



Gender Gaps in Commuting Time: Evidence from Peru, Ecuador, Chile, and Colombia

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Abstract

We analyze the relationship between gender and the time devoted to commuting by men and women in four Latin American countries. Using data from time surveys from Peru (2010), Ecuador (2012), Chile (2015) and Colombia (2012 and 2017), we observe in all four countries that women devote less time to this activity compared to men, in both urban and rural areas. This gender difference varies depending on the presence of children, the working hours, the type of employment, and the urban or rural status of the respondent. Our results contribute to the literature on gender differences in commuting time for a set of countries that have not been thoroughly analyzed, pointing to the responsibility for the care of children as a factor limiting the daily mobility of women in these countries.

Keywords Time use · Commuting · Gender gaps · Latin America countries

JEL Classification D10 · J22

Introduction

The analysis of commuting has gained importance in the literature in the most recent decade. Commuting can be considered as a shock to time endowments (Ross & Zenou, 2008), and certain uses of time, such as leisure, market work, child care, and home production, are significantly correlated with commuting (Gimenez-Nadal & Molina, 2016; Gimenez-Nadal et al., 2018a). Longer commutes have been related to decreased worker health outcomes, lower subjective and psychological well-being, increased stress and sickness absence, lower worker productivity, and significant

negative effects on wages (see Gimenez-Nadal et al. (2022a) for a review).

Kahneman et al. (2004) and Kahneman and Krueger (2006) show that time spent in commuting ranks among the lowest activities in terms of the “instant enjoyment” obtained by individuals. Gimenez-Nadal and Molina (2016) show that longer commutes may be related to higher levels of stress and fatigue of workers, which may in turn affect the quality of the time parents devote to caring for their children. Furthermore, commuting has been shown to have negative consequences for workers. Stone and Schneider (2016) show that commuting episodes are rated highly in terms of stress and tiredness and much lower in meaningfulness, compared with other daily activities, and thus commuting can be considered a low-well-being experience. There are also psychological costs associated with travel (Kahneman et al., 2004; Koslowsky et al., 1995; Stutzer & Frey, 2008), including increased blood pressure, physical disorders, and anxiety. Thus, given that commuting may have detrimental effects on workers, the analysis of what factors are related to more time in commuting is important (Liu et al., 2017; Rosales-Salas & Jara-Díaz, 2017).

Several sociodemographic characteristics of workers have been found to be important determinants of commuting trips,

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and one of the most important is gender.¹ Gender has been found to be related to lower commuting times (Gimenez-Nadal & Molina, 2016; Turner & Neimeier, 1997), and two hypotheses have been used to explain these gender differences: the Household Responsibilities Hypothesis and the Labor Market Structures Hypothesis. According to the former, mothers spend more time in childcare activities and other unpaid work activities than do fathers and they need more time for childcare than female workers without kids, leading to shorter commutes (Clark et al., 2003; Fan, 2017; Gimenez-Nadal & Molina, 2016; Hjorthol, 2000; Johnston-Anumonwo, 1992; Lee & McDonald, 2003; Turner & Neimeier, 1997). The Labor Market Structures Hypothesis argues that women take shorter trips because they are constrained by part-time employment and low wages, so long trips simply don't pay off (Carter & Butler, 2008; Carlson & Persky, 1999; Fanning Madden, 1981; Hanson & Johnston, 1985; Hanson & Pratt, 1988, 1992, 1995; Madden & Chiu, 1990; Sandow, 2008). Prior research has found significant differences between employees and self-employed workers (Gimenez-Nadal et al., 2018b; Van Ommeren & Van der Straaten, 2008), but the evidence regarding gender gaps in the time dedicated to commuting by the self-employed is scarce, and the results differ widely from country to country (Reuschke & Houston, 2020; Rosenthal & Strange, 2012).

Within this framework, we use data from time use surveys in Peru (2010), Ecuador (2012), Chile (2015) and Colombia (2012, 2017) to analyze gender differences in the time devoted to commuting by workers. We estimate linear models (OLS) for each country separately, and the urban/rural dimension is considered, since urban/rural residence may condition individual commuting behaviors (Östh & Lindgren, 2012; Schwanen et al., 2004; Susilo & Maat, 2007). Our main results show that women relative to men devote fewer hours to commuting. In urban areas, women devote 24 min, 42 min, 36 min, and 3.1 fewer minutes to commuting in Peru, Ecuador, and Chile (minutes per week) and Colombia (minutes per day), respectively. In rural areas, women devote 54 min, 42 min, and 5.4 fewer minutes to commuting in Peru and Ecuador (minutes per week) and Colombia (minutes per day), respectively. We also find that when there are no children in the households, the gender gaps in the time dedicated to commuting are present in urban and rural areas in Ecuador and Colombia, but when children

are present, we observe gender gaps in urban areas in the time devoted to commuting in all four countries analyzed, and the gender gaps in commuting increase in Ecuador (urban areas) and Colombia (urban and rural areas).

In Peru, Ecuador, Chile, and Colombia, we find that full-time female workers devote less time to commuting, compared to their male counterparts, in urban and rural areas, and the gender gaps are present in Ecuador (rural areas) and Colombia (urban areas) when we compare part-time male and female workers. When we analyze the influence of the type of employment, in the case of employed workers, women devote less time to commuting compared to men in Peru, Chile and Colombia (urban areas in the three countries) and Ecuador (urban and rural areas). In the case of the self-employed in Ecuador and Colombia (urban areas in both countries), the gender gap in the time dedicated to commuting increases. In the case of Peru and Colombia (rural areas in both countries), women (self-employed) relative to men (self-employed) devote less time to commuting.

We contribute to the literature by analyzing gender differences in the time devoted to commuting by men and women in these countries. The evidence for these gender gaps is scarce and inconclusive. Our results are similar to those found in developed countries, showing that women spend less time commuting than do men. The fact that this gender difference is found in a set of countries with different cultures, institutions, and populations, may indicate that factors considered at the country level do not determine the observed pattern. Given the importance of commuting in the environment and in the economies of countries, the analysis of commuting behavior is important for the correct design of mobility policies, which include pricing schemes and infrastructure planning, among others (Gimenez-Nadal et al., 2022b). This analysis has mostly been done in developed countries, in Europe, Australia, and the United States, but less work has been done in developing countries, perhaps because of a lack of data that allows for a comparative analysis across those countries.

Background

Several sociodemographic characteristics of workers have been found to be important determinants of commuting trips, and one of the most important is gender. Gender has been found to be related to lower commuting times (see Gimenez-Nadal and Molina (2016) for a review). Women tend to have shorter commutes than men, a finding that is remarkably persistent over time and consistent across countries (Black et al., 2014; Craig & Van Tienoven, 2019; Crane, 2007; Dex et al., 1995; Fanning Madden, 1981; Frändberg & Vilhelmsen, 2011; Gimenez-Nadal & Molina, 2016; Grieco et al., 1989; Hanson, 2010; Hanson & Pratt, 1988; Havet et al.,

¹ Literature has identified gender as a key factor linked with short/long commute distances and/or times (Fanning Madden, 1981; Hanson & Pratt, 1988; McLafferty, 1997), alongside other factors including earnings (McGregor & McConnachie, 1995); qualifications (Gordon et al., 1989); age (Loewenstein, 1965); race and ethnicity (Ihlanfeldt & Sjoquist, 1990); rural and suburban locations (Molho, 1995); access to a car (Taylor & Ong, 1995) and household time budgets (Duffy, 1992).

2021; Marcen & Morales, 2021; McLafferty, 1997; Turner & Niemeier, 1997). The Household Responsibilities Hypothesis states that mothers spend more time in childcare activities and other unpaid work than do fathers, given their household responsibilities, leading to shorter commutes (Clark et al., 2003; Fan, 2017; Gimenez-Nadal & Molina, 2016; Hjorthol, 2000; Johnston-Anumonwo, 1992; Lee & McDonald, 2003; Turner & Neimeier, 1997). Lee and McDonald (2003), using data from the Korean Population Census, find that the household responsibilities of childcare are an important factor in the shorter commutes of Korean married women. Gimenez-Nadal and Molina (2016), using the Dutch Time Use Survey, find that the effect of home production on commuting time for women is more than double that for men, while childcare time has an effect on women's commuting behavior only. Fan (2017), using data from the American Time Use Survey, finds that gender differences in commuting time are only observable when spouse/partner presence and parenthood interact (i.e., in couple households with children). The Labor Market Structures Hypothesis argues that women take shorter trips because they are constrained by part-time employment and low wages, so long trips simply do not pay off (Carter & Butler, 2008; Carlson & Persky, 1999; Fanning Madden, 1981; Hanson & Johnston, 1985; Hanson & Pratt, 1988, 1992, 1995; Madden & Chiu, 1990; Sandow, 2008).

Furthermore, the type of employment is an important determinant of commuting, as prior research has found significant differences between employees and self-employed workers (Gimenez-Nadal et al., 2018b; Van Ommeren & Van der Straaten, 2008), but the evidence regarding gender gaps in the time dedicated to commuting by the self-employed is scarce, and the results vary by country (Reuschke & Houston, 2020; Rosenthal & Strange, 2012;). Van Ommeren and Van der Straaten (2008) consider that self-employed workers have better information about the job-search market than do employees, finding that self-employed workers commute around 40–60% less than their employee counterparts. Gimenez-Nadal et al. (2018b) studied differences in the time devoted to commuting by US employees and self-employed workers, finding a difference of about 17%. Albert et al. (2019) 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%. Rosenthal and Strange (2012) find that self-employed women in the US, especially when they have children, commute less than their male counterparts, which the authors interpret as confirmation of the household responsibility hypothesis. Reuschke and Houston (2020) find little evidence for a commuting time gender gap amongst the self-employed in the UK, while their findings confirm existing evidence of a commuting gender gap for employees.

In the case of Latin-American countries, Gimenez-Nadal et al. (2022b) analyze the commuting behavior of employed and self-employed workers, in the urban areas of eleven Latin American countries, using data from the ECAF (Corporación Andina de Fomento and the Banco de Desarrollo de América Latina), and find that employed workers spend about 8.2 more minutes commuting to work than their self-employed counterparts, net of observable characteristics, a difference of around 18.5% of the employees' commuting time.²

Prior literature has identified a complex relationship between the commuting behavior of workers and urban forms and geographic characteristics (Cropper & Gordon, 1991; Gimenez-Nadal et al., 2018b; Manning, 2003; Rodríguez, 2004; Small & Song, 1992). Regarding the area of residence, differences are observed in terms of the time dedicated to commuting by individuals (Cropper & Gordon, 1991; Gimenez-Nadal et al., 2018b; Manning, 2003; Östh & Lindgren, 2012; Rodríguez, 2004; Schwanen et al., 2004; Small & Song, 1992; Susilo & Maat, 2007). Generally, the agriculture sector is predominant in rural areas. The female labor participation rate is lower in rural areas than in urban areas. Furthermore, there are other control variables, such as indigenous population and family structure that vary considerably across areas.

In the context of Latin American countries (as in developed countries), the labor participation of women has been growing in recent decades. Female labor force participation rates in Latin America and the Caribbean have grown from 41.5 in 1990 to 52% in 2020 (World Bank, 2021), generating positive societal effects.³ Consequently, an increasing proportion of women have begun to earn their own incomes, reducing traditional roles and dependence on husbands (Montaño, 2010). Yet, it is women who are still largely responsible for both unpaid work and household chores, and the care of children and other family members (Campaña et al., 2017, 2018; Canelas & Salazar, 2014; Esplen, 2009; Gimenez-Nadal et al., 2021; Medeiros et al., 2010). Women in Latin America devote relatively more time to unpaid work and care activities than do men. Thus, the gender gap in unpaid and care work leads women to devote more time to

² This analysis is a first exploration of self-employed and employed workers' commuting time in Latin American countries, but gender differences are not analyzed. The ECAF data does not include information on occupations, which are related to commuting behaviors, and is focused on urban regions only. The use of different data sources, such as detailed time use surveys (Gimenez-Nadal & Molina, 2022), panel databases, or specific regional surveys, with detailed information at the rural level, may be enlightening.

