



# Gender Differences in Commuting: New Evidence from Spain

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## Abstract

This article examines the origins of the shorter commutes typically observed for women, a phenomenon that contributes to the poorer work outcomes they typically suffer. The analysis extends previous research on the gender gap in commuting by using econometric decomposition techniques that are novel in this field which, combined with a Spanish nationally representative survey that allows for an exhaustive control of the different elements identified in the literature as possible determinants of gender differences in commuting to work, allows quantifying the specific influence of a wide range of individual, family, territorial and work-related elements. The evidence obtained shows that the gender gap in commuting is not the result of the relative characteristics of women, but of the presence of a systematic pattern of lower mobility that emerges when women are compared with observationally similar men. Yet, this pattern of lower mobility is not observed for certain groups of women whose behavior in the labor market is generally more egalitarian, such as women with higher education, without family responsibilities or without a partner, which is consistent with the presence of cultural or social constraints that tend to limit women's mobility.

**Keywords** Commuting · Gender · Household responsibilities · Satisfaction · Local labor market

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## 1 Introduction

In recent years, the phenomenon of commuting has been increasingly studied in the literature. The reason for this is its great impact in social and environmental terms as well as on the quality of life of citizens, since its duration and characteristics result in monetary and time use burdens, and it has a decisive influence on the balance between work and family life (Kahneman & Krueger, 2006; Kahneman et al., 2004), among other aspects.

A significant number of studies on this topic have focused on the analysis of gender differences in commuting and have generally found that women tend to have shorter commuting times than men, with evidence of a statistically significant gender gap in commuting time for a wide range of countries including the US, Ireland, Canada, Sweden, the Netherlands, and the UK (e.g. Crane & Takahashi, 2009; Hanson & Pratt, 1995; McQuaid & Chen, 2012; Mok, 2007; O’Kelly et al., 2012; Sandow & Westin, 2010a; van Ommeren & van der Straaten, 2008). Such a finding is relevant because, it may be associated with narrower job search areas, which could lead to poorer wages and other non-monetary working conditions and a possible increase in the risk of overeducation (Blau & Kahn, 2017; Le Barbanchon et al., 2021; Petrongolo & Ronchi, 2020), as a result of worse matches in the labour market (Crane & Takahashi, 2009; Ruppert et al., 2009; Van Ommeren & Rietveld, 2005; Waldfogel, 2007), or even lower labor force participation, especially in the case of married women (Black et al., 2014; Farré et al., 2020; Moreno-Maldonado, 2021).

The aim of this article is to further analyze the origin of gender differences in commuting by examining this phenomenon in the case of Spain. Previous analyses on this topic for Spain are very scarce and refer exclusively to specific areas such as the regions of Madrid, Valencia or Andalusia (Rodríguez & García, 2012; Salom & Delios, 1998; Torrado et al., 2018). This article overcomes this limitation by examining the commuting patterns of men and women, and identifying the factors that explain the potential gender differences in commuting times for the country as a whole.

In any case, the relevance of the study in the context of the related literature lies mainly in the fact that the empirical analysis is approached in a novel way using Oaxaca-Blinder econometric decomposition techniques, which are new to the field of research on gender gaps in commuting. These techniques have the advantage of decomposing the gender gap in commuting into two components: one that measures how much of it is due to the fact that men and women differ in the characteristics that determine commuting behavior and quantifies the specific contribution of each of the variables considered, and a second that captures the part of the difference that arises from the fact that both sexes have consistently different mobility patterns, even when comparing observationally similar individuals with the same characteristics. To this end, the analysis uses microdata from a Spanish nationwide representative survey, whose richness of information allows an adequate control of the numerous personal, family, geographic and work-related elements identified in the literature as potential determinants of gender differences in commuting, and provides new evidence on the origin of the gender gap in commuting. The survey provides information on commuting in terms of time, which has advantages over the alternative of measuring it in terms of distance for several reasons. The first is that the measurement of commuting based on time tends to be more refined, as it often includes time spent on ancillary activities such as finding a parking space (Bovy & Stern, 1990), whereas self-reported commuting distance often does not correspond to the actual distance traveled (Rietveld et al., 1999). The second is that travel time gives a better picture of the links between commuting, the mode of transport used and the efficiency of transport networks (Crane, 2007). Finally,

it is believed that while commuting distance is more closely related to the direct economic costs of travel, commuting time is more closely linked to the opportunity cost of time spent (Alonso, 1968; Muth, 1969), which may be particularly relevant given the tighter time constraints of women (Doyle & Taylor, 2000). In this sense, it should also be noted that the specific way of measuring commuting could be particularly important in gender analyses, since the differences observed between men and women are greater in terms of commuting distance than in terms of duration (Crane, 2007; MacDonald, 1999) so that commuting time and distance offer different views of the phenomenon (Giménez-Nadal & Molina, 2016).

The decomposition analysis of the gender gap in commuting allows testing the first of the three basic hypotheses of the analysis: differences in commuting time could be explained by the different average characteristics of men and women in various dimensions related to socio-economic and family background, geographical distribution, use of different modes of transport and work-related elements. Additional disaggregated analyses allow us to test the second main hypothesis, that the gender gap in commuting may be different for certain groups characterized by more egalitarian behavior and where roles are comparatively less gendered. In this sense, three specific groups are examined separately given previous evidence from other countries on the significant influence of family responsibilities on commuting (Giménez-Nadal & Molina, 2016; Sandow & Westin, 2010a; Wheatley, 2013), the smaller gender gap in commuting observed for women with higher levels of education (Lee & McDonald, 2003; Sandow & Westin, 2010a; Vance & Hedel, 2008), and the fact that for women with partners it is often the man's employment that determines the location of the couple's residence, which conditions the woman's job search (Madden, 1981; Salom & Delios, 1998). These groups are: women with higher levels of education, women without family responsibilities, and women without a partner. Finally, to test the third major hypothesis that women's lower commuting may be due to different preferences than men's, we also examine whether gender differences are at least partly due to differences in men's and women's tolerance for commuting, which should be reflected in different degrees of association between commuting and satisfaction in different domains.

In summary, the evidence obtained confirms that in Spain, as in other advanced countries, women on average have shorter commuting times than men. These unadjusted differences, although relatively small at first sight, are interestingly due to two relevant countervailing effects. The first stems from the average differences between men and women in various dimensions related to commuting time, which together tend to increase the commuting time of women. These include both the characteristics of their jobs (which are of lower quality and less stable) and the modes of transport they use to get to work (with a higher prevalence of public transport), which tend to be associated with longer commutes, with the exception of women's greater family responsibilities, which are associated with shorter commutes. Second, when comparing men and women with the same characteristics, women systematically have shorter commutes. Taken together, this evidence suggests that there may be social or cultural conditioning factors that limit women's commuting and thus worsen their employment prospects. This possibility is reinforced by the evidence from the disaggregated analysis that there are no distinct patterns of mobility by gender for certain groups of women (namely those with higher education, without family responsibilities, or without a partner) who are assumed to be more similar to men in their work patterns and gender role perceptions. Finally, the evidence also shows that there is no different association between commuting and satisfaction levels for men and women, suggesting that women's shorter commuting times are not plausibly the result of choices associated with a hypothetical lower tolerance for commuting.

The article is organized as follows. After this introduction, the second section reviews the literature related to gender differences in commuting. The third section describes the database used and the methodology of the empirical analysis. The fourth section reports the findings. Finally, the last section presents the main conclusions.

## 2 Literature Review

The analysis of commuting patterns has received considerable attention in the literature, reflecting the fact that this type of mobility generates considerable impacts on the environment, the territory and the quality of life of individuals (Gottholmseder et al., 2009; Kahneman & Krueger, 2006; Kahneman et al., 2004; Wener et al., 2003). For all these reasons, commuting today occupies a central place in territorial planning or the provision of infrastructure and means of transport (Wener et al., 2005).

The available evidence shows that commuting patterns vary according to many individual and family factors, such as age, marital status, number of children, educational attainment, or disposable income, with gender being a particularly important factor (de la Hoz, 2008; McQuaid & Chen, 2012; Paull, 2008; Sandow & Westin, 2010a). Thus, it is observed that women's commutes are generally comparatively shorter in both distance and time, with evidence on the existence of a statistically significant gender gap in commuting time for a large number of advanced countries, such as the US (Crane, 2007; Crane & Takahashi, 2009; Giménez-Nadal & Molina, 2016; Hanson & Johnston, 1985; Hanson & Pratt, 1995; Turner & Niemeier, 1997; White, 1986), Ireland (O'Kelly et al., 2012), Canada (Mok, 2007), Sweden (Sandow, 2008; Sandow & Westin, 2010a), the Netherlands (Gimenez-Nadal & Molina, 2014; van Ommeren & van der Straaten, 2008), and the United Kingdom (Dickerson et al., 2014; McQuaid, 2009; McQuaid & Chen, 2012; Nafilyan, 2019; Roberts et al., 2011), and on the fact that such gender differences in commuting are heterogeneous across countries (Giménez-Nadal et al., 2020a).

