.369 (4.221) | 3.028 (1.596) | -3.804* (1.272) | -2.166* (1.015) | -2.067 (1.267) | 0.552 (0.708) | -2.032*** (0.003) |
| Occupation FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Activity FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Country FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Constant | 38.354** (6.576) | 43.046*** (5.542) | 31.934*** (3.194) | 30.543*** (1.194) | 30.100*** (3.099) | 26.938*** (5.139) | 49.286* (4.211) | 47.181*** (0.267) |
| Observations | 1,795 | 1,736 | 2,869 | 2,926 | 4,591 | 4,430 | 1,131 | 1,243 |
| R-squared | 0.088 | 0.052 | 0.093 | 0.079 | 0.109 | 0.063 | 0.103 | 0.103 |

Note: Robust standard errors in parentheses, clustered at the country level. The sample (2015 EWCS) is restricted to employed and self-employed workers.

*** p<0.01, ** p<0.05, * p<0.1.

Table 5: Estimates including urbanization characteristics

| | Pooled sample | | Nordic | | Mediterranean | | Continental | | Anglo-Saxon | |
|--------------------|-----------------------|-----------------------|-----------------------|----------------------|----------------------|-----------------------|-----------------------|-----------------------|----------------------|----------------------|
| VARIABLES | (1) Women | (2) Men | (3) Women | (4) Men | (5) Women | (6) Men | (7) Women | (8) Men | (9) Women | (10) Men |
| Self-employed | -25.364*** (3.489) | -18.025*** (2.386) | -38.279*** (4.865) | -15.685** (4.155) | -12.933** (3.231) | -12.806*** (0.749) | -33.649*** (1.976) | -24.277*** (4.635) | -23.298** (0.804) | -20.282** (0.378) |
| Urban area | 1.372 (2.293) | 4.738*** (1.449) | 4.367 (5.764) | 12.128** (2.928) | 5.350** (1.114) | 7.770* (2.479) | 1.314 (3.767) | 3.594 (2.776) | -6.821 (2.110) | 2.036 (1.449) |
| Urban intermediate | -1.456 (1.965) | 1.106 (0.873) | -3.192 (2.063) | 5.609 (4.082) | 5.292** (1.490) | 0.647 (1.895) | -1.882 (1.002) | 1.256 (1.070) | -12.324* (1.569) | -0.237 (1.481) |
| Self-employed * | | | | | | | | | | |
| Urban area | 9.919*** (2.778) | 6.093 (5.543) | 16.578** (4.557) | 1.544 (1.638) | 5.384* (2.062) | -3.633 (1.760) | 16.008*** (3.690) | 5.130 (4.951) | 1.449 (0.558) | 23.683* (3.704) |
| Urban intermediate | 5.355* (2.796) | 4.472 (2.835) | 14.109 (8.882) | -2.407 (5.581) | -2.496 (4.887) | 3.889 (3.167) | 5.246 (2.928) | 3.159 (5.452) | 18.197*** (0.231) | 14.192* (1.992) |
| Control variables | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Occupation FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Activity FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Country FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Constant | 35.990*** (2.695) | 22.668*** (3.193) | 22.438*** (1.211) | 21.669*** (3.011) | 27.729*** (3.135) | 24.908*** (2.602) | 29.563*** (2.655) | 24.858*** (4.628) | 57.945* (6.161) | 43.251** (1.541) |
| Observations | 10,386 | 10,335 | 1,795 | 1,736 | 2,869 | 2,926 | 4,591 | 4,430 | 1,131 | 1,243 |
| R-squared | 0.106 | 0.100 | 0.097 | 0.064 | 0.102 | 0.091 | 0.114 | 0.065 | 0.114 | 0.111 |

Note: Robust standard errors in parentheses, clustered at the country level. The sample (2015 EWCS) is restricted to employed and self-employed workers. *** p<0.01, ** p<0.05,

* p<0.1.