³ For our analyzed countries, Peru experienced higher growth in the female labor market participation rates compared to other Latin American countries (increasing from 53.62% in 2000 to 70% in 2019, see ILO, 2022).

total work (i.e., the sum of paid and unpaid work activities), compared to men (Campaña et al., 2018; ECLAC, 2022).

The literature shows that more egalitarian social norms, and institutional factors like the representation of women in political and decision-making positions, a greater representation of women in senior and middle management, and more women judges in the highest courts or supreme court, are all correlated with decreased gender gaps in paid and unpaid work (Campaña et al., 2018, 2023). As advances in the region, 16 Latin American countries have passed quota laws of some kind, and 6 include norms of parity. In several countries, this has meant a notable increase in the participation of women in important positions in decision-making processes. This has not been without difficulties, for which actions and measures persist that seek to improve the effectiveness of implementation, control, and monitoring of current laws. Barriers to compliance with the quota laws have led to actions focused on electoral legislation and its enforcement (ECLAC, 2019).

Thus, this framework is evidence of the relationship between commuting and gender, which is scarce for Latin American countries, despite the flourishing literature on the determinants of time allocation in the region (Amarante & Rossel, 2018; Campaña et al., 2017, 2018; Canelas & Salazar, 2014; Dominguez Amoros et al., 2019; Gimenez-Nadal et al., 2021; Medeiros et al., 2010; Rubiano Matulevich & Viollaz, 2019; Salvador & Galvan, 2013). The literature has focused on analyzing gender differences among individuals in the time dedicated to paid work, unpaid work, and care activities. Variables such as presence of children, and labor activities influence positively or negatively the time spent by individuals on these time-use activities. Latin American countries are characterized by traditional roles in which men are income providers in marriage and women are homemakers (Campaña et al., 2018), and where the primary responsibility for the care of the sick, the elderly, and children still falls to women (Esplen, 2009; Folbre, 2006), and working women with household responsibilities (mainly childcare responsibilities) may have to devote less time to commuting (shorter commutes) compared to working women without household responsibilities (Gimenez-Nadal & Molina, 2016).

Data and variables

We use time use data obtained from surveys from Peru (2010), Ecuador (2012), Chile (2015) and Colombia (2012, 2017),⁴ providing us with information on individual time

⁴ The methodologies for the time use surveys used in this paper have been defined by the relevant institutes of statistics in each country: INEI (National Institute of Statistics and Informatics) in Peru, INEC (National Institute of statistics and censuses) in Ecuador,

use (Aguiar & Hurst, 2007; Bianchi, 2000; Campaña et al., 2018; Gershuny, 2000; Gimenez-Nadal et al., 2021, Gimenez-Nadal & Molina, 2022). The targeted populations in these surveys are all members of households, aged 12 and older for Peru, Ecuador, and Chile, and aged 10 and above for Colombia.⁵ The four surveys use a list of pre-coded activities to classify and order different activities.⁶ The databases for Peru, Ecuador, and Colombia include information on whether individuals live in a rural or urban area, while the Chilean database only includes information on individuals in urban areas.⁷ Following Gimenez-Nadal et al. (2021), our sample consists of male and female workers, who are not students or retirees, have answered all sections of the survey, and have positive hours of market work. Our study sample is 5555 individuals in Peru, 16,312 individuals in Ecuador, 9706 individuals in Chile, and 102,832 individuals in Colombia. Regarding areas, the percentage of individuals of our samples living in a rural area is 21% for Peru, 34% for Ecuador and 18% for Colombia. The surveys for Peru, Ecuador, and Chile, take the previous week as reference period, while for Colombia the reference period is the previous day.⁹

Footnote 4 (continued)

INE (National Institute of statistics) in Chile, and DANE (National Administrative Department of statistics) in Colombia.

⁵ This paper only uses information from independent time-use surveys (Campaña et al., 2017, 2018, 2020; Campaña & Ortega, 2021; Gimenez Nadal et al., 2021), which allows us to develop cross-country comparisons. Alternatives to independent time use surveys, such as time use modules integrated into household or employment surveys, have some negative consequences, since the individual respondent may feel overwhelmed by the large number of questions, there is a greater need for compatibility between the surveyed topics, and time periods, coding, and the dimensions of time use may be buried under the multitude of questions addressed in the survey (Aguirre and Ferrari, 2014). On the other hand, independent time-use surveys have the advantage of measuring information on a specific topic (time use) and therefore can produce more information, in greater detail, compared to integrated time-use modules. Despite that other time use surveys are available for other countries, in the cases of Mexico (2002, 2009, 2014) and Argentina (2021) there is no information about the sectorial composition of workers, while the time use survey of Panama (2011) does not have information regarding wages. One concern in the current analysis may be that the time use survey of Argentina (2016) corresponds only to the city of Buenos Aires, which limits the conclusions for this country.

⁶ For more information regarding Classification of Time-Use Activities for Latin America and the Caribbean see ECLAC (2015).

⁷ According to data from the World Bank, 88% of Chileans are living in urban areas. <https://datos.bancomundial.org/indicador/SP.URB.TOTL.IN.ZS>.

⁸ In Colombia, urban refers to a municipality and rural refers to not being a municipality.

⁹ In the case of Colombia, as the information refers to the previous day, which could be a weekday or a weekend day, it would not be methodologically correct to multiply by 7. For this reason, and following Campaña et al. (2017, 2020) and Gimenez-Nadal et al. (2021), the comparison of Colombia with other countries continues to be in hours per day and not hours per week.

Commuting is defined as the time of travel between home and the workplace. Table 1 (Columns 1 and 2 for Peru, Columns 3 and 4 for Ecuador, Column 5 for Chile, and Columns 6 and 7 for Colombia), shows the time devoted by individuals to commuting for our analyzed samples, considering urban and rural areas, and Table 2 (Columns 1 and 2 for Peru, Columns 3 and 4 for Ecuador, Column 5 for Chile, and Columns 6 and 7 for Colombia), shows the descriptive statistics of our samples.

In Table 1, our analysis is based on mean difference tests (*t* tests), gender differences in the time devoted to commuting considering the presence of children (0–12), the hours of working (full time/part time) and the type of employment (employed/self-employed). Concerning the presence of children in the home, individuals (mainly women) may choose to work closer to home to fulfill their household responsibilities, which can affect their job search area and lead to less well-paid jobs. We choose the age range of 0–12 for children in the household, since, as can be seen in Campaña et al. (2020), in this age range there are significant differences between self-employed and employed women, in terms of time spent on different time-use activities, such as paid work, unpaid work, and childcare. Furthermore, as shown by Campaña et al. (2017) for Latin American countries, women spend more time than men caring for their children. These activities are not only breastfeeding, bathing, dressing children and making sure they receive medical care, but also playing with them, helping them with homework, reading them stories, taking them to school, taking them to the park, and attending meetings and events at school, among other activities. For these reasons, we set the age range of children between 0 and 12 years, to consider the effect of both infants and older children.

Job characteristics, more specifically part-time employment, are linked to commutes of women (Fanning Madden, 1981). It is important to analyze whether the gender gaps in the time dedicated to commuting vary between full-time or part-time workers. Following Reuschke and Houston (2020), we consider part-time employment as working less than 30 h per week. Regarding type of employment, Rosenthal and Strange (2012) find that self-employed women commute less than self-employed men, while Reuschke and Houston (2020) find little evidence for a gender gap in the time devoted to commuting by the self-employed, while the authors findings confirm existing evidence of a gender commuting gap for employees.

Panel A of Table 1 shows the average hours devoted to commuting in the four countries, by gender and the urban/rural status of respondents. We observe that men spend more time commuting than do women in urban areas. In particular, in Peru (Column 1), Ecuador, (Column 3), and Chile (Column 5) men devote 4.97 h per week (4 h and 58 min), 4.92 h per week (4 h and 55 min), and 6.63 h per week (6 h

and 38 min), respectively, to commuting, while women dedicate 3.74 h per week (3 h and 44 min), 3.95 h per week (3 h and 57 min) and 5.62 h per week (5 h and 37 min) to this activity, respectively. In these three countries (on average), women devote 1 h and 4 min less per week to commuting compared to men. In Colombia (Column 6), men and women dedicate 0.47 h (28 min) and 0.41 h (24 min) per day to commuting, representing a gender gap of 4 min less per day to commuting for women.

Regarding rural areas (Panel A of Table 1), in Peru (Column 2), and Ecuador, (Column 4), men devote 5.34 h per week (5 h and 20 min) and 4.34 h per week (4 h and 20 min), respectively, to commuting, while women dedicate 3.74 h per week (3 h and 44 min), and 3.39 h per week (3 h and 23 min) to this activity, respectively. Women in rural areas (on average) devote 1 h and 16 min less per week to commuting, compared to men, and in Colombia (Column 7), rural men and women dedicate 0.41 h (25 min) and 0.24 h (14 min) to commuting. On average in Colombia, women devote 11 min less per day to commuting compared to men. Furthermore, the gender gap in the time dedicated to commuting is greater in rural areas in the cases of Peru and Colombia.

Panel B of Table 1 shows the average time devoted to commuting considering whether the household has a child under age 12, or not. We observe that men spend more time commuting, and the gender gaps are greater, when there are children under age 12 in the household. Panel C shows the average time devoted to commuting considering hours of work (full-time vs part-time workers). We observe that men spend more time commuting compared to women, except for individuals who work part-time in the case of rural areas of Peru. In this case, men spend 7 min more per week commuting, compared to women—although this value is not statistically significant at standard levels. Panel D of Table 1 shows the average time devoted to commuting, considering hours of work (employed vs self-employed workers). Men spend more time commuting compared to women in all cases, but the gender gaps in the time dedicated to commuting are greater in the case of the self-employed. These results (Panel A, B, C and D) are only a descriptive analysis, and we do not control for factors that may be affecting the results.