In this sense, whether the lower commuting observed among women is a desirable outcome or not is not an uncontroversial issue. On the one hand, shorter commutes reduce financial, time and psychological costs (Blau & Kahn, 2017; Le Barbanchon et al., 2021; Petrongolo & Ronchi, 2020) and allow for a better work-family balance (particularly for women with children or dependents). However, lower commuting may be due to some degree of discrimination or other cultural barriers that limit women's work opportunities (Giménez-Nadal & Molina, 2016; McQuaid & Chen, 2012). Therefore, shorter commutes may be associated with poorer relative working conditions, if they are involuntary and limit their job search area (Ruppert et al., 2009; Van Ommeren & Rietveld, 2005; Waldfogel, 2007). In general, an advantage of longer commutes is that they allow for a better match with the individual's educational level. In this sense, different studies show that longer commutes are associated with higher wages and better job characteristics and conditions (Brown et al., 2015; Manning, 2003; Mulalic et al., 2014; Plaut, 2006; Roberts & Taylor, 2017), so that commuters have, on average, higher wages than non-commuters (So et al., 2001). In addition, longer commutes provide a greater amount of job opportunities, so higher wages are an incentive to commute significantly longer (Sandow & Westin, 2010b).<sup>1</sup>

<sup>1</sup> While the literature has amply documented that commuting imposes significant costs on a wide range of health and personal aspects of life, there is also ample evidence that increased commuting allows individuals to expand their job search radius and thus gain access to better jobs. In fact, some authors have suggested in this regard that both circumstances could have a countervailing and offsetting effect on individual well-being levels (with commuting having a negative effect on certain well-being domains and a positive

Thus, Le Barbanchon et al. (2021) show that women have a lower willingness to commute and that gender differences in the valuation of commuting are a relevant source of the gender wage gap, explaining between 9% and 16% of it. In turn, according to Farré et al. (2020), longer commutes also have a comparatively significant negative effect on female labor force participation, because although such an effect also is observed for men, its magnitude is comparatively much smaller for them. Furthermore, the negative relationship between commuting times and labor force participation is particularly strong for married women and women with children. This evidence emphasizes the influence of gender norms on the roles that women play in society, on shaping women's commuting patterns and, by extension, on their work outcomes. Overall, to consider whether less commuting is a desirable outcome or not, it is essential to keep in mind that longer commutes will be perceived positively if they are freely chosen, but negatively if they are experienced as unwanted (Sandow & Westin, 2010a).

Three main areas of analysis can be identified in the literature on the origins of gender differences in commuting. Starting with the first of these, gender economics, the different degree of household responsibilities between men and women has been considered the main potential explanation of the phenomenon (Household Responsibility Hypothesis). In this regard, the available evidence suggests that part of the gender differences in the time and distance commuted is indeed due to the presence of children (Sandow & Westin, 2010a; Wheatley, 2013) and a generally greater involvement of women in household activities compared with men (Giménez-Nadal & Molina, 2016; Hanson & Johnston, 1985; Singell & Lillydahl, 1986; White, 1986). This suggests that women adjust their commuting patterns to meet family needs, thereby limiting themselves to jobs closer to home and narrower local labor markets<sup>2</sup> (Hanson & Pratt, 1995; Turner & Niemeier, 1997).

In light of this evidence, the origin of gender differences in commuting may be largely cultural and social in nature (Crane, 2007; Marcén & Morales, 2021; Sandow, 2008) and may be rooted in the fact that women often have to combine work and family responsibilities and, in some cases, tend to prioritize their domestic and family responsibilities and to perceive their work role as secondary (Lee & McDonald, 2003; Rosenbloom & Burns, 1993), which would lead to women's entrapment in terms of their mobility (entrapment-of-women theory). This is consistent with the fact that the gender stereotypes that exist to a greater or lesser extent in most societies (Leonard, 2001) lead, for example, to women being more likely to take care of family emergencies (Adkins, 1995; Rosenbloom & Burns, 1993), thus prioritizing their family responsibilities over the pursuit of paid work under the same conditions as men, which entails not being able to carry out commuting arrangements comparable to those of male workers (Cristaldi, 2005). This is in line with the economic theories of the household, which argue that the distribution of time devoted to the different daily activities is carried out seeking to maximize the income and joint satisfaction of all household members based

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Footnote 1 (continued)

effect on others), under the hypothesis that commuting could have a neutral effect on overall individual well-being levels (Stutzer and Frey, 2008), although the existing empirical evidence is inconclusive in this regard (e.g. Simón et al., 2020).

<sup>2</sup> This last circumstance has been documented for both Spain and the United Kingdom, countries for which it has been found that women's local labor markets are smaller than men's. This is due to the fact that when the flows between municipalities are analyzed in aggregate terms, their commutes to work have a shorter average length, although large territorial variations are observed in this pattern (Casado-Díaz 2000; Feria-Toribio et al., 2015; Green et al., 1986).

on elements such as comparative advantage, productivity and the preferences of each member, which may differ between men and women (Becker, 1991; Lakshmanasamy, 2003; Mattila-Wiro, 1999); Becker, 1991; Lakshmanasamy, 2003), as well as with the bargaining models, which assume that in the search for joint maximization of household utility a decision-making negotiation takes place in which each member uses his or her bargaining power, with the possibility of imbalances between men and women due to elements such as the different resources they control inside and outside the household (Lundberg & Pollak, 1993; McElroy, 1990).

One element with a potentially significant impact on commuting is educational attainment, which is positively correlated with individual commuting in terms of both distance and travel time (Lee & McDonald, 2003; Sandow & Westin, 2010a; Vance & Hedel, 2008). Such a relationship can be explained by job search in more specialized labor markets and a lower aversion to longer trips as a result of prioritizing residential location (Groot et al., 2012). The gender gap in commuting tends to be comparatively smaller for individuals with higher levels of education (Lee & McDonald, 2003; McQuaid, 2009; Sandow & Westin, 2010a; Vance & Hedel, 2008), which could be related to the fact that higher levels of education among women are associated with a lower acceptance of traditional gender roles (see, for example, Kane, 1995 and Garrido, 2018), which in turn could lead them to adopt more egalitarian work patterns. This is consistent with the significant influence of social/cultural beliefs about gender roles on women's work behavior and outcomes, as evidenced by the fact that countries with more anti-egalitarian views tend to have lower female employment rates and larger gender pay gaps (Fortin, 2005).

Another potentially influential element is the family structure, since in the case of women with a partner it is often the man's employment that determines the location of the couple and conditions the woman's job search (Madden, 1981; Salom & Delios, 1998). This may be the case even in households where both spouses have higher education and full-time jobs, i.e., regardless of the presence of comparable employment patterns (Green, 1995; Van Ommeren et al., 1998; Wheatley, 2013), although this is a controversial issue on which there is no conclusive evidence (Hoogstra et al., 2011, 2017). The influence of family structure on women's relative commuting is consistent with the fact that being married can significantly influence residential and work location decisions, as well as commuting time and distance (Lee & McDonald, 2003). In this sense, single workers have been found to have longer commutes than married workers, and married workers whose spouses also work have shorter commutes than those whose spouses do not work (Johnston-Anumonwo, 1992; Lee & McDonald, 2003; Turner & Niemeier, 1997). Thus, a larger gender commuting gap is observed when controlling for marriage, as women tend to coordinate dual roles (Giménez-Nadal & Molina, 2016; Hanson, 2010; McGuckin et al., 2005), resulting in greater spatiotemporal constraints (Kwan, 1999; Rapino et al., 2011). In contrast, commuting differences between men and unmarried women are generally smaller or insignificant (Hersch & Stratton, 1994; Kwon & Akar, 2021; Turner & Niemeier, 1997). Along the same lines, Cristaldi (2005) shows that differences in the commuting gap are also observed across female cohorts. In general, younger women, who are less likely to be married, have significantly longer commutes than older women, who are more likely to be married, less educated, and have greater family responsibilities. However, the evidence is inconclusive, with some studies finding that married women tend to commute further in response to wage increases (England, 1993) and that the presence of children in some cases leads to an increase in commuting time (Iwata & Tamada, 2014) to maintain the children's ties (Hofmeister, 2005) or to be closer to the grandparents' homes, which significantly reduces the burden of childcare (Iwata & Tamada, 2014).

In labor economics, on the other hand, the analysis of the determinants of the commuting gap has focused on the role of job characteristics, concluding that the nature of women's employment, characterized by occupational and sectoral distributions that are relatively different from those of men (Hanson & Pratt, 1995), is often associated with different labor market areas (Sandow & Westin, 2010a; Wheatley, 2013). This is because female-dominated jobs are often better spatially distributed, allowing for shorter commutes that facilitate the coordination of work and family responsibilities (Hanson & Pratt, 1995; Salom & Delios, 1998). Similarly, women often work part-time and are paid comparatively low wages, which reduces their ability to afford the monetary costs associated with increased travel (Van Ommeren & Rietveld, 2005).