Appendix: Additional results

Table A1: Sample sizes, by country

| COUNTRY | Observations | |
|-------------------------|--------------|-------|
| | Females | Males |
| Nordic countries | | |
| Denmark | 402 | 439 |
| Finland | 453 | 430 |
| Norway | 483 | 419 |
| Sweden | 457 | 448 |
| Mediterranean countries | | |
| Greece | 395 | 528 |
| Italy | 540 | 554 |
| Portugal | 448 | 316 |
| Spain | 1,486 | 1,528 |
| Continental countries | | |
| Austria | 498 | 411 |
| Belgium | 1,153 | 1,124 |
| France | 740 | 684 |
| Germany | 869 | 846 |
| Luxembourg | 463 | 466 |
| Netherlands | 448 | 447 |
| Switzerland | 420 | 452 |
| Anglo-Saxon countries | | |
| Ireland | 445 | 464 |
| United Kingdom | 686 | 779 |

Note: The sample (2015 EWCS) is restricted to employed and self-employed workers.

Table A2: Robustness checks

| VARIABLES | Tobit model | | Private sector workers | | Additional controls | |
|--------------------------|-----------------------|-----------------------|------------------------|-----------------------|-----------------------|-----------------------|
| | (1) Women | (2) Men | (3) Women | (4) Men | (5) Women | (6) Men |
| Self-employed | -24.653*** (2.988) | -18.590*** (2.983) | -19.266*** (1.880) | -14.136*** (3.212) | -22.312*** (2.192) | -14.137*** (3.944) |
| Age | -0.084*** (0.018) | -0.009 (0.037) | -0.094*** (0.029) | 0.030 (0.060) | -0.091** (0.032) | -0.007 (0.034) |
| Secondary education | -2.748** (1.365) | 4.585 (3.110) | -1.690 (1.261) | 5.247 (3.418) | -2.820* (1.504) | 4.578 (2.878) |
| University education | 4.173*** (1.355) | 6.956* (3.647) | 5.568*** (1.715) | 7.742* (4.235) | 2.039 (1.596) | 6.360* (3.508) |
| Living in couple | 1.510 (1.453) | 0.145 (2.112) | 0.756 (1.545) | -0.788 (1.943) | 1.380 (1.497) | 0.313 (1.753) |
| Couple's employment | -2.455* (1.472) | -0.595 (1.115) | -3.662** (1.390) | -0.555 (0.915) | -2.829** (1.181) | -1.500** (0.643) |
| Family size | -1.062** (0.417) | 0.069 (0.842) | -0.991** (0.431) | 0.198 (0.702) | -1.322*** (0.337) | 0.292 (0.757) |
| N. children under 5 | 3.971 (2.527) | -0.746 (1.687) | 3.686 (3.592) | -1.128 (1.384) | 4.790** (2.254) | -1.351 (1.483) |
| N. children 5-17 | -0.899 (0.566) | 1.480** (0.614) | -0.154 (1.018) | 1.768*** (0.551) | -0.343 (0.607) | 0.913* (0.488) |
| Full time worker | 4.495*** (1.318) | 2.945** (1.226) | 3.853*** (0.828) | 1.753 (1.573) | 2.800* (1.363) | 0.461 (0.800) |
| Public sector worker | -0.207 (0.972) | -2.534*** (0.879) | - | - | -0.226 (1.277) | -2.545** (0.884) |
| Weekly working hours | - | - | - | - | 0.023 (0.069) | 0.128* (0.063) |
| Supervisor (1-9 workers) | - | - | - | - | 3.829*** (0.831) | 0.708 (4.041) |
| Supervisor (10+ workers) | - | - | - | - | -3.707* (2.119) | -4.718 (3.219) |
| Monthly earnings | - | - | - | - | 0.003** (0.001) | 0.002*** (0.001) |
| Occupation FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Activity FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Country FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Constant | 35.837*** (2.576) | 24.458*** (3.292) | 38.229*** (3.868) | 25.843*** (3.251) | 32.358*** (2.017) | 19.830*** (2.678) |
| Observations | 10,386 | 10,335 | 7,324 | 8,382 | 9,118 | 8,926 |
| R-squared | - | - | 0.107 | 0.101 | 0.105 | 0.091 |

Note: Robust standard errors in parentheses, clustered at the country level. The sample (2015 EWCS) is restricted to employed and self-employed workers. Columns (3-4) are restricted to workers in the private sector. *** p<0.01, ** p<0.05, * p<0.1.