Following prior studies on commuting behavior, we consider the following socio-demographic characteristics of workers: wages, non-labor household income, education level, sectorial composition, age, if individuals are married/cohabiting, number of household members, presence of elderly ≥ 65 , ethnicity (indigenous), and the various regions of each country (Aguiar & Hurst, 2007; Campaña et al., 2017, 2018, 2020; Campaña & Ortega, 2021; Esteve et al., 2012; Gimenez-Nadal et al., 2021; Kalenkoski et al., 2005). Higher wages are associated with longer commutes (Crane, 2007; Gimenez-Nadal et al., 2018a; Leigh, 1986; Mulalic

Table 1 Gender differences in the time devoted to commuting

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Peru		Ecuador		Chile	Colombia	
	Urban	Rural	Urban	Rural	Urban	Urban	Rural
Panel A							
General							
Men	4.97	5.34	4.92	4.34	6.63	0.47	0.41
Women	3.74	3.74	3.95	3.39	5.62	0.41	0.24
<i>Difference</i>	1.22***	1.60***	0.97***	0.94***	1.02***	0.06***	0.17***
Panel B							
Children							
<i>No presence of children</i>							
Men	4.77	5.20	4.65	3.80	6.32	0.46	0.37
Women	4.06	4.25	4.09	3.05	5.76	0.42	0.25
<i>Difference</i>	0.71***	0.95**	0.56***	0.75***	0.57***	0.04***	0.12***
<i>Presence of children 0–12</i>							
Men	5.09	5.41	5.14	4.73	7.07	0.48	0.44
Women	3.55	3.48	3.84	3.62	5.46	0.41	0.23
<i>Difference</i>	1.54***	1.93***	1.30***	1.11***	1.61***	0.08***	0.21***
Panel C							
Hours of working							
<i>Full time</i>							
Men	5.21	5.62	5.09	4.47	6.94	0.48	0.42
Women	4.56	3.92	4.38	3.89	6.32	0.46	0.29
<i>Difference</i>	0.66***	1.69***	0.71***	0.58***	0.62***	0.02***	0.13***
<i>Part time</i>							
Men	2.95	3.69	3.27	3.68	4.03	0.27	0.29
Women	2.11	3.58	2.58	2.36	3.04	0.18	0.15
<i>Difference</i>	0.84***	0.11	0.69***	1.32***	0.98***	0.09***	0.14***
Panel D							
Type of employment							
<i>Employed</i>							
Men	5.66	4.70	5.66	4.77	7.27	0.54	0.38
Women	4.93	3.89	5.06	4.22	6.35	0.52	0.34
<i>Difference</i>	0.72***	0.81***	0.60***	0.55***	0.92***	0.02***	0.04**
<i>Self-employed</i>							
Men	3.61	5.79	3.54	3.70	4.43	0.38	0.44
Women	2.36	3.67	2.29	2.82	2.86	0.25	0.18
<i>Difference</i>	1.25***	2.13***	1.25***	0.88***	1.57***	0.13***	0.27***
Observations	4032	1523	8439	7873	9706	87,420	15,412

Data sources are time-use surveys from Peru (2010), Ecuador (2012), Chile (2015) and Colombia (2012, 2017). The sample is restricted to workers who are not students or retired. Weekly hours for commuting are considered for Peru, Ecuador and Chile, and daily hours for commuting are considered for Colombia. Significant level corresponds to t tests

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$ (***)Significant at the 99% level, **Significant at the 95% level, *Significant at the 90% level)

et al., 2014; Ross & Zenou, 2008; Rupert et al., 2009; White, 1999; Zax, 1991) and non-labour family income may also affect the time devoted to different activities (Kalenkoski et al., 2005).

Wages are measured as hourly wages, and non-labor household income (per month) in the four countries includes income from transfers (income from other households, and subsidies from the government or from private institutions),

other income (income from renting houses, apartments, vehicles, machinery, and equipment), including income from bank interest and from stocks or dividends. Hourly wages and non-labor household income are expressed in US Dollars.¹⁰ In the case of the Peruvian Time Use Survey, information on non-labor household income is not available. Regarding education, the literature shows that people with more education are willing to spend more time commuting compared to their counterparts with lower levels of education, in order to get more specialized jobs (Dargay & Clark, 2012; Dargay & Van Ommeren, 2005; Rouwendal & Nijkamp, 2004; Sandow & Westin, 2010).

The literature shows significant differences in the times dedicated to commuting when occupations are considered (McQuaid, 2009; McQuaid & Chen, 2012; Walks, 2014). Three time-use surveys (Peru, Ecuador, and Colombia) have information about four major sectors (sectoral composition), encompassing the following activities: Primary Sector (agriculture, forestry and fishing, mining), Secondary sector (construction, manufacturing), Tertiary sector (transportation, electric, gas and sanitary services; wholesale trade; retail trade) and Quaternary sector (finance, insurance and real estate; services and public administration). For Chile, we include information from the International Standard Classification of Occupations ISCO-88 (10 major groups): Legislators, senior officials, and managers; Professionals; Technicians and associate professionals; Clerks; Service workers and shop and market sales workers; Skilled agricultural and fishery workers; Craft and related trades workers; Plant and machine operators and assemblers; Elementary occupations; and Armed forces.

We consider age and age squared divided by 100 (Aguiar & Hurst, 2007; Kalenkoski et al., 2005) to account for the allocation of time to an activity over the whole life cycle. The presence of partners may produce specialization within the household (Becker, 1991), leading women to devote more time to unpaid work, less time to paid work, and less time to commuting. Furthermore, it is important to control for the number of family members and the presence of the elderly, as the responsibility of taking care of them may influence the time devoted to commuting. To measure ethnic differences, we consider whether the respondents are

indigenous, or not (Campaña et al., 2017, 2020; Gimenez-Nadal et al., 2021). In Peru, we consider four regions (Rest of the Coast, Sierra, Selva, and Lima), in Ecuador we consider three regions (Sierra, Costa, and Amazon), in Chile we consider six regions (Norte Grande, Norte Chico, Central Nucleus, Concepción and La Frontera, Region of the Lakes, Region of the Channels), and in Colombia we consider six regions (Atlantic, Central, Eastern, Pacific, Bogota, and San Andres region).

Table 2 shows the average values for the samples of the 4 countries. Concerning the presence of children (0–12 years) in the households of our sample, we observe that this percentage is higher in rural areas. On average, the presence of children in the households in Peru, Ecuador, Chile, and Colombia in urban areas, is 62%, 55.5%, 45% and 53% respectively, while in rural areas of Peru, Ecuador and Colombia, children are present 66.5%, 59.5% and 60% of the time, respectively. We observe a greater number of women who work part-time, compared to men who work part-time, both in urban and rural areas. On average, men working part time in Peru, Ecuador, Chile, and Colombia, in urban areas, are 11%, 9%, 11% and 7% respectively, while in rural areas in Peru, Ecuador and Colombia, part-time men represent 14%, 17% and 11%, respectively. Women working part time in Peru, Ecuador, Chile, and Colombia, in urban areas, are 33%, 24%, 22% and 18% respectively, while in rural areas in Peru, Ecuador and Colombia, women are 52%, 33% and 39%, respectively.

There are more self-employed (both men and women) in rural areas. In urban areas in Peru, Ecuador, Chile, and Colombia the percentage of self-employed in the case of men is 34%, 35%, 22% and 44%, respectively, and in the case of women the proportion is 46%, 40%, 21% and 41% respectively. While for the rural areas in Peru, Ecuador, and Colombia, the percentage of self-employed men is 59%, 40%, and 48%, respectively, and in the case of women it is 66%, 59% and 62%, respectively. In Peru's urban areas, men earn \$1.78 per hour, while women earn \$1.65, and in rural areas men earn \$1.23, while women earn \$1.33. In Ecuador's urban areas, men earn \$2.18, while women earn \$2.10, and in rural areas men earn \$1.58 and women earn \$1.27. In Chile's urban areas, men earn \$4.13, while women earn \$3.13. In Colombia's urban areas, men earn \$2.20, while women earn \$2.16. In rural areas of Colombia, men earn \$1.27 while women earn \$1.28, and both men and women in urban areas have higher hourly wages compared to their rural counterparts. Non-labor income (per month) in Ecuador for men in urban areas is \$44.58 and for women is \$64.88, while men in rural areas get \$36.17 and women get \$51.65. In Chile, non-labor income (per month) in urban areas for men is \$36.66 and for women is \$50.05. In Colombia, non-labor income (per month) of men in urban areas is \$61.70 and for women is \$75.69, while men in rural areas get \$19.47 and

¹⁰ In the case of Colombia, we analyze their two time-use surveys (2012, 2017). Thus, we consider 2012 as the base year to deflate both the Hourly wages and non-labor household income, considering the Colombian Consumer Price Index <https://www.dane.gov.co/index.php/estadisticas-por-tema/precios-y-costos/indice-de-precios-al-consumidor-ipc>. The exchange rate used according to the years of their time use surveys, for Peru, 1 US dollar, equivalent to 2.811 Peruvian soles. For Colombia, 1 US dollar, equivalent to 1817.52 Colombian pesos (exchange rate 2012). For Chile, 1 US dollar, equivalent to 697.33 Chilean pesos. The official currency of Ecuador is the US Dollar, so it is not necessary to make any conversion in the case of this country.