There is a close relationship between commuting and migration, two forms of mobility that are central to the adequate functioning of the labor market (Deding & Filges, 2010; Lux & Sunega, 2012) by allowing the spatial adjustment of labor supply and demand. In fact, depending on distances/times and costs, migration and commuting can be substitutes (e.g., Royuela & Vargas, 2009; Sandow, 2008), in a mechanism that improves labor conditions. It should be noted, however, that in the case of Spain residential mobility is lower than in other European countries (Romani et al., 2003; Sánchez & Andrews, 2011), given the presence of rigidities both in the labor market (high unemployment rates that discourage workers from changing jobs) and in the residential market (a strong preference for homeownership and a scarce and expensive supply of rental housing).

Extensive literature has addressed the related decisions of commuting and migration, an extremely complex issue in terms of endogeneity, reverse causality, the dynamic nature of these processes, and the context of uncertainty that characterizes them (Haas & Osland, 2014). For example, although commuting is not the most important factor in the decision, many studies have concluded that the length of the commute is positively related to migration (Deding & Filges, 2010; Deding et al., 2009) because, from an individual point of view, very long commutes are suboptimal (Van Ham & Hooimeijer, 2009). In the case of two-earner households, where mobility decisions are made jointly (Plaut, 2006), a change in residence affects the commuting patterns of both workers and may have different consequences (Nivalainen, 2004; Roberts & Taylor, 2017). Authors such as Plaut (2006) or Roberts and Taylor (2017) conclude that commuting decisions within a household are complementary, i.e. both spouses decide to adjust commuting in such a way that both increase or reduce their commuting. However, the evidence is inconclusive because these decisions may also be substitutive, i.e., one spouse tends to commute significantly longer than the other (Davis, 1993). Thus, some authors (Brown et al., 2015; Sandow & Westin, 2010b) show that the relocation of the family residence is associated with commuting times/distances that are longer than before the migration, although to a much lesser extent in the case of women (Clark et al., 2003), implying a widening of the gender gap in commuting. However, Axisa et al., (2012a, 2012b) find that over time after the change of residence, as the length of residence increases, the commuting distance could decrease for both spouses through an adjustment process, implying a narrowing in the gender gap in commuting.

Finally, urban economics offers a third set of explanatory factors, as commuting patterns also reflect individuals' location choices and the characteristics of the territories in which they live, which may differ for men and women if they have different geographical distributions (Østbye et al., 2018; Sandow & Westin, 2010a). In particular, one territorial factor that is likely to be relevant is population density, as higher density is usually associated with longer commuting times due to factors such as traffic congestion and greater reliance on public transport (Groot et al., 2012). In this area of analysis, there is also evidence that the mode of transport may play a particularly important role, as the relatively greater use of

public transport by women tends to increase the length and distance of their commutes, and thus their job search area and employment opportunities (Crane & Takahashi, 2009; De la Hoz, 2008).

On a separate vein, studies that have examined how commuting affects different aspects of workers' subjective well-being have found that longer commuting times have an overall negative impact on individuals' level of life satisfaction (De Vos et al., 2013; Ettema et al., 2010; MacKerron, 2012; Simón et al., 2020; Stutzer & Frey, 2008). Thus, longer commutes are not fully compensated by improvements in the labor or housing markets, leading to higher disutility (Ingenfeld et al., 2019; Jacob et al., 2019; Wheatley, 2014). Several studies have also looked at the possible differential effect of commuting by gender in areas such as perceived stress, mental health, flexible working hours, impact on leisure time, and subjective well-being (Chatterjee et al., 2020; García et al., 2007). Evidence suggests that commuting may have a comparatively detrimental effect on women's satisfaction and stress levels, suggesting a lower tolerance for travel time (Wener et al., 2005). Tao et al. (2023) examine this relationship from a household perspective and show that although both men and women experience a decrease in their subjective well-being, increases in women's commuting time not only reduce their own life satisfaction but also negatively affect their husbands' subjective well-being. This may be due to reduced support for family tasks when wives commute longer hours (Brömmelhaus et al., 2020). Nevertheless, such evidence is not entirely conclusive, as some studies suggest that the effect of gender is negligible (Clark et al., 2020; Lorenz, 2018; Morris & Zhou, 2018), not significant (Gottholmseder et al., 2009; Lucas & Heady, 2002) or significant only for those individuals with very long commutes (Jacob et al., 2019).

To conclude, analyses of the gender gap in commuting for the Spanish case are very scarce. With a few exceptions they are mainly descriptive and use aggregate data. Moreover, all of them have focused on specific territories, such as the region of Madrid (Rodríguez & García, 2012), that of Valencia (Salom & Delios, 1998), or the main urban areas of Andalusia (Torrado et al., 2018). These analyses confirm, in line with studies for other countries, that women's commuting time to work is lower than men's but differ in their conclusions about which are the main explanatory factors: occupational and sectoral segregation of women (Torrado et al., 2018) or greater domestic responsibilities (Rodríguez & García, 2012 and Salom & Delios, 1998).

### 3 Data and Methodology

#### 3.1 Data

The *Quality of Life at Work Survey* (hereafter QLWS) is an annual survey conducted by the Spanish Ministry of Employment and Social Security. It consists of independent cross sections for each year, covering only employed persons, and has an annual sample size of around 8000 workers. The purpose of the survey is to provide detailed information on the social and labor conditions of Spanish workers, and to this end it includes extensive information on individual and family characteristics of workers, as well as on the objective characteristics and subjective perceptions of their jobs. In addition, the survey includes information on variables that measure the level of satisfaction of workers with their work, personal life or their leisure time.



Starting with the dependent variables, commuting is defined as the time spent commuting between home and work, measured in minutes,<sup>3</sup> while the variables that measure the level of satisfaction of workers with different areas of life are taken from the answers to questions measured on a 0–10 scale. Different types of independent variables have been considered in the empirical analyses. Firstly, attributes related to workers' individual and family characteristics: age; educational level (distinguishing between primary and secondary education and, alternatively, higher education); marital status (distinguishing whether the person lives with a partner or not); whether they live with children under 15 years or with dependent persons; and daily time spent on household tasks (in minutes). Second, variables related to the territorial environment: region of residence, size of the municipality (five strata are distinguished) and population density. Thirdly, the mode of transport used to travel to work, distinguishing between public (bus, metro/tram, taxi or train), private (car, motorbike or bicycle) or other modes of transport (walking or other means). Finally, a wide range of job attributes has also been considered, including both objective characteristics and subjective perceptions by workers. In the first case, these are the type of working day (full-time or part-time); continuous or split working day; type of contract (permanent or fixed-term); seniority in the company (in years); occupation (divided into 3 qualification levels); and firm size (grouped into 3 categories). In the second case, the variables considered are the subjective perception of being over-educated for the requirements of the job, as well as the level of satisfaction with the routine and physical effort in the job, the perceived level of danger/risk, and the assessment of health and safety at work.

The analysis focuses on the cross sections of the QLWS corresponding to the period 2007–2010 since although the survey was conducted from 1999 to 2010, the main variable of interest, commuting, was measured in intervals before 2007. The working sample includes salaried workers aged 16–65.<sup>4</sup> The final sample consists of 25,957 employees for the four-year pool. The sample weights provided by the QLWS have been taken into account throughout the empirical analysis, and therefore the results are representative of the entire Spanish wage-earning population.

### 3.2 Methodology

The research uses several econometric techniques of estimation and decomposition. The first one is the Oaxaca-Blinder method (Oaxaca, 1973 and Blinder, 1973), which allows to carry out a detailed breakdown of the gap in average commuting time between men and women. This technique starts from the ordinary least-squares estimation of an equation of the form:

$$C_i = X_i\beta + \varepsilon_i \quad (1)$$

where  $C_i$  is the commuting time of individual  $i$  (in minutes);  $X_i$  is a vector of individual explanatory variables plus a constant term;  $\beta$  is a vector of parameters and  $\varepsilon_i$  is a random error term.

<sup>3</sup> Commuting is self-reported and is measured as the time an individual spends on the daily one-way trip between home and work in the following survey question: "On average, how long does it take you to get from home to work?".

<sup>4</sup> The exclusion of self-employed workers is a frequent decision in this type of analysis, as self-employed workers have distinct commuting patterns compared to wage-earners (see for example Albert et al., 2019 and Giménez-Nadal et al., 2020b).

After empirically estimating the return structure for the joint sample of men and women, and using this return structure as the reference structure in the decomposition (see Oaxaca & Ransom, 1994 and Neumark, 1988), based on the properties of the ordinary least-squares estimator, the difference in the duration of the average commuting by gender ( $\Delta$ ) can be decomposed as follows:

$$\Delta = (\bar{C}^i - \bar{C}^n) = (\bar{X}^i - \bar{X}^n)\hat{\beta}^* + \left\{ \bar{X}^i(\hat{\beta}^n - \hat{\beta}^*) + \bar{X}^n(\hat{\beta}^* - \hat{\beta}^i) \right\} \quad (2)$$

Where  $\bar{C}^i$  and  $\bar{C}^n$  are the average commuting times of men and women;  $\bar{X}^i$  y  $\bar{X}^n$  are the average observed characteristics of individuals from both groups and  $\hat{\beta}^i, \hat{\beta}^n$  y  $\hat{\beta}^*$  are the estimated coefficients after regressing commuting time over the set of explanatory variables for men, women and the pool of both groups, respectively.

