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Working Paper Gender gaps in time devoted to Commuting: Evidence from Peru, Ecuador, Chile, and Colombia

GLO Discussion Paper, No. 1185

Provided in Cooperation with: Global Labor Organization (GLO)

Suggested Citation: Campaña, Juan Carlos; Gimenez-Nadal, J. Ignacio (2022) : Gender gaps in time devoted to Commuting: Evidence from Peru, Ecuador, Chile, and Colombia, GLO Discussion Paper, No. 1185, Global Labor Organization (GLO), Essen

This Version is available at: https://hdl.handle.net/10419/265368

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Gender gaps in time devoted to Commuting: Evidence from Peru, Ecuador, Chile, and Colombia.¹

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Abstract

We analyze the relationship between gender and the time devoted to commuting by men and women in Latin American Countries. Using data from time surveys from Peru (2010), Ecuador (2012), Chile (2015) and Colombia (2012 and 2017), we observe in the four countries, that women devoted less time to this activity compared to men. We find that among the possible justifications for these gender gaps, it is important to consider the presence of children in the household, the hours of work and the type of employment of individuals. These results illustrate the importance of studying this topic in countries where the evidence is scarce mainly due to limitations in comparing the data between countries.

Keywords: Time Use, Commuting, Gender Gaps, Latin America countries **JEL:** D10, J22.

¹ J. C. Campaña and J.I. Gimenez-Nadal acknowledges funding from the Government of Aragón (Project S32_20R, funded by Program FSE Aragón 2014–2020), and the Spanish Ministry of Science and Innovation (Project PID2019-108348RA-I00, funded by MCIN/AEI/10.13039/501100011033). J. C. Campaña acknowledges funding from the Spanish Ministry of Science and Innovation (Project PID2019-111765GB-I00, funded by MCIN/AEI/10.13039/501100011033), and the Regional Government of Madrid (OPINBI Project H2019/HUM-5793, B.O.C.M. Num. 302).

1. Introduction

Commuting is the time/distance between home and the workplace, and its analysis has gained importance in the literature in the most recent decade. Commutes can be considered as shocks to time endowments (Ross & Zenou, 2008), and some uses of time, such as leisure, market work, child care or 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, Molina and Velilla (2022) 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 high in stress and tiredness and much lower in meaningfulness, compared with other daily activities, and thus commuting can be considered a low-well-being experienced. Furthermore, there are also psychological costs associated with travel (Koslowsky et al., 1995; Kahneman et al., 2004; Stutzer and Frey, 2008), which include increased blood pressure, physical disorders, and anxiety. Thus, 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, and among them one of the most important is gender.² Gender has been found to be related to lower commuting times (Turner and Neimeier, 1997; Sandow, 2008; Sandow and Westin, 2010; Dargay and Clark, 2012; Groot et al., 2012; McQuaid and Chen, 2012; Gimenez-Nadal and Molina, 2016). Commuting is strongly gendered with the result that women tend to have shorter commutes than men,

² Literature has identified gender as a key factor linked with short/long commute distances and/or times (Fanning Madden, 1981; Hanson and Pratt, 1988; McLafferty, 1997), alongside other factors including earnings (McGregor and McConnachie, 1995); qualifications (Gordon et al., 1989a); age (Loewenstein, 1965); race and ethnicity (Ihlanfeldt and Sjoquist, 1990); rural and suburban locations (Molho, 1995); access to a car (Taylor and Ong, 1995) and household time budgets (Duffy, 1992).

a finding that is remarkably persistent over time and consistent across countries (Fanning Madden, 1981; Hanson and Pratt, 1988; Grieco et al., 1989; Dex et al., 1995; McLafferty, 1997; Turner and Niemeier, 1997; Crane, 2007; Hanson, 2010; Frändberg and Vilhelmson, 2011; Black et al., 2014; Gimenez-Nadal and Molina, 2016; Craig and Van Tienoven, 2019; Havet et al., 2021; Marcen and Morales, 2021).