Table 2 Descriptive statistics of the data

	(1)		(2)		(3)		(4)		(5)		(6)		(7)	
	Peru		Ecuador		Chile		Colombia		Urban		Urban		Rural	
	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
Children														
Presence of children 0–12 (men)	0.62 (0.49)	0.67 (0.47)	0.56 (0.47)	0.58 (0.49)	0.42 (0.49)	0.51 (0.50)	0.57 (0.49)	0.51 (0.50)	0.42 (0.49)	0.51 (0.50)	0.57 (0.49)	0.51 (0.50)	0.57 (0.49)	0.57 (0.49)
Presence of children 0–12 (women)	0.62 (0.49)	0.66 (0.48)	0.55 (0.48)	0.61 (0.49)	0.47 (0.49)	0.55 (0.49)	0.63 (0.48)	0.55 (0.49)	0.47 (0.49)	0.55 (0.49)	0.63 (0.48)	0.55 (0.49)	0.63 (0.48)	0.63 (0.48)
Working hours														
Part time (men)	0.11 (0.31)	0.14 (0.35)	0.09 (0.35)	0.17 (0.38)	0.11 (0.31)	0.07 (0.26)	0.11 (0.31)	0.17 (0.38)	0.11 (0.31)	0.07 (0.26)	0.11 (0.31)	0.07 (0.26)	0.11 (0.31)	0.11 (0.31)
Part time (women)	0.33 (0.47)	0.52 (0.50)	0.24 (0.42)	0.33 (0.47)	0.22 (0.41)	0.18 (0.38)	0.39 (0.49)	0.33 (0.47)	0.22 (0.41)	0.18 (0.38)	0.39 (0.49)	0.18 (0.38)	0.39 (0.49)	0.39 (0.49)
Labor activity														
Self-employed (men)	0.34 (0.47)	0.59 (0.49)	0.35 (0.49)	0.40 (0.49)	0.22 (0.42)	0.44 (0.50)	0.48 (0.50)	0.40 (0.49)	0.22 (0.42)	0.44 (0.50)	0.48 (0.50)	0.44 (0.50)	0.48 (0.50)	0.48 (0.50)
Self-employed (women)	0.46 (0.50)	0.66 (0.48)	0.40 (0.48)	0.59 (0.49)	0.21 (0.41)	0.41 (0.49)	0.62 (0.49)	0.59 (0.49)	0.21 (0.41)	0.41 (0.49)	0.62 (0.49)	0.41 (0.49)	0.62 (0.49)	0.62 (0.49)
Other interest variables														
Hourly wage (men)	1.78 (1.50)	1.23 (1.53)	2.18 (1.53)	1.58 (1.82)	4.13 (3.56)	2.20 (2.13)	1.27 (1.02)	1.58 (1.82)	4.13 (3.56)	2.20 (2.13)	1.27 (1.02)	2.20 (2.13)	1.27 (1.02)	1.27 (1.02)
Hourly wage (women)	1.65 (1.75)	1.33 (1.27)	2.10 (1.27)	1.27 (1.21)	3.13 (2.52)	2.16 (2.09)	1.28 (1.36)	1.27 (1.21)	3.13 (2.52)	2.16 (2.09)	1.28 (1.36)	2.16 (2.09)	1.28 (1.36)	1.28 (1.36)
Non-labor income (men)	–	–	44.58 (205.8)	36.17 (79.53)	36.66 (194.8)	61.70 (241.1)	19.47 (76.54)	36.17 (79.53)	36.66 (194.8)	61.70 (241.1)	19.47 (76.54)	61.70 (241.1)	19.47 (76.54)	19.47 (76.54)
Non-labor income (women)	–	–	64.88 (249.1)	51.65 (209.8)	50.05 (142.2)	75.69 (262.3)	31.99 (108.22)	51.65 (209.8)	50.05 (142.2)	75.69 (262.3)	31.99 (108.22)	75.69 (262.3)	31.99 (108.22)	31.99 (108.22)
Primary education (men)	0.30 (0.46)	0.69 (0.46)	0.54 (0.46)	0.84 (0.37)	0.29 (0.45)	0.40 (0.49)	0.78 (0.41)	0.84 (0.37)	0.29 (0.45)	0.40 (0.49)	0.78 (0.41)	0.40 (0.49)	0.78 (0.41)	0.78 (0.41)
Primary education (women)	0.33 (0.47)	0.76 (0.43)	0.45 (0.43)	0.77 (0.42)	0.26 (0.44)	0.29 (0.45)	0.60 (0.49)	0.77 (0.42)	0.26 (0.44)	0.29 (0.45)	0.60 (0.49)	0.29 (0.45)	0.60 (0.49)	0.60 (0.49)
Secondary education (men)	0.38 (0.49)	0.21 (0.40)	0.26 (0.40)	0.11 (0.32)	0.34 (0.47)	0.31 (0.46)	0.17 (0.37)	0.11 (0.32)	0.34 (0.47)	0.31 (0.46)	0.17 (0.37)	0.31 (0.46)	0.17 (0.37)	0.17 (0.37)
Secondary education (women)	0.29 (0.45)	0.15 (0.35)	0.25 (0.35)	0.14 (0.35)	0.34 (0.47)	0.29 (0.45)	0.24 (0.43)	0.14 (0.35)	0.34 (0.47)	0.29 (0.45)	0.24 (0.43)	0.29 (0.45)	0.24 (0.43)	0.24 (0.43)
University education (men)	0.32 (0.47)	0.10 (0.30)	0.20 (0.30)	0.05 (0.21)	0.37 (0.48)	0.29 (0.45)	0.05 (0.21)	0.05 (0.21)	0.37 (0.48)	0.29 (0.45)	0.05 (0.21)	0.29 (0.45)	0.05 (0.21)	0.05 (0.21)
University education (women)	0.38 (0.49)	0.09 (0.29)	0.31 (0.29)	0.09 (0.29)	0.40 (0.49)	0.43 (0.49)	0.16 (0.36)	0.09 (0.29)	0.40 (0.49)	0.43 (0.49)	0.16 (0.36)	0.43 (0.49)	0.16 (0.36)	0.16 (0.36)
Sector 1/occupation 1 (men)	0.10 (0.30)	0.73 (0.44)	0.11 (0.31)	0.68 (0.47)	0.03 (0.17)	0.06 (0.23)	0.68 (0.47)	0.11 (0.31)	0.03 (0.17)	0.06 (0.23)	0.68 (0.47)	0.06 (0.23)	0.68 (0.47)	0.68 (0.47)
Sector 1/occupation 1 (women)	0.05 (0.21)	0.48 (0.50)	0.05 (0.21)	0.45 (0.50)	0.01 (0.11)	0.01 (0.11)	0.24 (0.42)	0.45 (0.50)	0.01 (0.11)	0.01 (0.11)	0.24 (0.42)	0.01 (0.11)	0.24 (0.42)	0.24 (0.42)
Sector 2/occupation 2 (men)	0.28 (0.45)	0.10 (0.30)	0.28 (0.30)	0.15 (0.35)	0.15 (0.36)	0.26 (0.44)	0.11 (0.32)	0.15 (0.35)	0.15 (0.36)	0.26 (0.44)	0.11 (0.32)	0.26 (0.44)	0.11 (0.32)	0.11 (0.32)
Sector 2/occupation 2 (women)	0.12 (0.33)	0.11 (0.32)	0.15 (0.32)	0.10 (0.30)	0.18 (0.38)	0.15 (0.35)	0.14 (0.34)	0.10 (0.30)	0.18 (0.38)	0.15 (0.35)	0.14 (0.34)	0.15 (0.35)	0.14 (0.34)	0.14 (0.35)
Sector 3/occupation 3 (men)	0.36 (0.48)	0.08 (0.28)	0.37 (0.28)	0.10 (0.30)	0.14 (0.35)	0.40 (0.49)	0.23 (0.42)	0.10 (0.30)	0.14 (0.35)	0.40 (0.49)	0.23 (0.42)	0.40 (0.49)	0.13 (0.34)	0.13 (0.34)
Sector 3/occupation 3 (women)	0.39 (0.49)	0.20 (0.40)	0.33 (0.40)	0.21 (0.41)	0.16 (0.37)	0.29 (0.45)	0.23 (0.42)	0.21 (0.41)	0.16 (0.37)	0.29 (0.45)	0.23 (0.42)	0.29 (0.45)	0.23 (0.42)	0.23 (0.42)
Sector 4/occupation 4 (men)	0.25 (0.44)	0.08 (0.27)	0.24 (0.27)	0.07 (0.26)	0.04 (0.20)	0.28 (0.44)	0.07 (0.26)	0.07 (0.26)	0.04 (0.20)	0.28 (0.44)	0.07 (0.26)	0.28 (0.44)	0.07 (0.26)	0.07 (0.26)
Sector 4/occupation 4 (women)	0.44 (0.50)	0.21 (0.41)	0.47 (0.41)	0.25 (0.43)	0.10 (0.30)	0.55 (0.50)	0.40 (0.49)	0.25 (0.43)	0.10 (0.30)	0.55 (0.50)	0.40 (0.49)	0.55 (0.50)	0.40 (0.49)	0.40 (0.49)
Occupation 5 (men)	–	–	–	–	0.14 (0.34)	–	–	–	0.14 (0.34)	–	–	–	–	–
Occupation 5 (women)	–	–	–	–	0.20 (0.40)	–	–	–	0.20 (0.40)	–	–	–	–	–
Occupation 6 (men)	–	–	–	–	0.02 (0.15)	–	–	–	0.02 (0.15)	–	–	–	–	–
Occupation 6 (women)	–	–	–	–	0.01 (0.07)	–	–	–	0.01 (0.07)	–	–	–	–	–
Occupation 7 (men)	–	–	–	–	0.22 (0.41)	–	–	–	0.22 (0.41)	–	–	–	–	–
Occupation 7 (women)	–	–	–	–	0.06 (0.24)	–	–	–	0.06 (0.24)	–	–	–	–	–

Table 2 (continued)

	(1)		(2)		(3)		(4)		(5)		(6)		(7)	
	Peru		Ecuador		Chile		Colombia		Urban		Urban		Rural	
	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
Occupation 8 (men)	-	-	-	-	-	-	-	-	0.14	-	-	-	-	-
Occupation 8 (women)	-	-	-	-	-	-	-	-	0.01	-	-	-	-	-
Occupation 9 (men)	-	-	-	-	-	-	-	-	0.11	-	-	-	-	-
Occupation 9 (women)	-	-	-	-	-	-	-	-	0.27	-	-	-	-	-
Occupation 10 (men)	-	-	-	-	-	-	-	-	0.01	-	-	-	-	-
Occupation 10 (women)	-	-	-	-	-	-	-	-	0.001	-	-	-	-	-
Age (men)	35.57	(12.39)	38.29	(12.38)	41.65	(13.77)	44.16	(16.17)	42.61	(14.26)	38.94	(13.44)	38.19	(14.81)
Age (women)	36.58	(12.31)	38.55	(12.88)	41.01	(12.98)	43.22	(15.20)	42.13	(13.39)	38.31	(12.50)	39.13	(13.92)
Married/cohabiting (men)	0.60	(0.49)	0.73	(0.44)	0.73	(0.45)	0.74	(0.44)	0.65	(0.48)	0.62	(0.49)	0.63	(0.48)
Married/cohabiting (women)	0.51	(0.50)	0.57	(0.50)	0.49	(0.50)	0.51	(0.50)	0.50	(0.50)	0.50	(0.50)	0.59	(0.49)
N. household members (men)	4.65	(2.28)	4.57	(2.05)	4.12	(1.97)	4.38	(2.29)	3.68	(1.76)	4.03	(1.98)	4.11	(2.02)
N. household members (women)	4.55	(2.22)	4.24	(1.87)	3.95	(1.85)	4.14	(2.18)	3.71	(1.71)	3.93	(1.86)	3.99	(1.85)
Presence of elderly ≥ 65 (men)	0.15	(0.35)	0.11	(0.32)	0.15	(0.35)	0.22	(0.42)	0.20	(0.40)	0.17	(0.38)	0.16	(0.37)
Presence of elderly ≥ 65 (women)	0.16	(0.37)	0.14	(0.35)	0.17	(0.38)	0.22	(0.41)	0.20	(0.40)	0.16	(0.37)	0.15	(0.36)
Indigenous (men)	0.09	(0.28)	0.41	(0.49)	0.02	(0.15)	0.13	(0.34)	0.07	(0.26)	0.02	(0.15)	0.10	(0.30)
Indigenous (women)	0.11	(0.31)	0.39	(0.49)	0.02	(0.14)	0.15	(0.36)	0.08	(0.27)	0.02	(0.15)	0.15	(0.35)
Region 1	0.28	(0.45)	0.15	(0.36)	0.37	(0.48)	0.47	(0.50)	0.07	(0.25)	0.19	(0.39)	0.23	(0.42)
Region 2	0.21	(0.41)	0.66	(0.47)	0.60	(0.49)	0.44	(0.50)	0.05	(0.21)	0.24	(0.43)	0.30	(0.46)
Region 3	0.09	(0.29)	0.19	(0.39)	0.03	(0.16)	0.09	(0.28)	0.67	(0.47)	0.16	(0.37)	0.22	(0.42)
Region 4	0.42	(0.49)	-	-	-	-	-	-	0.14	(0.35)	0.16	(0.37)	0.25	(0.43)
Region 5	-	-	-	-	-	-	-	-	0.06	(0.24)	0.25	(0.43)	-	-
Region 6	-	-	-	-	-	-	-	-	0.02	(0.13)	0.002	(0.04)	-	-
Observations	4032		1523		8439		7873		9706		87,420		15,412	

Data sources are time-use surveys from Peru (2010), Ecuador (2012), Chile (2015) and Colombia (2012, 2017). The sample is restricted to workers who are not students or retired. Weekly hours for commuting are considered for Peru, Ecuador and Chile, and daily hours for commuting are considered for Colombia. Standard deviation in parentheses

women get \$31.99.¹¹ In the analyzed countries, non-labor income is higher for women compared to men.

We consider three education levels: primary education (less than high school degree), secondary education (high school degree), and university education (more than high school degree). The prevailing education level in urban areas for men is primary education in Ecuador and Colombia, at 54% and 40% respectively, with 38% secondary education in Peru, and university education at 37% in Chile. For women in urban areas, university education is the prevailing level in Peru, Chile, and Colombia, at 38%, 40% and 43%, respectively, and primary education prevails in Ecuador, at 45%. In rural areas, the prevailing education level is primary in Peru, Ecuador, and Colombia, at 69%, 84% and 78%, respectively, for men, and 76%, 77% and 60%, respectively for women.

In terms of job sectors, we observe that in Peru, Ecuador, and Colombia, in urban areas, men are mainly concentrated in the tertiary sector (36%, 37% and 40%, respectively) and women are mainly concentrated in the quaternary sector (44%, 47% and 55%, respectively). In rural areas, men are concentrated in the primary sector in Peru (73%), Ecuador (68%) and Colombia (68%), while women are concentrated in the primary sector in Peru (48%) and Ecuador (45%) and in the quaternary sector in Colombia (40%). In Chile's urban areas, men are concentrated (22%) in occupation 7 (Craft and related trades workers) and women are concentrated (27%) in occupation 9 (Elementary occupations).