The first component on the right-hand side of Eq. (2) represents the effect on the commuting average gap caused by the existence of differences in characteristics (or the ‘explained’ component), while the second one corresponds to the effect of the coefficients (or the ‘unexplained’ component). A relevant feature of this procedure is that it provides a detailed decomposition that differentiates the specific individual contribution of each explanatory variable to the characteristic component of the unadjusted differential.

Second, ordinary least squares are used to estimate the relationship between commuting and satisfaction in different areas of workers’ lives.<sup>5</sup> For this purpose, an equation is estimated of the form:

$$S_i = Z_i\delta + \varepsilon_i \quad (2)$$

where  $S_i$  is the satisfaction in the specific domain (work, personal life or leisure) expressed by individual  $i$ ;  $Z_i$  is a vector of individual explanatory variables plus a constant term;  $\delta$  is a vector of parameters and  $\varepsilon_i$  is a random error term.

## 4 Results

Following the literature review in Sect. 2, the empirical analysis tests three major hypotheses. The first hypothesis is that the observed gender differences in commuting time could be explained by the different characteristics that men and women might have on average in different dimensions related to socioeconomic and family, geographic distribution, modes of transport and job elements. The second main hypothesis is that in certain groups where gender roles may be comparatively minor women’s commuting behavior may be more similar to that of men. Finally, a third hypothesis is that women’s shorter commutes may be the result of their different preferences, as women may have lower a tolerance for commuting, and that this may be reflected in different degrees of association with satisfaction in different domains compared to men.

<sup>5</sup> Although some studies on the determinants of subjective well-being use ordered logit or probit estimation models, considering that when satisfaction is measured subjectively the alternatives in the decision process implicitly express an order of utility, and therefore have an ordinal character (see MacKerron 2012), it is a widespread and rather standard practice to treat them as continuous variables when the number of values taken by this variable is high, as is our case (e.g., Stutzer and Frey 2008). On the other hand, it is worth noting that the results obtained from models based on the cardinality of subjective well-being measures generally resemble, in practice, those based on ordinality (Ferrer-i-Carbonell and Frijters 2004).

## 4.1 Descriptive Evidence

Table 4 in the Appendix provides descriptive evidence by gender on the main variable of interest in the analysis (commuting time), on the variables that potentially explain gender differences in commuting (namely individual, family, territorial and occupational characteristics) and on satisfaction in different domains. The evidence corresponds both to the sample as a whole and to two sub-samples that distinguish between workers with relatively long and short commuting times. The criterion used here is whether or not individual commuting time exceeds the average commuting time of the pool of men and women.

The table shows that women's commutes in Spain are generally shorter than men's (average commuting times are 22.1 and 22.8 min respectively). Although this unadjusted gender gap in commuting (0.7 min) is not particularly pronounced, which is in line with previous evidence for this country from an international comparative perspective (Giménez-Nadal et al., 2020a), it is in the same direction as that observed for many other advanced countries and is different from zero with a statistical significance of 5%. Meanwhile, in the case of the satisfaction variables that are also used as dependent variables in the final part of the empirical analysis, no gender differences are observed in terms of job satisfaction, but women's satisfaction with both personal life and leisure is comparatively lower. In general, there is no significant variation in these patterns of results depending on whether commuting is above or below the mean.

As for the other variables included in Table 4, in the case of individual and family characteristics, the higher level of education of women (44% of women have higher education compared with 34% of men) and the much greater time spent on domestic tasks (139 min compared with 75 min for men) stand out. In terms of territorial variables, there is a slightly greater presence of women in regions such as Madrid and Catalonia and in comparatively larger municipalities, and women are much more likely to use public transport such as bus, metro or train to get to work (20% compared to 10% of men) or to walk (24% compared to 13%), while men are more likely to use cars (69% compared to 52%). Finally, there are also significant gender differences in job attributes. For example, women are more likely than men to work part-time, to work continuous days, to have lower levels of seniority, and to have a more polarized occupational distribution. These differences are also found in subjective attributes, with women reporting more overeducation, less physical effort and less risk at work.

Regarding the distinction between longer and shorter commuting times, the distribution of men and women in both groups is relatively similar, although it is noticeable that women with longer commuting times have better jobs, which is reflected, among other things, in a higher proportion of full-time jobs and a greater presence in skilled occupations and in larger companies, as well as in better subjective job indicators. This is also the case for men, but with less pronounced differences in job quality levels depending on commuting time.

Overall, there are therefore very significant differences between men and women in various individual, family, territorial and work-related elements that previous studies suggest may be relevant in explaining the different gender patterns in commuting. For this reason, the subsequent empirical analysis uses econometric decomposition techniques that allow the identification of the overall effect associated with these differences, provide detailed evidence on the relevance of each individual factor and allow to determine whether gender differences in commuting persist after controlling for these differences.

## 4.2 Multivariate Analysis

### 4.2.1 Decomposition of the Gender Gap in Commuting: General Analysis

To determine the extent to which the shorter duration of women's commuting in the Spanish labor market is due to possible differences in their relative characteristics compared to men, and which specific factors are more associated with these differences, Table 1 presents the results of the decomposition using the Oaxaca-Blinder technique, applied to the full sample according to expression (2). For this purpose, a full specification of the model has been used, considering a wide range of explanatory variables related to individual, family, territorial and work characteristics (and also fixed effects per year). The evidence includes the average gender gap in commuting time, the values of the two components (characteristics and coefficients) on the right side of the expression (2), as well as the detailed results of the characteristics component, reflecting the contribution of each explanatory variable to the gap. A negative (positive) value indicates that it is an element associated with lower (higher) relative commuting for women (men).

It can be seen that the unadjusted commuting difference observed in favor of men (0.7 min) is the result of two opposing effects each of which is related to the components of the decomposition. Thus, the negative value of the characteristics component (which has a 5% significance) indicates that Spanish women overall exhibit relative characteristics that are associated with longer commutes, resulting in higher average commuting times of around 0.44 min. On the other hand, the unexplained component shows that when comparing observationally similar subjects with the same individual, family, territorial, and work characteristics, women make substantially shorter trips (with a difference of 1.14 min that is statistically significant at 1% and quantitatively relevant), which is the basic origin of the lower unadjusted women's commuting times. Although due to the nature of the estimation, these unexplained differences in commuting times could be influenced by measurement problems in the variables or the omission of relevant explanatory factors, they suggest the existence of systematic gendered patterns associated with lower female mobility.<sup>6</sup>

Looking more closely at the detailed results, which make it possible to identify the relative role of each individual factor in the characteristics component (lower part of Table 1), a very prominent element is the higher time spent on household tasks, which is associated with 0.65 min less commuting time for women. The rest of the factors considered are, on the other hand, generally associated with longer commuting times for women, *ceteris paribus*, with the exception of age (women are on average younger) and the greater weight of part-time employment. This is the case both for education (since women have higher levels of education, something that is associated with longer commutes) and for their different regional distribution (due to the higher presence of women in Spanish regions such as Madrid and Catalonia, where commutes are typically longer). Another factor that tends to significantly increase the gender gap is the mode of transport (0.66 min), as women are more likely to use public transport. Finally, the differing relative employment characteristics of women are also relevant in this regard, so that certain characteristics of their jobs,

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<sup>6</sup> This result is comparable to that obtained in the literature that focuses on the analysis of the gender wage gap, where the unexplained component that potentially captures, among other circumstances, discriminatory factors, is generally very relevant in explaining unadjusted gaps (see, for example, Blau and Kahn 2017).

**Table 1** Decomposition of the gender commuting gap (minutes). Oaxaca-Blinder technique

		Total	
Total	Male commuting	22.776 (0.216)***	
	Female commuting	22.081 (0.216)***	
	Difference	0.695 (0.305)**	
	Characteristics	-0.444 (0.198)**	
	Coefficients	1.139 (0.322)***	
	Characteristics	Age	0.104 (0.023)***
		Education	-0.158 (0.041)***
		Lives with a partner	0.002 (0.020)
		Lives with children under 15 years	0.004 (0.005)
		Lives with dependent people	-0.000 (0.004)
		Housework time	0.650 (0.126)***
		Year	0.026 (0.011)**
		Municipality size	-0.017 (0.019)
Population density		-0.002 (0.003)	
Region		-0.126 (0.040)***	
Mode of transport		-0.662 (0.124)***	
Full/part-time job		0.137 (0.071)*	
Continuous/split working day		0.020 (0.051)	
Permanent/fixed-term contract		-0.097 (0.021)***	
Seniority		-0.156 (0.028)***	
Occupation		-0.123 (0.047)***	
Firm size		-0.044 (0.023)*	
N			25,957

\* $p < 0.1$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.01$ . Standard errors in parenthesis.  
 Source Own elaboration from the *Quality of Life at Work Survey*

such as greater temporariness, lower seniority, or their segregation into occupations and firm sizes different from those of men, are associated with longer commuting times.