Table A3: Zero commuters, by occupation

| OCCUPATIONS (ISCO 88-1) | Employees | | | Self-employed | | |
|------------------------------|-----------|------------|--------------|---------------|------------|--------------|
| | Commuters | Zero comm. | % zero comm. | Commuters | Zero comm. | % zero comm. |
| Armed forces occupations | 63 | 2 | 3.077 | 0 | 0 | 0.000 |
| Managers | 978 | 29 | 2.880 | 559 | 147 | 20.822 |
| Professionals | 3,334 | 60 | 1.768 | 334 | 133 | 28.480 |
| Technicians and associated | 2,405 | 92 | 3.684 | 234 | 116 | 33.143 |
| Clerical support workers | 2,230 | 47 | 2.064 | 34 | 12 | 26.087 |
| Service and sales workers | 3,242 | 139 | 4.111 | 245 | 104 | 29.799 |
| Skilled agricultural workers | 198 | 3 | 1.493 | 185 | 74 | 28.571 |
| Craft and related trade | 1,594 | 54 | 3.277 | 334 | 108 | 24.434 |
| Plant and machine operators | 1,258 | 43 | 3.305 | 84 | 31 | 26.957 |
| Elementary occupations | 1,972 | 74 | 3.617 | 136 | 34 | 20.000 |
| Total | 17,274 | 543 | 3.048 | 2,145 | 759 | 26.136 |

Note: The sample (2015 EWCS) is restricted to employed and self-employed workers.

Table A4: Estimates for zero commuters

| VARIABLES | Pooled sample | | Nordic | | Mediterranean | | Continental | | Anglo-Saxon | |
|--------------------|-----------------------|-----------------------|-----------------------|---------------------|----------------------|-----------------------|-----------------------|----------------------|---------------------|----------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| | Women | Men | Women | Men | Women | Men | Women | Men | Women | Men |
| Self-employed | -18.328*** (3.082) | -12.321*** (1.841) | -34.873*** (4.500) | -3.731 (4.425) | -11.579* (3.768) | -10.989*** (1.690) | -24.003*** (3.991) | -16.056** (6.083) | -2.233 (3.913) | -12.431** (0.931) |
| Urban area | 0.983 (2.209) | 4.606** (1.679) | 4.030 (5.982) | 12.471** (3.358) | 5.405*** (0.757) | 9.186* (3.725) | 0.144 (3.774) | 3.331 (2.718) | -5.932 (1.905) | 0.731 (2.170) |
| Urban intermediate | -1.971 (1.881) | 1.750* (0.910) | -3.905 (2.490) | 5.479 (4.501) | 4.904** (1.525) | 1.571 (1.116) | -2.728** (0.911) | 2.111 (1.521) | -11.306* (1.143) | -0.416 (2.072) |
| Self-employed * | | | | | | | | | | |
| Urban area | 10.540*** (3.534) | 12.519 (7.630) | 26.820** (6.135) | -2.640 (6.001) | 6.375** (1.264) | 0.268 (2.864) | 17.345*** (2.638) | 8.089* (3.376) | -12.258 (2.041) | 37.134* (4.336) |
| Urban intermediate | 4.887 (3.083) | 4.747 (3.579) | 17.658 (12.654) | -9.881 (6.784) | -0.186 (5.502) | 4.128 (4.620) | 2.261 (2.077) | 5.096 (7.733) | 11.759 (3.001) | 12.648 (2.757) |
| Control variables | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Occupation FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Activity FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Country FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Constant | 33.809*** (2.415) | 21.065*** (4.003) | 34.306*** (4.474) | 28.379** (5.762) | 37.078*** (2.647) | 14.313** (3.612) | 28.221*** (2.498) | 22.004** (6.016) | 47.123* (4.339) | 38.495** (2.015) |
| Observations | 9,804 | 9,615 | 1,727 | 1,630 | 2,731 | 2,743 | 4,277 | 4,112 | 1,069 | 1,130 |
| R-squared | 0.097 | 0.100 | 0.088 | 0.059 | 0.094 | 0.082 | 0.093 | 0.055 | 0.114 | 0.132 |

Note: Robust standard errors in parentheses, clustered at the country level. The sample (2015 EWCS) is restricted to employed and self-employed workers who report positive commuting time.. *** p<0.01, ** p<0.05, * p<0.1.