The average age is quite similar between men and women; in urban areas in Peru it is 36.1 years, in Ecuador 41.33 years, in Chile 42.37 years and in Colombia 38.5 years. In rural areas in Peru, it is 36.6 years, in Ecuador 42.1 years, and in Colombia 38.6 years. For individuals in our sample who are in a couple (married/cohabiting), the percentage on average in the four countries is higher for men than for women. In urban areas of Peru, Ecuador, Chile, and Colombia, 60%, 73%, 65% and 62% of men, respectively, and 51%, 49%, 50% and 50% of women, respectively, are married or cohabiting. In rural areas of Peru, Ecuador and Colombia, 73%, 74%, and 63% of men, respectively, and 57%, 51%, and 59% of women, respectively, are married or cohabiting. On average, there are four members in each household of our analyzed samples, and individuals over age 65, on average, are present in 17% of the households. Regarding ethnicity (indigenous individuals) in urban areas, this factor applies to 10% in Peru, 2% in Ecuador, 7.5% in Chile and 2% in Colombia, and in rural areas the proportion is 40% in Peru, 14% in Ecuador, and 13% in Colombia.

¹¹ In the case of the Peruvian Time Use Survey, information on non-labor income is not available.

Empirical strategy and results

For the time devoted to commuting by workers in Peru, Ecuador, Chile, and Colombia, we estimate Ordinary Least Squares (OLS) regressions. Gershuny (2012) argues that OLS models can deliver accurate estimates of average activity times for samples and for subgroups. Frazis and Stewart (2012) also prefer these models for the analysis of time-allocation decisions, while Foster and Kalenkoski (2013), discussing the analysis of childcare time, compare OLS and Tobit models, finding that the qualitative conclusions of the two models are similar.

Thus, we estimate the following equation by OLS regressions:

$$T_{ik} = \alpha_t + \beta_1 woman_{ik} + \beta_2 x_{ik} + \beta_3 Z_{ik} + \varepsilon_{ik} \quad (1)$$

where T_{ik} is the time devoted to commuting by individual 'i' in country "k", $Woman_{ik}$ takes value '1' if respondent 'i' in country "k" is a woman and value '0' otherwise. X_{ik} is a vector of variables that includes dummies for the presence of children (up to age 12 in the household of respondent), if respondent works part-time, and if respondent is self-employed. Z_{ik} includes additional socio-demographic variables (log wage, non-labor income, education, sector/occupation, age, age squared, married/cohabiting, number of household members, presence of elderly over age 65, ethnic origin (indigenous), and regions of the country. The "woman" dummy is included to measure gender differences in the time devoted to commuting. Thus, $\beta_1 < 0$ would indicate that, compared to men, women in Peru, Ecuador, Chile, and Colombia devote less time to commuting. This regression is estimated by the urban/rural status of respondents.

Table 3, Columns 1 and 2 (Peru), Columns 3 and 4 (Ecuador), Column 5 (Chile) and Columns 6 and 7 (Colombia) show the results of estimating Eq. (1). In this regression, the reference category is the man. In all four countries (and considering urban and rural areas), we observe that β_1 is negative and statistically significant, so in our general econometric analysis we find gender differences in the time devoted to commuting. Women in urban areas devote 0.4 h (24 min), 0.7 h (42 min), 0.6 h (36 min) and 0.05 h (3.1 min) less to commuting in Peru, Ecuador, and Chile (hours per week) and Colombia (hours per day), respectively. In rural areas, women devote 0.9 h (54 min), 0.7 h (42 min), and 0.09 h (5.4 min) less to commuting in Peru and Ecuador (hours per week) and Colombia (hours per day). From these results, it is important to highlight that the gender gap in the time dedicated to commuting is greater in rural areas than in urban areas in the cases of Peru and Colombia. These results are similar to those in the literature of developed countries (Dargay & Clark, 2012; Gimenez-Nadal & Molina, 2016; Groot et al., 2012; McQuaid & Chen, 2012; Sandow,

Table 3 OLS estimates on the time devoted to commuting

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Peru		Ecuador		Chile	Colombia	
	Urban	Rural	Urban	Rural	Urban	Urban	Rural
Woman	- 0.443*** (0.140)	- 0.893*** (0.250)	- 0.650*** (0.157)	- 0.651*** (0.149)	- 0.549*** (0.159)	- 0.0505*** (0.00488)	- 0.0951*** (0.0155)
Presence of children 0–12	0.0717 (0.154)	0.151 (0.303)	- 0.266 (0.165)	- 0.0549 (0.188)	0.128 (0.182)	- 0.00901* (0.00546)	- 0.00318 (0.0163)
Part-time	- 1.817*** (0.151)	- 1.134*** (0.274)	- 1.097*** (0.168)	- 0.736*** (0.187)	- 2.496*** (0.171)	- 0.158*** (0.00624)	- 0.140*** (0.0144)
Self-employed	- 1.481*** (0.151)	0.224 (0.273)	- 1.976*** (0.165)	- 0.953*** (0.159)	- 2.583*** (0.195)	- 0.151*** (0.00501)	0.0247* (0.0135)
Log wage	0.219** (0.0896)	- 0.0115 (0.133)	0.174* (0.0984)	0.0950 (0.0730)	0.682*** (0.124)	0.00359** (0.00145)	0.00338 (0.00511)
Non-labor income	-	-	8.98e-05 (0.000301)	- 6.45e-05 (0.000274)	- 0.000831*** (0.000316)	- 4.21e-05*** (7.13e-06)	- 4.74e-05 (4.99e-05)
Secondary education	0.278* (0.157)	- 0.173 (0.306)	- 0.252 (0.175)	- 0.0169 (0.180)	- 0.116 (0.195)	- 0.00196 (0.00592)	0.00562 (0.0218)
University education	0.353** (0.169)	- 0.202 (0.423)	- 0.497** (0.200)	- 0.0575 (0.228)	- 0.0956 (0.253)	- 0.0129** (0.00633)	0.0969*** (0.0260)
Sector 1/occupation 1	-	-	-	-	- 1.342 (1.682)	-	-
Sector 2/occupation 2	- 1.597*** (0.253)	- 1.384*** (0.354)	0.0260 (0.223)	- 0.500*** (0.164)	- 1.860 (1.580)	- 0.141*** (0.0148)	- 0.0730*** (0.0190)
Sector 3/occupation 3	- 2.516*** (0.236)	- 1.493*** (0.383)	- 0.429** (0.205)	- 0.101 (0.207)	- 0.608 (1.583)	- 0.197*** (0.0144)	- 0.0855*** (0.0195)
Sector 4/occupation 4	- 2.125*** (0.237)	- 1.119*** (0.411)	- 0.103 (0.218)	- 0.484*** (0.177)	- 1.225 (1.588)	- 0.176*** (0.0147)	- 0.123*** (0.0199)
Occupation 5	-	-	-	-	- 1.600 (1.582)	-	-
Occupation 6	-	-	-	-	1.525 (1.704)	-	-
Occupation 7	-	-	-	-	- 0.333 (1.586)	-	-
Occupation 8	-	-	-	-	- 1.080 (1.594)	-	-
Occupation 9	-	-	-	-	- 0.212 (1.584)	-	-
Age	0.152*** (0.0324)	- 0.0705 (0.0530)	0.0713** (0.0296)	0.0424** (0.0205)	0.0466 (0.0286)	0.00541*** (0.000898)	0.00305 (0.00213)
Age squared	- 0.183*** (0.0404)	0.0726 (0.0646)	- 0.0978*** (0.0332)	- 0.0610*** (0.0216)	- 0.0408 (0.0323)	- 0.00742*** (0.00104)	- 0.00388 (0.00247)
Married/cohabiting	- 0.273* (0.155)	0.536* (0.299)	0.0551 (0.155)	- 0.0548 (0.149)	- 0.384** (0.178)	- 0.0196*** (0.00508)	0.00459 (0.0141)
N. household members	- 0.00956 (0.0289)	- 0.144** (0.0632)	0.0927** (0.0384)	0.163*** (0.0351)	0.134** (0.0523)	0.0106*** (0.00148)	0.0185*** (0.00404)
Presence of elderly ≥ 65	0.0572 (0.187)	- 0.179 (0.344)	0.220 (0.219)	- 0.280 (0.185)	- 0.0215 (0.196)	0.00230 (0.00641)	0.0180 (0.0172)
Indigenous	0.670*** (0.218)	0.740*** (0.264)	0.841* (0.508)	0.712*** (0.147)	0.344 (0.272)	- 0.0550*** (0.0122)	- 0.0252 (0.0184)
Region 1	- 2.163***	-	1.574***	0.221*	0.631*	0.202***	-

Table 3 (continued)

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Peru		Ecuador		Chile	Colombia	
	Urban	Rural	Urban	Rural	Urban	Urban	Rural
Region 2	(0.151)	–	(0.176)	(0.125)	(0.359)	(0.00737)	–
	– 1.992***	0.674**	1.240***	– 0.210	0.972**	0.228***	– 0.0123
	(0.167)	(0.286)	(0.158)	(0.167)	(0.391)	(0.00715)	(0.0162)
Region 3	– 2.828***	– 0.798***	–	–	2.667***	0.176***	– 0.0251
	(0.165)	(0.267)	–	–	(0.296)	(0.00763)	(0.0176)
Region 4	–	–	–	–	0.661**	0.221***	0.0832***
	–	–	–	–	(0.300)	(0.00792)	(0.0209)
Region 5	–	–	–	–	0.482	0.498***	–
	–	–	–	–	(0.341)	(0.00846)	–
Year 2	–	–	–	–	–	0.0172***	– 0.0111
	–	–	–	–	–	(0.00461)	(0.0129)
Constant	5.854***	6.915***	3.217***	3.773***	4.214**	0.0850***	0.175***
	(0.615)	(0.991)	(0.656)	(0.498)	(1.644)	(0.0256)	(0.0510)
R-squared	0.231	0.127	0.109	0.067	0.112	0.143	0.068
Observations	4032	1523	8439	7873	9706	87,420	15,412

Data sources are time-use surveys from Peru (2010), Ecuador (2012), Chile (2015) and Colombia (2012, 2017). The sample is restricted to workers who are not students or retired

*Weekly hours for commuting are considered for Peru and Ecuador, and daily hours for commuting are considered for Colombia. Robust standard errors in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

2008; Sandow & Westin, 2010; Turner & Neimeier, 1997; Waldfoegel, 2007).

With respect to other variables, we observe interesting and statistically significant results at standard levels for the first equation. In the four countries (in urban areas) log wages are influenced positively, while non-labour income in Chile and Colombia (in urban areas) negatively influences the time devoted to commuting by individuals. In Peru (urban areas), Ecuador (urban and rural areas) and Colombia (urban areas), age positively influences the time devoted by individuals to commuting. In Peru, Chile, and Colombia (in urban areas) to be in partner (married/cohabiting) negatively influences the time devoted to commuting, and in Ecuador and Colombia (urban and rural areas) and Chile (urban areas), a greater number of household members positively influences the time devoted to commuting. In terms of education levels, we find mixed evidence in these countries. In the case of Peru (urban areas), higher levels of education are associated with more time spent commuting, with these results being similar to those found in developed countries (Dargay & Clark, 2012; Dargay & Van Ommeren, 2005; Rouwendal & Nijkamp, 2004; Sandow & Westin, 2010;). In the case of Ecuador (urban areas) and Colombia (urban and rural areas), a higher level of education is associated with less time spent commuting. Prior literature for Latin American countries shows mixed results among countries

when considering levels of education and certain time use activities. For example, in the case of Colombia, a higher level of education means devoting less time to paid work in the case of men (Campaña et al., 2017) and women (Campaña et al., 2020).