#### 4.2.2 Decomposition of the Gender Gap in Commuting: Disaggregated Analysis

Table 2 shows the results of the decomposition analysis of gender differences in commuting time, broken down by groups according to educational level, presence of family responsibilities and whether individuals live with a partner. This allows examining the commuting behavior of certain groups of women whose work patterns and outcomes have also traditionally been more comparable to those of men<sup>7</sup> (such as women with higher education, those without family responsibilities or those not living with a partner), and thus assessing the possible influence of cultural or social constraints on women's commuting. The table also includes the decomposition analysis that distinguishes whether the commuting time is below/above the average commuting time.

Starting with the results disaggregated by level of education, the evidence obtained for employees with primary and secondary education is in the same direction as that for the total sample, albeit with significant and quantitatively higher values for the estimated components, which also in this case confirm a pattern of lower mobility for women once the differences in characteristics are controlled for (with a difference of 1.7 min). However, for the group of employees with higher education, neither the characteristics coefficient (again as a result of the opposite effect of different individual factors) nor the returns one are different from zero at conventional levels of significance, contrary to the general case. This last result implies that for this group of workers there are no differences in the commuting patterns of observationally similar men and women, and suggests that women with higher levels of education, who are characterized by a work behavior that is more assimilable compared to men and a lower acceptance of gender roles, do not have differentiated commuting patterns.

Similarly, when differentiating by family responsibilities, it can be observed that in the case of persons without them (namely those who do not live with children or dependent people) there are no differences between men and women in commuting duration and, although there are relevant differences in characteristics associated with different levels of commuting, the coefficient component of the decomposition is not significant. On the contrary, in the case of people with family responsibilities, there are significant differences in unadjusted commuting, with a shorter average commute for women, and this gap is even more pronounced once the differences in characteristics by gender are taken into account. This evidence suggests that also in the case of no family responsibilities, men and women tend to behave similarly, in contrast to what happens in the case of those with family responsibilities.

Similar results are observed when differentiating by cohabitation. Thus, the fifth and sixth columns of Table 2 present the results of the decomposition analysis that differentiates according to whether individuals live with a partner or not. Within the group of

<sup>7</sup> To illustrate, it has been found that the size of the gender pay gap is typically smaller or nonexistent for unmarried women (Ponthieux and Meurs 2015) and that there is a significant wage penalty for women associated with having children (see, for example, Budig and England, 2001 and Harkness and Waldfogel 2003). Similarly, women with more egalitarian views tend to have fewer children (Kaufman 2000), which is consistent with evidence that social norms in each country have a significant influence on household formation and fertility (Giménez-Nadal et al., 2012).

persons not living with a partner, the commuting behavior of men and women is relatively similar (in fact, women have longer commuting times), so that the returns component of the decomposition of this difference is not significant. In contrast, for those living with a partner, significant differences are observed in both the unadjusted difference and the coefficient component, indicating that women living with a partner commute shorter hours than men in the same situation.

Finally, when looking at the disaggregated results according to commute length, the unadjusted gender differences in commuting are quite similar in both groups (1.24 min for below-average commutes and 1.21 min for above-average commutes), and the results of the decomposition of these differences are also very similar in both cases so that no relevant differences are observed with respect to the general analysis.

### 4.2.3 Determinants of Satisfaction

The final part of the empirical analysis examines the relationship between commuting time and workers' satisfaction in different domains, since a hypothetical explanation for women's shorter commutes could be a differential effect on their level of relative well-being, associated with women's lower tolerance for this phenomenon due to distinct preferences.<sup>8</sup> To this end, several specifications of Eq. (3) were estimated by ordinary least squares, each taking as dependent variables satisfaction with work, leisure, and personal life, respectively. The results are reported in Table 3. For reasons of space, the table includes only a small number of variables: commuting, the gender dummy variable and the main variable of interest in this part of the analysis, i.e. the interaction between these two variables (the detailed estimation results can be found in Table 5 in the Appendix). The other explanatory variables considered as controls for all the satisfaction domains include the same individual, family and territorial characteristics as in the previous part of the analysis, while the model referring to job satisfaction includes both objective and subjective characteristics of the jobs, in line with previous literature (see Simón et al., 2020).

The results show that longer commutes are associated with lower levels of job satisfaction and that women may not have a different tolerance for commuting compared with men, either for the population as a whole or for any specific group disaggregated by level of education, family responsibilities, and family structure. Similarly, despite the generally negative association observed between commuting and the other satisfaction domains (personal life and leisure time), the interaction variables between commuting and women are not statistically significant in any case. Overall, this evidence suggests that women's shorter commuting times are not plausibly the result of decisions associated with a hypothetical lower tolerance for commuting, but are probably the consequence of other restrictive factors of a social and cultural nature, which is consistent with the rest of the evidence obtained in the empirical analysis.

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<sup>8</sup> Taking into account potential gender differences in social and cognitive aspects that might influence preferences has allowed considerable progress in understanding the reasons why men and women generally perform differently in the labor market (Croson and Gneezy 2009, and Bertrand 2011).

**Table 2** Decomposition of the gender commuting gap (minutes). Oaxaca-Blinder technique. Disaggregated analysis

	Primary and secondary education	Higher education	Individuals with family responsibilities	Individuals without family responsibilities	Individuals with partner	Individuals without partner	Commuting under average	Commuting over average
Total	21.840 (0.262)***	24.614 (0.375)***	22.961 (0.239)***	22.337 (0.462)***	22.959 (0.239)***	22.375 (0.453)***	11.662 (0.081)***	43.711 (0.381)***
Female commuting	20.891	23.575	21.877	22.535	21.741	22.660	11.084	43.013
Difference	(0.278)*** 0.949 (0.382)**	(0.332)*** 1.039 (0.501)**	(0.256)*** 1.084 (0.350)***	(0.391)*** -0.198 (0.605)	(0.273)*** 1.218 (0.363)***	(0.349)*** -0.285 (0.572)	(0.085)*** 0.941 (0.118)***	(0.378)*** 1.208 (0.537)**
Characteristics	-0.746 (0.279)***	0.414 (0.292)	-0.375 (0.266)	-0.883 (0.328)***	-0.215 (0.273)	-1.010 (0.320)***	-0.663 (0.072)***	-0.509 (0.330)
Coefficients	1.694 (0.413)***	0.625 (0.498)	1.458 (0.393)***	0.685 (0.571)	1.434 (0.409)***	0.725 (0.549)	1.241 (0.129)**	1.207 (0.298)***
Age	0.030 (0.022)	0.174 (0.059)***	0.221 (0.060)***	-0.488 (0.119)***	0.218 (0.063)***	-0.512 (0.122)***	0.030 (0.009)***	0.073 (0.034)**
Education	-	-	-0.086 (0.041)**	-0.356 (0.105)***	-0.095 (0.045)**	-0.285 (0.085)***	-0.018 (0.015)	-0.048 (0.075)
Lives with a partner	0.014	-0.041	-0.037	-	-	-	0.003	-0.030
Lives with children under 15 years	(0.023)	(0.037)	(0.045)	-	0.007	-0.105	(0.006)	(0.056)
Lives with dependent people	0.005	0.011	-0.001	-	0.000	-0.016	-0.001	0.029
	(0.006)	(0.012)	(0.003)	-	(0.008)	(0.088)	(0.002)	(0.025)
	-0.003	0.000	0.001	-	0.000	-0.016	0.001	-0.009
	(0.006)	(0.007)	(0.006)	-	(0.001)	(0.022)	(0.002)	(0.010)



Table 2 (continued)

	Primary and secondary education	Higher education	Individuals with family responsibilities	Individuals without family responsibilities	Individuals with partner	Individuals without partner	Commuting under average	Commuting over average
Housework time	0.605 (0.192)***	0.648 (0.147)***	0.870 (0.174)***	0.249 (0.146)*	0.942 (0.179)***	0.253 (0.159)	0.108 (0.051)**	0.549 (0.230)***
Year	0.036 (0.018)**	0.005 (0.015)	0.012 (0.012)	0.050 (0.037)	0.015 (0.012)	0.059 (0.033)*	-0.003 (0.005)	0.089 (0.037)**
Municipality size	-0.046 (0.036)	0.031 (0.025)	-0.004 (0.017)	-0.044 (0.064)	0.001 (0.017)	-0.035 (0.060)	-0.036 (0.017)**	0.391 (0.079)***
Population density	-0.002	0.000	-0.004	0.005	-0.004	0.004	-0.003	0.007
Region	(0.004)	(0.004)	(0.005)	(0.013)	(0.005)	(0.011)	(0.002)	(0.010)
	-0.223	0.165	-0.129	-0.153	-0.101	-0.191	-0.004	-0.131
	(0.050)***	(0.082)**	(0.055)**	(0.068)**	(0.058)*	(0.061)***	(0.007)	(0.092)
Mode of transport	-1.016	-0.407	-0.764	-0.304	-0.712	-0.363	-0.616	-1.411
	(0.174)***	(0.182)**	(0.147)***	(0.246)	(0.153)***	(0.227)	(0.037)***	(0.209)***
Full/part-time job	-0.051	0.313	0.092	0.146	0.058	0.170	-0.050	0.183
	(0.118)	(0.072)***	(0.099)	(0.083)*	(0.106)	(0.078)**	(0.032)	(0.124)
Continuous/split working day	0.131	-0.127	-0.011	0.049	0.002	0.019	0.002	-0.129
	(0.077)*	(0.061)**	(0.065)	(0.073)	(0.068)	(0.073)	(0.019)	(0.098)
Permanent/fixed-term contract	-0.085	-0.158	-0.122	-0.002	-0.120	0.012	-0.026	-0.025
	(0.024)***	(0.054)***	(0.030)***	(0.031)	(0.030)***	(0.027)	(0.009)***	(0.019)
Seniority	-0.127	-0.196	-0.292	0.167	-0.293	0.178	-0.021	-0.117
	(0.037)***	(0.051)***	(0.053)***	(0.063)***	(0.055)***	(0.062)***	(0.011)*	(0.042)***

Table 2 (continued)

	Primary and secondary education	Higher education	Individuals with family responsibilities	Individuals without family responsibilities	Individuals with partner	Individuals without partner	Commuting under average	Commuting over average
Occupation	0.006 (0.050)	-0.086 (0.051)*	-0.097 (0.056)*	-0.090 (0.110)	-0.110 (0.059)*	-0.088 (0.095)	-0.027 (0.017)	0.071 (0.098)
Firm size	-0.020 (0.039)	0.082 (0.030)***	-0.024 (0.026)	-0.112 (0.048)**	-0.024 (0.027)	-0.111 (0.045)**	-0.004 (0.009)	-0.003 (0.035)
N	16,153	9,804	18,285	7,672	17,081	8,876	17,401	8,556

\* $p < 0.1$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.01$ . Standard errors in parenthesis. Source Own elaboration from the *Quality of Life at Work Survey*

## 5 Conclusions

The aim of this article is to examine the differences in commuting times between male and female employees in Spain. A better knowledge of the origins of the gender gap in commuting times, which, albeit with international differences in its magnitude, tends to be observed in many advanced countries, could contribute, among other circumstances, to a better understanding of one of the elements that could influence the worse employment outcomes suffered by women.

A particularly novel aspect of the research is the use, for the first time in this field of study, of econometric decomposition techniques. These techniques make it possible to quantify how much of the gap can be explained (in total and separately) by each of the individual, family, territorial and work-related factors identified as relevant in the literature, and to test whether different commuting patterns exist when men and women with the same characteristics are compared. To this end, the empirical analysis uses microdata from a survey with a wealth of information that allows for a comprehensive control of the various elements that the literature has identified as possible determinants of gender differences in commuting, including those related to several dimensions of family responsibilities. The analysis is based on time-based measures of commuting, which have important advantages over those based on distance.

The empirical analysis tests three main hypotheses. The first one is that the observed raw gender differences in commuting time could be explained by the different characteristics that men and women have on average with respect to different individual, family, territorial, and job-related elements associated with commuting time. The second hypothesis is that there may be no gender differences in commuting patterns for certain groups of women with weaker gender roles, such as those with higher education, those without family responsibilities, and those without a partner. Finally, the third major hypothesis is that the lower commuting of women could be due to different preferences as compared to those of men and a lower tolerance of women towards commuting, and that this could be reflected in different degrees of association between commuting time and satisfaction on different domains.

As in other advanced countries, women in Spain have comparatively shorter commuting times than men. The results of the decomposition analysis show that Spanish women as a whole have relative characteristics that, *ceteris paribus*, are associated with longer commutes, such as the modes of transport they use (with a predominance of public transport) and the characteristics of their jobs (generally of lower quality and less stable), with the exception of their greater family responsibilities, a factor typically associated with shorter commutes. Although this evidence confirms that gender differences in the relative endowments of characteristics help to explain the raw gender differences in commuting time, it does not support the hypothesis that the lower commuting time of women is due to the fact that men and women differ in the characteristics that are important determinants of the phenomenon. Consequently, according to the decomposition analysis, women systematically show significantly shorter commuting times than observationally comparable men

**Table 3** Determinants of satisfaction with job, leisure time and personal life

	Job satisfaction	Satisfaction with leisure time	Satisfaction with personal life
Total			
Commuting	-0.005 (0.001)***	-0.012 (0.002)***	-0.005 (0.001)***
Woman	0.031 (0.041)	-0.495 (0.077)***	-0.080 (0.052)
Woman*Commuting	0.107 (0.078)	0.079 (0.159)	-0.051 (0.103)
Primary and secondary education			
Commuting	-0.004 (0.001)***	-0.012 (0.002)***	-0.005 (0.001)***
Woman	-0.020 (0.055)	-0.610 (0.100)***	-0.175 (0.074)**
Woman*Commuting	0.063 (0.109)	0.164 (0.207)	-0.036 (0.149)
Higher education			
Commuting	-0.006 (0.001)***	-0.011 (0.003)***	-0.004 (0.002)***
Woman	0.085 (0.060)	-0.335 (0.120)***	0.068 (0.067)
Woman*Commuting	0.120 (0.111)	-0.065 (0.249)	-0.111 (0.143)
Individuals without family responsibilities			
Commuting	-0.004 (0.002)**	-0.017 (0.004)***	-0.003 (0.002)
Woman	0.078 (0.077)	0.009 (0.156)	0.083 (0.111)
Woman*Commuting	0.114 (0.154)	0.318 (0.331)	-0.182 (0.209)
Individuals with family responsibilities			
Commuting	-0.005 (0.001)***	-0.010 (0.002)***	-0.006 (0.001)***
Woman	0.020 (0.048)	-0.730 (0.087)***	-0.140 (0.054)***
Woman*Commuting	0.094 (0.088)	-0.036 (0.177)	0.008 (0.115)
Individuals with a partner			
Commuting	-0.004 (0.001)***	-0.010 (0.002)***	-0.005 (0.001)***
Woman	0.024 (0.049)	-0.715 (0.089)***	-0.127 (0.054)**
Woman*Commuting	0.094 (0.091)	-0.063 (0.183)	0.053 (0.114)
Individuals without a partner			

**Table 3** (continued)

	Job satisfaction	Satisfaction with leisure time	Satisfaction with personal life
Commuting	-0.005 (0.002)***	-0.016 (0.004)***	-0.003 (0.002)
Woman	0.064 (0.072)	-0.074 (0.148)	0.054 (0.104)
Woman*Commuting	0.130 (0.144)	0.378 (0.312)	-0.229 (0.200)
Personal, household and territorial characteristics	Yes	Yes	Yes
Objective job characteristics	Yes	No	No
Subjective job characteristics	Yes	No	No

\* $p < 0.1$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.01$ . Estimation by ordinary least squares. Fixed effects by year and region were also included. Robust standard errors. *Source*: Own elaboration from the *Quality of Life at Work Survey*

with the same personal, family, territorial and occupational characteristics. This evidence is consistent with the hypothesis expressed in the literature that there are social or cultural determinants that may limit women's ability to commute in practice. This evidence is further supported by the finding that women with higher education, those without family responsibilities and those without a partner have commuting patterns similar to those of comparable men, confirming the hypothesis that there are no gendered commuting patterns in groups with lower acceptance of traditional gender roles. Finally, with regard to the third hypothesis, it does not appear that the relationship between commuting and satisfaction with various life domains varies by gender. Thus, this result does not support the possibility that women's shorter commuting times are allegedly voluntary, related to different preferences and, in particular, to a lower tolerance for commuting.

The shorter average commuting time of women suggests that the average size of the local labor markets in which they participate is comparatively small, which may condition their access to a wider variety of higher quality jobs. The evidence obtained suggests that women's shorter commutes are related to their spending more time on household tasks, together with unobservable elements that are likely to be related to traditional gender roles and women's functions in the family structure. Any policy that addresses these factors could therefore contribute to reducing the commuting gap between men and women and possibly lead to less differentiated employment opportunities. Among the various measures that would be in line with both this objective and the European strategies for reducing gender gaps in the labor market (European Commission, 2017; European Union, 2019) are, for example, those related to the provision of sufficient and affordable services offering quality care for children (including free education for 0–3 year olds, non-teaching staff in schools for children who require sporadic care, after-school activities and homework support, and

holiday care services); an adequate supply of quality and affordable long-term care services related to population aging and dependency (such as residential care, day centres, and permanent or emergency home care); and, finally, a more flexible organization of working time, which would reduce the pressure on women to work closer to home to care for their families and cope with contingencies, and could lead to greater spatial flexibility. As Petrongolo and Ronchi (2020) point out, two relevant aspects in this context are the impact of new technologies, both in terms of technological and organizational changes that allow more flexible forms of work organization in established sectors, and the rise of the collaborative economy. While both of these trends could prove positive for women by reducing the costs of flexibility, there is also a risk that they will deepen their specialization in occupations that are more permeable to non-standard work arrangements, thereby reinforcing a potential comparative advantage in non-market work, which in turn could have a negative impact on gender norms and aspirations. Similarly, policies aimed at providing better care services in the context of ageing, dependency and childcare need to be carefully designed and implemented to avoid simply commodifying currently unpaid female care work in ways that create low-paid, low-status jobs, mostly occupied by women, thereby reinforcing the stereotype of care work as female work.