In Table 4, we analyze the influence of the presence of children on the time devoted to commuting, and we include the following interaction: woman with presence of children.

$$T_{ik} = \alpha_t + \beta_1 woman_{ik} + \beta_2 x_{ik} + \beta_3 presence\ of\ children * woman_{ik} + \beta_4 Z_{ik} + \epsilon_{ik} \quad (2)$$

In this regression, the reference category is man without children. First, we find that when we compare men and women with children in the household, we only find gender gaps in commuting in urban and rural areas in Ecuador (hours per week) and Colombia (hours per day). In these two countries, in urban areas, women relative to men devote 0.4 h (24 min) and 0.04 h (2.4 min) less to commuting, and in rural areas women devote 0.6 h (36 min) and 0.04 h (2.4 min) less to commuting. When we compare men and women with children in the household in urban areas, we find gender gaps in the time devoted to commuting in all four countries, while in rural areas we find gender gaps in the time devoted to commuting only in

Table 4 OLS estimates on the time devoted to commuting (considering the presence of children)

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Peru		Ecuador		Chile	Colombia	
	Urban	Rural	Urban	Rural	Urban	Urban	Rural
Woman	- 0.0937 (0.215)	- 0.429 (0.418)	- 0.366* (0.221)	- 0.551*** (0.207)	- 0.271 (0.206)	- 0.0377*** (0.00641)	- 0.0420* (0.0238)
Presence of children 0–12	0.309 (0.194)	0.383 (0.354)	- 0.0682 (0.200)	- 0.00629 (0.219)	0.423* (0.243)	0.00182 (0.00713)	0.0202 (0.0188)
Presence of children 0–12 Woman*	- 0.577** (0.259)	- 0.712 (0.503)	- 0.530* (0.280)	- 0.170 (0.264)	- 0.649** (0.289)	- 0.0249*** (0.00910)	- 0.0873*** (0.0273)
Constant	5.734*** (0.617)	6.861*** (0.994)	3.143*** (0.654)	3.756*** (0.499)	4.070** (1.642)	0.0813*** (0.0256)	0.163*** (0.0512)
R-squared	0.232	0.128	0.110	0.067	0.112	0.143	0.069
Observations	4032	1523	8439	7873	9706	87,420	15,412

Data sources are time-use surveys from Peru (2010), Ecuador (2012), Chile (2015) and Colombia (2012, 2017). The sample is restricted to workers who are not students or retired

*Weekly hours for commuting are considered for Peru and Ecuador, and daily hours for commuting are considered for Colombia. Robust standard errors in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Colombia. In urban areas, women devote 0.7 h (42 min), 0.9 h (54 min), 0.9 h (54 min) and 0.06 h (4 min) less to commuting in Peru, Ecuador, and Chile (hours per week) and Colombia (hours per day), respectively. In rural areas in Colombia, women devote 0.13 h (8 min) less per day to commuting.

One of the main reasons why the results are not statistically significant when we consider the presence of children in commuting time in rural areas of Peru and Ecuador, is that in Latin American countries, the countries with the highest proportion of employed rural women have, at the same time, the highest rates of female participation in agriculture. In Bolivia, Brazil, Ecuador, Peru and Uruguay, the majority of rural women are engaged in agriculture, while in the other countries the main activity for them is non-agricultural (OIT, 2012). This could partly justify our result, since the majority of women in Peru and Ecuador who live in rural areas do not have opportunities to work in other sectors, and family members will often help with childcare (Delgado & Canabal, 2006; Fuller et al., 1996).

In the cases of Ecuador (urban areas) and Colombia (urban and rural areas), the presence of children in the households increases the gender gaps in the time devoted to commuting. These results are consistent with the notion that women with family responsibilities spend less time commuting than women without family responsibilities (Gimenez-Nadal & Molina, 2016). Another interesting result is found in urban areas in Chile: men with children in their households devote 0.4 h per week (24 min) more to commuting compared to men without children in their households. In the case of Chile, men without children spend 35.67 h a week in

paid work, while men with children under 15 spend 44.27 h a week in paid work (ECLAC, 2022).¹²

In Table 5, we analyze the influence of working hours on the time devoted to commuting. We include the following interaction for a woman who works full-time.

$$T_{ik} = \alpha_t + \beta_1 woman_{ik} + \beta_2 x_{ik} + \beta_3 part - time * woman_{ik} + \beta_4 Z_{ik} + \varepsilon_{ik} \quad (3)$$

The reference category here is a man who works full-time. When we compare men and women who work full-time, we find for all four countries (in urban and rural areas) that women spend less time commuting compared to men. Women (full-time) relative to men (full-time) in urban areas devote 0.5 h (30 min), 0.7 h (42 min), 0.5 h (30 min), and 0.05 h (3 min) less to commuting in Peru, Ecuador, and Chile (hours per week) and Colombia (hours per day), respectively. In rural areas, women (full-time) devote 1.39 h (1 h and 29 min), 0.5 h (30 min), and 0.09 h (5 min) less to commuting in Peru and Ecuador (hours per week) and Colombia (hours per day), respectively.

When we compare men and women who work part-time, we find in Peru in rural areas that the gender gap in the time dedicated to commuting almost disappears (men devote 5 min more per week to commuting compared to women). In Ecuador, in rural areas, women (part-time) relative to men (part-time) devote 1.14 h (1 h and 8 min) less to commuting per week. And in Colombia, in urban areas,

¹² Table 7 in the Appendix shows a full description of results.

Table 5 OLS estimates on the time devoted to commuting (considering hours of working)

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Peru		Ecuador		Chile	Colombia	
	Urban	Rural	Urban	Rural	Urban	Urban	Rural
Woman	-0.473*** (0.160)	-1.393*** (0.292)	-0.701*** (0.173)	-0.480*** (0.164)	-0.527*** (0.179)	-0.0475*** (0.00526)	-0.0906*** (0.0183)
Part-time	-1.908*** (0.242)	-1.850*** (0.358)	-1.274*** (0.238)	-0.491* (0.263)	-2.416*** (0.288)	-0.142*** (0.0104)	-0.133*** (0.0212)
Part-time*woman	0.149 (0.292)	1.482*** (0.516)	0.325 (0.324)	-0.658* (0.344)	-0.140 (0.340)	-0.0263** (0.0125)	-0.0167 (0.0284)
Constant	5.890*** (0.622)	7.234*** (0.991)	3.265*** (0.662)	3.674*** (0.501)	4.202** (1.646)	0.0814*** (0.0257)	0.173*** (0.0511)
R-squared	0.231	0.132	0.109	0.068	0.112	0.143	0.068
Observations	4032	1523	8439	7873	9706	87,420	15,412

Data sources are time-use surveys from Peru (2010), Ecuador (2012), Chile (2015) and Colombia (2012, 2017). The sample is restricted to workers who are not students or retired

*Weekly hours for commuting are considered for Peru and Ecuador, and daily hours for commuting are considered for Colombia. Robust standard errors in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

women (part-time) relative to men (part-time) devote 0.07 h (4 min) less to commuting per day. Other interesting results are found in the four countries in urban and rural areas. In urban areas, men who work part-time relative to men who work full-time devote 1.9 h (1 h and 54 min), 1.3 h (1 h and 18 min), 2.4 h (1 h and 24 min) and 0.14 h (8 min) less to commuting in Peru, Ecuador, and Chile (hours per week) and Colombia (hours per day), respectively. In rural areas, men who work part-time relative to men who work full-time devote 1.9 h (1 h and 54 min), 0.5 h (30 min), and 0.13 h (8 min) less to commuting in Peru, and Ecuador (hours per week) and Colombia (hours per day), respectively.¹³

In Table 6, we analyze the influence of type of employment on the time devoted to commuting. We include the following interaction: self-employed women.

$$T_{ik} = \alpha_t + \beta_1 woman_{ik} + \beta_2 x_{ik} + \beta_3 self - employed * woman_{ik} + \beta_4 Z_{ik} + \epsilon_{ik} \quad (4)$$

In this regression, the reference category is a man who is an employee. In urban areas, when we compare men and women employees, we find in the four countries that women spend less time commuting. Women (employed) relative to men (employed) devote 0.4 h (24 min), 0.5 h (30 min), 0.6 h (36 min) and 0.02 h (1.2 min) less to commuting in Peru, Ecuador, and Chile (hours per week) and Colombia (hours per day), respectively. For rural areas of Ecuador, we find that women (employed) spend less time commuting, with the

difference being 0.5 h per week (30 min). When we compare self-employed men and women, we find in the cases of Ecuador and Colombia, in urban areas, the gender gap in the time dedicated to commuting increases. Women (self-employed) relative to men (self-employed) devote 0.95 h (57 min), and 0.10 h (6 min) less to commuting in Ecuador (hours per week) and Colombia (hours per day), respectively. And in the case of Peru (hours per week) and Colombia (hours per day) in rural areas, women (self-employed) relative to men (self-employed) devote 1.2 h (1 h and 12 min) and 0.21 h (13 min) less to commuting, respectively. These mixed results are consistent with prior literature (Rosenthal & Strange, 2012; Reuschke & Houston, 2020).

Other interesting results are found in the four countries. In urban areas, self-employed men, relative to employee men devote 1.5 h (1 h and 30 min), 1.8 h (1 h and 48 min), 2.6 h (1 h and 36 min), and 0.1 h (6 min) less to commuting in Peru, Ecuador, and Chile (hours per week) and Colombia (hours per day), respectively. In rural areas, self-employed men, relative to employee men devote 0.9 h (54 min) and 0.1 h (6 min) less to commuting in Ecuador (hours per week) and Colombia (hours per day), respectively.¹⁴

Regarding the results obtained in Tables 4, 5, and 6 showing certain differences between countries, the underlying reasons remain unclear, although existing research has documented that commuting behaviors crucially depend on transport infrastructures, urban forms, transport policies, housing prices, public transit services, and/or the share of

¹³ Table 8 in the Appendix shows a full description of results.

¹⁴ Table 9 in the Appendix show a full description of results.

Table 6 OLS estimates on the time devoted to commuting (considering type of employment)

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Peru		Ecuador		Chile	Colombia	
	Urban	Rural	Urban	Rural	Urban	Urban	Rural
Woman	- 0.422** (0.181)	- 0.406 (0.362)	- 0.474** (0.202)	- 0.529** (0.216)	- 0.564*** (0.180)	- 0.0174*** (0.00648)	0.0158 (0.0225)
Self-employed	- 1.461*** (0.191)	0.454 (0.315)	- 1.821*** (0.196)	- 0.893*** (0.191)	- 2.611*** (0.257)	- 0.120*** (0.00641)	0.0668*** (0.0158)
Self-employed*woman	- 0.0521 (0.254)	- 0.816* (0.485)	- 0.478* (0.274)	- 0.230 (0.284)	0.0722 (0.346)	- 0.0823*** (0.00912)	- 0.191*** (0.0271)
Constant	5.842*** (0.619)	6.763*** (0.994)	3.149*** (0.657)	3.724*** (0.505)	4.214** (1.644)	0.0607** (0.0258)	0.161*** (0.0508)
R-squared	0.231	0.129	0.109	0.067	0.112	0.144	0.072
Observations	4032	1523	8439	7873	9706	87,420	15,412

Data sources are time-use surveys from Peru (2010), Ecuador (2012), Chile (2015) and Colombia (2012, 2017). The sample is restricted to workers who are not students or retired

*Weekly hours for commuting are considered for Peru and Ecuador, and daily hours for commuting are considered for Colombia. Robust standard errors in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

car ownership, among others (Gimenez-Nadal et al., 2022b; Mitra & Saphores, 2019; Næss, 2003, 2006, 2009; Santos et al., 2013). A deeper analysis of these differences is left for further research.

Conclusions

In this paper, we analyze the differences in the time devoted by men and women to commuting, in four Latin American countries, considering urban and rural areas, and with particular attention to the influence of the presence of children in the household, the hours of work, and the type of employment. We use time use surveys from Peru (2010), Ecuador (2012), Chile (2015), and Colombia (2012 and 2017), employing linear models for our econometric estimates. Our principal results show that female workers devote fewer hours to commuting in comparison to their male counterparts in both urban and rural areas, with these differences being greater in rural areas, particularly in Peru and Colombia. We find that when there are no children in the household, gender gaps in the time dedicated to commuting are present in Ecuador and Colombia in both urban and rural areas, but when children are present, we observe gender gaps in urban areas in the time devoted to commuting in all four countries. Furthermore, we find that the hours of work and the type of employment influence the gender gaps in the time devoted to commuting. These results are similar to those found in developed countries.

The existing literature shows that domestic responsibilities lead women to dedicate less time to commuting than

men (Johnston-Anumonwo, 1992; Turner & Neimeier, 1997) and in countries as traditional as those analyzed, the greater unpaid work workload is carried by women (Campaña et al., 2018), with this unpaid workload being more onerous in rural areas (Rubiano Matulevich & Viollaz, 2019). Although more egalitarian social norms, and institutional factors, can help reduce gender gaps in paid and unpaid work, these gender gaps remain considerable (Campaña et al., 2023). Inequalities stemming from gender norms are deeply rooted in individual and social consciousness and are resistant to change, which may make the redistribution of paid and unpaid work difficult (Seguino, 2007). Batthyány (2015) suggests two mechanisms to achieve more egalitarian roles, based on intrahousehold redistribution of tasks, and redistribution through private and public institutions being engaged in the social organization of care. In this sense, it is recommended that policy makers work to provide households with children access to formal childcare services. Contreras et al. (2012), Hallman et al. (2005), and Mateo Díaz and Rodríguez-Chamussy (2016), all show for Latin American countries the benefits of formal childcare services and their positive effect on mothers' working hours, so this could also influence the commuting time of women.

According to Batthyány et al. (2013), a possible scenario for gender and social equity is that family-State-market co-responsibility policies be developed, in such a way as to favor the political, social, and economic rights of women. Greater participation by the State is crucial to complement intrahousehold redistribution, in order to improve services and achieve gender equity in Latin America. Furthermore, the multigenerational family relationship is an important

factor in the distribution of households in Latin America, and the extended family is a particular feature, on average representing around twenty percent of all family structures (Esteve et al., 2012). The literature has, so far, focused on analyzing the influence of children at home on the time spent commuting by individuals, so for future research it would be productive to analyze how the presence of the elderly at home influences the time spent commuting by workers.

One limitation of our analysis is that our data is a cross-section of individuals and does not allow us to identify differences in the time devoted to work, net of (permanent) individual heterogeneity in preferences and characteristics. At present, there are no panels of time-use surveys available, and we leave this issue, also, for future research. Another limitation of the current analysis is the lack of continuity in time use surveys, something that is common in this type of survey

(see Gimenez-Nadal and Molina (2022) for a review). In fact, this type of time use survey develops in uneven time gaps, and many things can change between surveys. Furthermore, the surveys differ in methodologies and sample sizes, which may also limit comparisons across countries. However, the fact that we focus on one time use activity only minimizes the effect of differences in methodology, given that commuting time is clearly identified in all the surveys used. For differences in sample size, despite that they exist, these surveys are supposed to be nationally representative, and so our results can be considered as representative at the country level.

Appendix 1

See Tables 7, 8 and 9.

Table 7 OLS estimates on the time devoted to commuting (considering presence of children)

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Peru		Ecuador		Chile	Colombia	
	Urban	Rural	Urban	Rural	Urban	Urban	Rural
Woman	-0.0937 (0.215)	-0.429 (0.418)	-0.366* (0.221)	-0.551*** (0.207)	-0.271 (0.206)	-0.0377*** (0.00641)	-0.0420* (0.0238)
Presence of children 0–12	0.309 (0.194)	0.383 (0.354)	-0.0682 (0.200)	-0.00629 (0.219)	0.423* (0.243)	0.00182 (0.00713)	0.0202 (0.0188)
Presence of children 0–12 *woman	-0.577** (0.259)	-0.712 (0.503)	-0.530* (0.280)	-0.170 (0.264)	-0.649** (0.289)	-0.0249*** (0.00910)	-0.0873*** (0.0273)
Part-time	-1.799*** (0.151)	-1.131*** (0.274)	-1.087*** (0.168)	-0.736*** (0.187)	-2.478*** (0.171)	-0.157*** (0.00624)	-0.139*** (0.0144)
Self-employed	-1.470*** (0.151)	0.223 (0.273)	-1.968*** (0.165)	-0.950*** (0.159)	-2.574*** (0.195)	-0.151*** (0.00501)	0.0243* (0.0135)
Log wage	0.225** (0.0896)	-0.00837 (0.133)	0.169* (0.0980)	0.0949 (0.0729)	0.679*** (0.125)	0.00359** (0.00145)	0.00349 (0.00511)
Non-labor income	-	-	8.39e-05 (0.000303)	-5.83e-05 (0.000274)	-0.000822*** (0.000315)	-4.23e-05*** (7.12e-06)	-5.02e-05 (5.00e-05)
Secondary education	0.272* (0.157)	-0.169 (0.306)	-0.248 (0.175)	-0.0160 (0.180)	-0.105 (0.195)	-0.00167 (0.00591)	0.00492 (0.0218)
University education	0.342** (0.169)	-0.208 (0.424)	-0.500** (0.199)	-0.0592 (0.227)	-0.0976 (0.253)	-0.0127** (0.00633)	0.0932*** (0.0257)
Sector 1/occupation 1	-	-	-	-	-1.229 (1.679)	-	-
Sector 2/occupation 2	-1.610*** (0.252)	-1.389*** (0.355)	0.0271 (0.223)	-0.502*** (0.164)	-1.777 (1.575)	-0.142*** (0.0148)	-0.0709*** (0.0189)
Sector 3/occupation 3	-2.525*** (0.235)	-1.474*** (0.383)	-0.430** (0.205)	-0.100 (0.207)	-0.518 (1.578)	-0.197*** (0.0144)	-0.0853*** (0.0195)
Sector 4/occupation 4	-2.136*** (0.236)	-1.109*** (0.409)	-0.0929 (0.218)	-0.480*** (0.177)	-1.135 (1.583)	-0.176*** (0.0147)	-0.122*** (0.0198)
Occupation 5	-	-	-	-	-1.511 (1.578)	-	-
Occupation 6	-	-	-	-	1.621 (1.700)	-	-

Table 7 (continued)

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Peru		Ecuador		Chile	Colombia	
	Urban	Rural	Urban	Rural	Urban	Urban	Rural
Occupation 7	–	–	–	–	– 0.254 (1.582)	–	–
Occupation 8	–	–	–	–	– 1.000 (1.590)	–	–
Occupation 9	–	–	–	–	– 0.121 (1.580)	–	–
Age	0.153*** (0.0324)	– 0.0726 (0.0531)	0.0707** (0.0295)	0.0421** (0.0205)	0.0457 (0.0286)	0.00540*** (0.000898)	0.00314 (0.00213)
Age squared	– 0.185*** (0.0404)	0.0739 (0.0649)	– 0.0972*** (0.0331)	– 0.0607*** (0.0217)	– 0.0402 (0.0323)	– 0.00742*** (0.00104)	– 0.00407* (0.00247)
Married/cohabiting	– 0.296* (0.155)	0.519* (0.299)	0.0405 (0.155)	– 0.0570 (0.150)	– 0.417** (0.178)	– 0.0210*** (0.00513)	0.00144 (0.0141)
N. household members	– 0.0125 (0.0290)	– 0.149** (0.0634)	0.0907** (0.0383)	0.162*** (0.0352)	0.129** (0.0522)	0.0105*** (0.00148)	0.0179*** (0.00407)
Presence of elderly ≥ 65	0.0694 (0.187)	– 0.175 (0.344)	0.221 (0.219)	– 0.277 (0.185)	– 0.0136 (0.196)	0.00261 (0.00641)	0.0196 (0.0171)
Indigenous	0.681*** (0.218)	0.740*** (0.264)	0.851* (0.509)	0.709*** (0.147)	0.354 (0.272)	– 0.0550*** (0.0122)	– 0.0246 (0.0184)
Region 1	– 2.158*** (0.151)	–	1.570*** (0.175)	0.220* (0.125)	0.627* (0.359)	0.201*** (0.00737)	–
Region 2	– 2.000*** (0.166)	0.666** (0.287)	1.228*** (0.158)	– 0.210 (0.167)	0.978** (0.391)	0.227*** (0.00716)	– 0.0123 (0.0162)
Region 3	– 2.834*** (0.165)	– 0.807*** (0.267)	–	–	2.662*** (0.296)	0.175*** (0.00764)	– 0.0250 (0.0175)
Region 4	–	–	–	–	0.656** (0.300)	0.221*** (0.00793)	0.0841*** (0.0209)
Region 5	–	–	–	–	0.489 (0.340)	0.498*** (0.00846)	–
Year 2	–	–	–	–	–	0.0172*** (0.00461)	– 0.0111 (0.0128)
Constant	5.734*** (0.617)	6.861*** (0.994)	3.143*** (0.654)	3.756*** (0.499)	4.070** (1.642)	0.0813*** (0.0256)	0.163*** (0.0512)
R-squared	0.232	0.128	0.110	0.067	0.112	0.143	0.069
Observations	4032	1523	8439	7873	9706	87,420	15,412

Data sources are time-use surveys from Peru (2010), Ecuador (2012), Chile (2015) and Colombia (2012, 2017). The sample is restricted to workers who are not students or retired

*Weekly hours for commuting are considered for Peru and Ecuador, and daily hours for commuting are considered for Colombia. Robust standard errors in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 8 OLS estimates on the time devoted to commuting (considering hours of working)