To conclude, some limitations of the analysis, which derive from the characteristics of the dataset employed, should be mentioned. First, since the survey does not include information on the unemployed, it is not possible to account for the selection into labor market participation and possible related biases. Second, the econometric techniques used in the analysis do not allow for the identification of causality in the observed relationships and, in the specific case of the examination of the determinants of satisfaction, the estimations could be affected by endogeneity and reverse causality problems that cannot be sorted out with our cross-sectional data. Finally, the results observed for Spain in the specific period examined cannot be automatically extrapolated to other countries and periods. All these points encourage further research in this area, expanding the range of countries and periods considered, and based on different types of data and econometric techniques.

## Appendix

See Tables 4 and 5

**Table 4** Descriptive variables

	Total				Low commuting				High commuting			
	Men		Women		Men		Women		Men		Women	
	Average	Standard deviation	Average	Standard deviation	Average	Standard deviation	Average	Standard deviation	Average	Standard deviation	Average	Standard deviation
Commuting time (minutes)	22.78	20.29	22.08	18.91	11.66	5.96	11.08	5.97	43.71	21.01	43.01	18.77
Job satisfaction (0–10)	7.24	1.72	7.31	1.76	7.34	1.68	7.39	1.76	7.05	1.77	7.15	1.74
Satisfaction with personal life (0–10)	7.60	1.77	7.50	1.89	7.66	1.75	7.59	1.85	7.50	1.80	7.33	1.97
Satisfaction with leisure time (0–10)	6.54	2.40	6.10	2.55	6.70	2.35	6.21	2.54	6.22	2.46	5.89	2.55
Age	39.47	11.16	38.58	10.72	39.41	11.34	38.44	10.75	39.57	10.83	38.84	10.67
Primary and secondary education	0.66	0.47	0.56	0.50	0.69	0.46	0.59	0.49	0.61	0.49	0.50	0.50
Higher education	0.34	0.47	0.44	0.50	0.31	0.46	0.41	0.49	0.39	0.49	0.50	0.50
Lives with a partner	0.69	0.46	0.63	0.48	0.68	0.47	0.64	0.48	0.70	0.46	0.61	0.49
Lives with children under 15 years	0.36	0.48	0.35	0.48	0.35	0.48	0.36	0.48	0.37	0.48	0.33	0.47
Lives with dependent people	0.06	0.23	0.06	0.24	0.06	0.23	0.06	0.24	0.05	0.22	0.06	0.24
Housework time (minutes)	75.20	67.76	139.22	84.98	76.30	68.84	143.04	85.58	73.14	65.65	131.79	83.32
Andalusia	0.16	0.37	0.15	0.35	0.17	0.38	0.15	0.36	0.15	0.36	0.13	0.34

**Table 4** (continued)

	Total						Low commuting				High commuting					
	Men		Women		Men		Women		Men		Women		Men		Women	
	Average	Standard deviation	Average	Standard deviation	Average	Standard deviation	Average	Standard deviation	Average	Standard deviation	Average	Standard deviation	Average	Standard deviation	Average	Standard deviation
Aragon	0.03	0.17	0.03	0.17	0.03	0.17	0.03	0.17	0.03	0.17	0.03	0.16	0.03	0.16	0.03	0.18
Asturias	0.02	0.15	0.02	0.15	0.02	0.15	0.02	0.15	0.02	0.15	0.02	0.13	0.02	0.13	0.02	0.14
Balearic Islands	0.02	0.15	0.03	0.16	0.03	0.16	0.03	0.17	0.02	0.17	0.02	0.12	0.02	0.12	0.02	0.13
Canary Islands	0.04	0.20	0.04	0.20	0.04	0.20	0.04	0.20	0.04	0.20	0.05	0.22	0.04	0.22	0.04	0.21
Cantabria	0.01	0.11	0.01	0.11	0.02	0.12	0.01	0.12	0.01	0.12	0.01	0.09	0.01	0.09	0.01	0.09
Castilla y Leon	0.05	0.22	0.05	0.21	0.06	0.23	0.05	0.23	0.04	0.23	0.04	0.20	0.03	0.20	0.03	0.17
Castilla-La Mancha	0.05	0.21	0.04	0.19	0.05	0.22	0.04	0.21	0.05	0.22	0.03	0.18	0.03	0.18	0.03	0.17
Catalonia	0.17	0.37	0.18	0.39	0.17	0.38	0.19	0.39	0.15	0.39	0.15	0.36	0.17	0.36	0.17	0.37
Valencian Community	0.11	0.31	0.11	0.31	0.11	0.32	0.12	0.33	0.09	0.33	0.09	0.29	0.08	0.29	0.08	0.28
Extremadura	0.02	0.15	0.02	0.13	0.03	0.16	0.02	0.15	0.01	0.15	0.01	0.12	0.01	0.12	0.01	0.09
Galicia	0.06	0.23	0.05	0.23	0.06	0.24	0.06	0.24	0.05	0.24	0.05	0.21	0.04	0.21	0.04	0.19
Madrid	0.15	0.36	0.17	0.38	0.10	0.29	0.11	0.31	0.26	0.44	0.26	0.44	0.30	0.44	0.30	0.46
Murcia	0.03	0.18	0.03	0.17	0.03	0.18	0.04	0.19	0.03	0.17	0.03	0.17	0.02	0.17	0.02	0.14
Navarre	0.01	0.12	0.01	0.12	0.02	0.13	0.02	0.13	0.01	0.13	0.01	0.10	0.01	0.10	0.01	0.10
Basque country	0.05	0.22	0.05	0.22	0.05	0.22	0.05	0.21	0.05	0.21	0.05	0.21	0.05	0.21	0.05	0.22
La Rioja	0.01	0.08	0.01	0.08	0.01	0.09	0.01	0.09	0.00	0.09	0.00	0.06	0.00	0.06	0.00	0.07
Municipality size < 10,000	0.20	0.40	0.17	0.38	0.21	0.41	0.19	0.39	0.16	0.37	0.16	0.37	0.13	0.37	0.13	0.34
Municipality size 10,000–49,999	0.28	0.45	0.27	0.44	0.29	0.46	0.30	0.46	0.25	0.43	0.25	0.43	0.20	0.43	0.20	0.40



Table 4 (continued)

	Total						Low commuting				High commuting					
	Men		Women		Men		Women		Men		Women		Men		Women	
	Average	Standard deviation	Average	Standard deviation	Average	Standard deviation	Average	Standard deviation	Average	Standard deviation	Average	Standard deviation	Average	Standard deviation	Average	Standard deviation
Municipality size 50,000–99,999	0.13	0.33	0.13	0.34	0.13	0.33	0.14	0.34	0.13	0.34	0.13	0.34	0.13	0.34	0.13	0.34
Municipality size 100,000–1,000,000	0.31	0.46	0.32	0.47	0.32	0.47	0.32	0.47	0.30	0.46	0.33	0.47	0.30	0.46	0.33	0.47
Municipality size > 1,000,000	0.09	0.28	0.11	0.31	0.05	0.22	0.06	0.23	0.15	0.36	0.20	0.40	0.15	0.36	0.20	0.40
Population density (inhabitants per squared kilo-metre)	1781.39	3024.43	1742.39	2988.16	1.840.63	3.012.50	1.751.33	3.032.10	1.670.80	3.043.80	1.724.99	2.901.07	1.670.80	3.043.80	1.724.99	2.901.07
Mode of transport: public	0.10	0.30	0.20	0.40	0.04	0.20	0.08	0.27	0.21	0.41	0.44	0.50	0.21	0.41	0.44	0.50
Mode of transport: private	0.74	0.44	0.54	0.50	0.74	0.44	0.57	0.50	0.75	0.44	0.50	0.50	0.75	0.44	0.50	0.50
Mode of transport: on foot and other	0.15	0.36	0.26	0.44	0.21	0.41	0.35	0.48	0.05	0.21	0.07	0.25	0.05	0.21	0.07	0.25
Mode of transport: car	0.69	0.46	0.52	0.50	0.67	0.47	0.54	0.50	0.72	0.45	0.48	0.50	0.72	0.45	0.48	0.50
Mode of transport: motorbike	0.04	0.20	0.01	0.12	0.05	0.23	0.02	0.13	0.02	0.15	0.01	0.09	0.02	0.15	0.01	0.09
Mode of transport: taxi	0.00	0.03	0.00	0.04	0.00	0.03	0.00	0.04	0.00	0.02	0.00	0.04	0.00	0.02	0.00	0.04
Mode of transport: bus	0.05	0.21	0.11	0.32	0.02	0.15	0.06	0.23	0.09	0.29	0.23	0.42	0.09	0.29	0.23	0.42