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Peru		Ecuador		Chile	Colombia	
	Urban	Rural	Urban	Rural	Urban	Urban	Rural
Woman	- 0.473*** (0.160)	- 1.393*** (0.292)	- 0.701*** (0.173)	- 0.480*** (0.164)	- 0.527*** (0.179)	- 0.0475*** (0.00526)	- 0.0906*** (0.0183)
Part-time	- 1.908*** (0.242)	- 1.850*** (0.358)	- 1.274*** (0.238)	- 0.491* (0.263)	- 2.416*** (0.288)	- 0.142*** (0.0104)	- 0.133*** (0.0212)
Part-time*woman	0.149 (0.292)	1.482*** (0.516)	0.325 (0.324)	- 0.658* (0.344)	- 0.140 (0.340)	- 0.0263** (0.0125)	- 0.0167 (0.0284)
Presence of children 0–12	0.0691 (0.154)	0.152 (0.300)	- 0.268 (0.165)	- 0.0465 (0.187)	0.131 (0.182)	- 0.00887 (0.00546)	- 0.00324 (0.0163)
Self-employed	- 1.483*** (0.151)	0.227 (0.271)	- 1.981*** (0.165)	- 0.940*** (0.159)	- 2.581*** (0.196)	- 0.151*** (0.00501)	0.0248* (0.0135)
Log wage	0.220** (0.0896)	- 0.0224 (0.132)	0.178* (0.0987)	0.0896 (0.0723)	0.682*** (0.124)	0.00355** (0.00145)	0.00330 (0.00512)
Non-labor income	-	-	8.80e-05 (0.000301)	- 4.60e-05 (0.000266)	- 0.000834*** (0.000316)	- 4.20e-05*** (7.12e-06)	- 4.77e-05 (4.99e-05)
Secondary education	0.276* (0.157)	- 0.155 (0.304)	- 0.255 (0.175)	- 0.0248 (0.180)	- 0.115 (0.195)	- 0.00202 (0.00592)	0.00528 (0.0220)
University education	0.351** (0.169)	- 0.186 (0.422)	- 0.493** (0.200)	- 0.0964 (0.228)	- 0.0960 (0.253)	- 0.0133** (0.00634)	0.0957*** (0.0261)
Sector 1/occupation 1	-	-	-	-	- 1.344 (1.683)	-	-
Sector 2/occupation 2	- 1.596*** (0.253)	- 1.381*** (0.353)	0.0188 (0.223)	- 0.474*** (0.164)	- 1.862 (1.581)	- 0.141*** (0.0148)	- 0.0727*** (0.0190)
Sector 3/occupation 3	- 2.517*** (0.236)	- 1.509*** (0.382)	- 0.436** (0.205)	- 0.0848 (0.207)	- 0.611 (1.583)	- 0.196*** (0.0144)	- 0.0858*** (0.0195)
Sector 4/occupation 4	- 2.122*** (0.237)	- 1.104*** (0.408)	- 0.109 (0.218)	- 0.467*** (0.177)	- 1.228 (1.588)	- 0.176*** (0.0147)	- 0.123*** (0.0199)
Occupation 5	-	-	-	-	- 1.602 (1.582)	-	-
Occupation 6	-	-	-	-	1.520 (1.704)	-	-
Occupation 7	-	-	-	-	- 0.332 (1.586)	-	-
Occupation 8	-	-	-	-	- 1.079 (1.594)	-	-
Occupation 9	-	-	-	-	- 0.214 (1.585)	-	-
Age	0.151*** (0.0325)	- 0.0810 (0.0527)	0.0700** (0.0296)	0.0448** (0.0205)	0.0469 (0.0286)	0.00550*** (0.000901)	0.00308 (0.00214)
Age squared	- 0.182*** (0.0405)	0.0841 (0.0643)	- 0.0963*** (0.0332)	- 0.0638*** (0.0217)	- 0.0410 (0.0323)	- 0.00754*** (0.00104)	- 0.00393 (0.00248)
Married/cohabiting	- 0.280* (0.157)	0.524* (0.296)	0.0537 (0.155)	- 0.0467 (0.149)	- 0.382** (0.179)	- 0.0194*** (0.00508)	0.00517 (0.0141)
N. household members	- 0.00913 (0.0289)	- 0.141** (0.0629)	0.0931** (0.0384)	0.161*** (0.0348)	0.134** (0.0523)	0.0106*** (0.00148)	0.0185*** (0.00404)
Presence of elderly ≥ 65	0.0574 (0.187)	- 0.206 (0.341)	0.224 (0.219)	- 0.278 (0.183)	- 0.0228 (0.196)	0.00213 (0.00641)	0.0180 (0.0172)
Indigenous	0.672***	0.737***	0.838*	0.707***	0.344	- 0.0547***	- 0.0251

Table 8 (continued)

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Peru		Ecuador		Chile	Colombia	
	Urban	Rural	Urban	Rural	Urban	Urban	Rural
	(0.219)	(0.263)	(0.508)	(0.147)	(0.272)	(0.0122)	(0.0184)
Region 1	- 2.163***	-	1.571***	0.221*	0.630*	0.202***	-
	(0.151)	-	(0.175)	(0.125)	(0.359)	(0.00736)	-
Region 2	- 1.992***	0.664**	1.240***	- 0.209	0.973**	0.228***	- 0.0124
	(0.167)	(0.287)	(0.158)	(0.167)	(0.391)	(0.00715)	(0.0162)
Region 3	- 2.829***	- 0.808***	-	-	2.666***	0.176***	- 0.0252
	(0.165)	(0.267)	-	-	(0.296)	(0.00763)	(0.0176)
Region 4	-	-	-	-	0.660**	0.221***	0.0829***
	-	-	-	-	(0.300)	(0.00792)	(0.0210)
Region 5	-	-	-	-	0.482	0.498***	-
	-	-	-	-	(0.341)	(0.00845)	-
Year 2	-	-	-	-	-	0.0173***	- 0.0112
	-	-	-	-	-	(0.00461)	(0.0129)
Constant	5.890***	7.234***	3.265***	3.674***	4.202**	0.0814***	0.173***
	(0.622)	(0.991)	(0.662)	(0.501)	(1.646)	(0.0257)	(0.0511)
R-squared	0.231	0.132	0.109	0.068	0.112	0.143	0.068
Observations	4032	1523	8439	7873	9706	87,420	15,412

Data sources are time-use surveys from Peru (2010), Ecuador (2012), Chile (2015) and Colombia (2012, 2017). The sample is restricted to workers who are not students or retired

*Weekly hours for commuting are considered for Peru and Ecuador, and daily hours for commuting are considered for Colombia. Robust standard errors in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 9 OLS estimates on the time devoted to commuting (considering type of employment)

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Peru		Ecuador		Chile	Colombia	
	Urban	Rural	Urban	Rural	Urban	Urban	Rural
Woman	- 0.422** (0.181)	- 0.406 (0.362)	- 0.474** (0.202)	- 0.529** (0.216)	- 0.564*** (0.180)	- 0.0174*** (0.00648)	0.0158 (0.0225)
Self-employed	- 1.461*** (0.191)	0.454 (0.315)	- 1.821*** (0.196)	- 0.893*** (0.191)	- 2.611*** (0.257)	- 0.120*** (0.00641)	0.0668*** (0.0158)
Self-employed*woman	- 0.0521 (0.254)	- 0.816* (0.485)	- 0.478* (0.274)	- 0.230 (0.284)	0.0722 (0.346)	- 0.0823*** (0.00912)	- 0.191*** (0.0271)
Presence of children 0–12	0.0723 (0.154)	0.147 (0.303)	- 0.261 (0.165)	- 0.0531 (0.188)	0.128 (0.182)	- 0.00924* (0.00546)	- 0.00340 (0.0162)
Part-time	- 1.812*** (0.154)	- 1.106*** (0.275)	- 1.043*** (0.169)	- 0.725*** (0.187)	- 2.500*** (0.173)	- 0.147*** (0.00633)	- 0.127*** (0.0145)
Log wage	0.218** (0.0895)	- 0.0147 (0.134)	0.162 (0.0988)	0.0909 (0.0723)	0.684*** (0.125)	0.00321** (0.00145)	0.00269 (0.00511)
Non-labor income	-	-	8.74e-05 (0.000300)	- 5.96e-05 (0.000272)	- 0.000830*** (0.000316)	- 4.17e-05*** (7.15e-06)	- 4.41e-05 (4.99e-05)
Secondary education	0.276* (0.157)	- 0.196 (0.306)	- 0.263 (0.175)	- 0.0230 (0.179)	- 0.117 (0.195)	- 0.00123 (0.00591)	- 5.78e-05 (0.0221)
University education	0.350** (0.170)	- 0.243 (0.424)	- 0.523*** (0.200)	- 0.0792 (0.230)	- 0.0959 (0.253)	- 0.0156** (0.00636)	0.0748*** (0.0257)
Sector 1/occupation 1	-	-	-	-	- 1.334 (1.684)	-	-
Sector 2/occupation 2	- 1.595*** (0.253)	- 1.301*** (0.359)	0.0280 (0.223)	- 0.491*** (0.164)	- 1.855 (1.581)	- 0.141*** (0.0148)	- 0.0642*** (0.0192)
Sector 3/occupation 3	- 2.515*** (0.236)	- 1.391*** (0.385)	- 0.424** (0.204)	- 0.0856 (0.207)	- 0.603 (1.583)	- 0.197*** (0.0144)	- 0.0821*** (0.0195)
Sector 4/occupation 4	- 2.124*** (0.237)	- 1.113*** (0.410)	- 0.108 (0.218)	- 0.491*** (0.178)	- 1.217 (1.588)	- 0.174*** (0.0147)	- 0.125*** (0.0197)
Occupation 5	-	-	-	-	- 1.597 (1.582)	-	-
Occupation 6	-	-	-	-	1.533 (1.705)	-	-
Occupation 7	-	-	-	-	- 0.330 (1.586)	-	-
Occupation 8	-	-	-	-	- 1.076 (1.594)	-	-
Occupation 9	-	-	-	-	- 0.206 (1.585)	-	-
Age	0.152*** (0.0324)	- 0.0691 (0.0529)	0.0730** (0.0295)	0.0433** (0.0206)	0.0467 (0.0286)	0.00574*** (0.000899)	0.00312 (0.00212)
Age squared	- 0.183*** (0.0404)	0.0717 (0.0647)	- 0.0998*** (0.0331)	- 0.0620*** (0.0217)	- 0.0408 (0.0323)	- 0.00781*** (0.00104)	- 0.00399 (0.00246)
Married/cohabiting	- 0.272* (0.155)	0.505* (0.300)	0.0479 (0.154)	- 0.0562 (0.149)	- 0.384** (0.179)	- 0.0195*** (0.00508)	0.00689 (0.0141)
N. household members	- 0.00976 (0.0289)	- 0.147** (0.0630)	0.0922** (0.0383)	0.163*** (0.0351)	0.134** (0.0523)	0.0106*** (0.00148)	0.0178*** (0.00401)
Presence of elderly ≥ 65	0.0577 (0.187)	- 0.182 (0.343)	0.214 (0.218)	- 0.279 (0.185)	- 0.0207 (0.196)	0.00169 (0.00641)	0.0168 (0.0171)
Indigenous	0.670***	0.730***	0.845*	0.708***	0.345	- 0.0535***	- 0.0230

Table 9 (continued)

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Peru		Ecuador		Chile	Colombia	
	Urban	Rural	Urban	Rural	Urban	Urban	Rural
Region 1	(0.218)	(0.264)	(0.511)	(0.148)	(0.272)	(0.0122)	(0.0184)
	– 2.163***	–	1.570***	0.225*	0.630*	0.205***	–
	(0.151)	–	(0.175)	(0.126)	(0.359)	(0.00737)	–
Region 2	– 1.991***	0.685**	1.235***	– 0.203	0.973**	0.231***	– 0.0153
	(0.166)	(0.286)	(0.158)	(0.169)	(0.391)	(0.00717)	(0.0160)
Region 3	– 2.829***	– 0.803***	–	–	2.667***	0.180***	– 0.0302*
	(0.165)	(0.267)	–	–	(0.296)	(0.00765)	(0.0175)
Region 4	–	–	–	–	0.660**	0.225***	0.0768***
	–	–	–	–	(0.300)	(0.00793)	(0.0210)
Region 5	–	–	–	–	0.483	0.502***	–
	–	–	–	–	(0.341)	(0.00848)	–
Year 2	–	–	–	–	–	0.0172***	– 0.0117
	–	–	–	–	–	(0.00460)	(0.0128)
Constant	5.842***	6.763***	3.149***	3.724***	4.214**	0.0607**	0.161***
	(0.619)	(0.994)	(0.657)	(0.505)	(1.644)	(0.0258)	(0.0508)
R-squared	0.231	0.129	0.109	0.067	0.112	0.144	0.072
Observations	4032	1523	8439	7873	9706	87,420	15,412

Data sources are time-use surveys from Peru (2010), Ecuador (2012), Chile (2015) and Colombia (2012, 2017). The sample is restricted to workers who are not students or retired

*Weekly hours for commuting are considered for Peru and Ecuador, and daily hours for commuting are considered for Colombia. Robust standard errors in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

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Data Availability The datasets analyzed during the current study are available from the corresponding author on request.

Declarations

Conflict of interest No potential conflict of interest was reported by the authors.

Ethical Approval This research article is a secondary data analysis and involves no own human or animal participants.

Consent for Participant Not applicable.

Consent for Publication The used secondary data only involves anonymized data. Therefore, participant consent was not required.

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