**Table 4** (continued)

	Total						Low commuting				High commuting					
	Men		Women		Men		Women		Men		Women		Men		Women	
	Average	Standard deviation	Average	Standard deviation	Average	Standard deviation	Average	Standard deviation	Average	Standard deviation	Average	Standard deviation	Average	Standard deviation	Average	Standard deviation
Mode of transport: underground or tram	0.03	0.18	0.06	0.23	0.01	0.11	0.02	0.13	0.07	0.26	0.02	0.13	0.07	0.26	0.14	0.34
Mode of transport: train	0.02	0.14	0.03	0.16	0.00	0.07	0.00	0.07	0.05	0.21	0.00	0.07	0.05	0.21	0.07	0.25
Mode of transport: bicycle	0.01	0.11	0.01	0.08	0.02	0.13	0.01	0.09	0.00	0.06	0.01	0.09	0.00	0.06	0.01	0.07
Mode of transport: on foot	0.13	0.34	0.24	0.43	0.19	0.39	0.34	0.47	0.02	0.15	0.34	0.47	0.02	0.15	0.06	0.24
Mode of transport: other	0.03	0.16	0.01	0.12	0.03	0.16	0.02	0.13	0.02	0.15	0.02	0.13	0.02	0.15	0.01	0.08
Year 2007	0.27	0.44	0.25	0.43	0.26	0.44	0.25	0.43	0.29	0.46	0.25	0.43	0.29	0.46	0.26	0.44
Year 2008	0.27	0.44	0.26	0.44	0.27	0.44	0.26	0.44	0.26	0.44	0.26	0.44	0.26	0.44	0.27	0.44
Year 2009	0.23	0.42	0.24	0.43	0.23	0.42	0.24	0.43	0.24	0.43	0.24	0.43	0.24	0.43	0.24	0.43
Year 2010	0.23	0.42	0.24	0.43	0.24	0.43	0.24	0.43	0.20	0.40	0.24	0.43	0.20	0.40	0.24	0.43
Full-time job	0.93	0.25	0.76	0.43	0.93	0.25	0.75	0.44	0.94	0.24	0.75	0.44	0.94	0.24	0.79	0.41
Part-time job	0.07	0.25	0.23	0.42	0.07	0.25	0.25	0.44	0.06	0.24	0.25	0.44	0.06	0.24	0.21	0.41
Continuous working day	0.51	0.50	0.67	0.47	0.51	0.50	0.67	0.47	0.50	0.50	0.67	0.47	0.50	0.50	0.68	0.47
Split working day	0.49	0.50	0.33	0.47	0.49	0.50	0.33	0.47	0.50	0.50	0.33	0.47	0.50	0.50	0.32	0.47
Permanent contract	0.77	0.42	0.73	0.45	0.78	0.41	0.73	0.44	0.79	0.44	0.73	0.44	0.79	0.44	0.78	0.45
Fixed-term contract	0.23	0.42	0.27	0.45	0.22	0.41	0.27	0.44	0.21	0.44	0.27	0.44	0.21	0.44	0.22	0.45

Table 4 (continued)

	Total				Low commuting				High commuting			
	Men		Women		Men		Women		Men		Women	
	Average	Standard deviation	Average	Standard deviation	Average	Standard deviation	Average	Standard deviation	Average	Standard deviation	Average	Standard deviation
Seniority	9.63	10.14	8.31	9.34	9.97	10.34	8.34	9.32	8.99	9.73	8.27	9.37
Non-qualified occupation	0.11	0.32	0.15	0.35	0.12	0.32	0.14	0.35	0.10	0.30	0.16	0.37
Semi-qualified occupation	0.58	0.49	0.45	0.50	0.61	0.49	0.48	0.50	0.54	0.50	0.37	0.48
Qualified occupation	0.30	0.46	0.41	0.49	0.27	0.44	0.38	0.48	0.36	0.48	0.47	0.50
Firm size < 10 employees	0.17	0.37	0.23	0.42	0.25	0.43	0.27	0.44	0.18	0.38	0.20	0.40
Firm size 10-249 employees	0.23	0.42	0.24	0.43	0.25	0.44	0.20	0.40	0.22	0.41	0.17	0.38
Firm size > = 250 employees	0.24	0.43	0.19	0.39	0.49	0.50	0.53	0.50	0.60	0.49	0.63	0.48
Over-educated	0.53	0.50	0.57	0.50	0.16	0.37	0.23	0.41	0.18	0.39	0.22	0.43
Monotony at work (0-10)	4.93	3.06	4.96	3.15	4.94	3.08	5.03	3.15	4.91	3.04	4.93	3.15
Physical effort at work (0-10)	4.82	3.10	4.17	3.34	4.80	3.06	4.14	3.32	4.85	3.19	4.18	3.36
Danger/risk at work (0-10)	4.17	3.25	2.74	2.98	4.29	3.21	2.94	2.91	4.25	3.33	2.64	3.10
Security and health at work (0-10)	7.30	2.14	7.28	2.28	7.38	2.10	7.10	2.24	7.34	2.20	7.37	2.30

**Table 4** (continued)

	Total			Low commuting				High commuting			
	Men		Women	Men		Women	Men		Women		
	Average	Standard deviation	Average	Standard deviation	Average	Standard deviation	Average	Standard deviation	Average	Standard deviation	
<i>Number of observations</i>	14,521		11,436		9668		7733		4853		3703

*Source:* Own elaboration from the *Quality of Life at Work Survey*

**Table 5** Determinants of satisfaction

	Job satisfaction	Satisfaction with leisure time	Satisfaction with personal life
Commuting time (minutes)	−0.005 (0.001)***	−0.012 (0.002)***	−0.005 (0.001)***
Woman	0.031 (0.041)	−0.495 (0.077)***	−0.080 (0.052)
Commuting*Woman	0.107 (0.078)	0.079 (0.159)	−0.051 (0.103)
Age	−0.002 (0.002)	0.011 (0.002)***	−0.010 (0.002)***
Higher education	0.057 (0.032)*	0.100 (0.048)**	0.263 (0.030)***
Lives with a partner	0.038 (0.032)	0.028 (0.061)	0.640 (0.041)***
Lives with children under 15 years	−0.019 (0.029)	−0.376 (0.052)***	−0.216 (0.034)***
Lives with dependent people	−0.019 (0.050)	−0.509 (0.097)***	−0.215 (0.062)***
Housework time (minutes)	0.000 (0.000)***	0.000 (0.000)	0.000 (0.000)
Municipality size 10,000–49,999	−0.059 (0.037)	−0.020 (0.069)	−0.027 (0.045)
Municipality size 50,000–99,999	−0.112 (0.047)**	−0.171 (0.089)*	−0.054 (0.059)
Municipality size 100,000–1,000,000	−0.113 (0.036)***	−0.115 (0.069)*	−0.011 (0.043)
Municipality size > 1,000,000	−0.246 (0.057)***	−0.429 (0.111)***	−0.248 (0.071)***
Population density	0.000 (0.000)	−0.000 (0.000)	0.000 (0.000)
Mode of transport: private	−0.007 (0.040)	−0.052 (0.078)	0.061 (0.049)
Mode of transport: on foot or other	0.027 (0.047)	−0.025 (0.090)	0.049 (0.057)
Full-time job	0.132 (0.040)***	−	−
Continuous working day	0.048 (0.027)*	−	−
Permanent contract	0.278 (0.033)***	−	−
Seniority	−0.002 (0.002)	−	−
Semi-qualified occupation	0.089 (0.045)**	−	−
Qualified occupation	0.193	−	−

**Table 5** (continued)

	Job satisfaction	Satisfaction with leisure time	Satisfaction with personal life
	(0.051)***		
Firm size 10–249	–0.060 (0.038)	–	–
Firm size 250 or more	0.042 (0.034)	–	–
Over–educated	–0.741 (0.036)***	–	–
Monotony at work	–0.087 (0.004)***	–	–
Physical effort at work	–0.014 (0.005)***	–	–
Danger/risk at work	–0.012 (0.005)***	–	–
Security and health at work	0.284 (0.008)***	–	–
Constant	5.491 (0.125)***		
N	25,957	19,663	25,957

\* $p < 0.1$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.01$ . In addition to the explanatory variables shown in the table, fixed effects by year and region have been included. Reference categories are primary and secondary education for the educational level; no partner, children under 15 years of age or dependent persons in the household in variables related to household composition; municipalities under 10,000 inhabitants for municipality size; use of public modes of transport; part time, split working day and temporary contract for these job characteristics; unskilled occupations for occupation; and firm size under 10 workers for firm size. *Source:* Own elaboration from the *Quality of Life at Work Survey*

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**Data Availability** Ministry of Labour, Spain, <http://www.mitramiss.gob.es/estadisticas/Ecvt/welcome.htm>

## Declarations

**Conflicts of interests** The authors have no conflicts of interest to declare that are relevant to the content of this article.

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