The literature has suggested different reasons for the gender gap in the time devoted to commuting, and the Household Responsibility Hypothesis assumes that women devoted less time to commuting compared to men because of parenting and domestic responsibilities (Johnston-Anumonwo, 1992; Turner and Neimeier, 1997; Hjorthol, 2000; Clark et al., 2003; Lee and McDonald, 2003; Gimenez-Nadal and Molina, 2016). In this sense, the gender commuting gap is largest with the presence of children in the household (Fan, 2017). According to the Household Responsibilities Hypothesis (Gimenez-Nadal and Molina, 2016), mothers spend more time in childcare activities and other unpaid work activities than do males and they need more time for childcare than female workers without kids, leading to shorter commutes.

Despite the results shown above, other studies show what is known as the Commuting Preference Hypothesis. This hypothesis assumes that gender differences in the time devoted to commuting persist after controlling for household type and the presence of children, marital status, and age (Gordon et al., 1989b; Crane, 2007; Hjorthol and Vågane, 2014; Silveira Neto et al., 2015). Thus, this literature suggests that women's greater sensitivity to commuting could partly be the result of gender differences in commute choices, albeit constrained choices.

Another hypothesis that would allow us to understand the gender gap in commuting is that of the Labor Market Structures Hypothesis. This Hypothesis argues that women take shorter trips because they are constrained by part-time employment and low wages, so long trips don't pay off (Fanning Madden, 1981; Hanson and Johnston, 1985; Hanson and Pratt, 1988, 1992, 1995; Madden and Chiu, 1990; Carlson and Persky, 1999; Carter and Butler, 2008; Sandow, 2008). Hence, the type of employment is an important determinant of commutes, as prior research has found significant differences between employees and self-employed workers (Lee and McDonald, 2003; Van Ommeren & Van der Straaten, 2008; Rosenthal and Strange, 2012; Gimenez-Nadal et al., 2018b). But the evidence regarding gender gaps in the time dedicated to commuting by the self-employed is scarce, and the results differ considering countries. 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 gender commuting time gap amongst the self-employed in the UK, while their findings confirm existing evidence of a gender commuting gap for employees.

Despite of all this research in developed countries, the evidence on the relationship between the commuting and gender is scarce for Latin American countries, despite the flourishing literature on the determinants of time allocation in that region (Medeiros et al., 2010; Salvador and Galvan, 2013; Canelas and Salazar, 2014; Campaña et al., 2017,2018; Amarante and Rossel, 2018; Rubiano and Viollaz, 2019; Dominguez et al., 2019; Gimenez et al., 2021). This literature has focused on analyzing gender differences between individuals in the time dedicated to paid work, unpaid work, and care activities and their general results show that men spend more time to paid work and less time to unpaid work and care activities compared to women and variables such as presence of children, and labor activities, influence positively or negatively on the time spent by individuals on these time-use activities.

In these countries, 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 (Folbre, 2006; Esplen, 2009), worker women with household responsibilities (mainly childcare responsibilities) may have to devote less time to commuting (shorter commutes) compared to worker women without household responsibilities (Gimenez-Nadal and Molina, 2016).

Under this framework, we use data from time use surveys in Peru (2010), Ecuador (2012), Chile (2015) and Colombia (2012, 2017) to analyze gender differences int the time devoted to commuting by workers from these four countries. We estimate linear models (OLS) for each country separately and our main econometric results show that women relative to men devoted less hours to commuting. Women relative to men devoted 0.5, 0.6, 0.6 and 0,05 less hours to commuting in Peru, Ecuador, and Chile (hours per week) and Colombia (hours per day), respectively. We also find that when there are no children in the households, the gender gaps in the time dedicated to commuting is present in Ecuador and Colombia only, but when the presence of children is analyzed, we observe

gender gaps in the time devoted to commuting in the four countries, and the gender gaps in commuting increased in Ecuador and Colombia.

In Peru, Ecuador, Chile, and Colombia, we find that full-time female workers devote less time to commuting compared to their male counterparts, while the gender gap is present in Colombia only when we compare part-time male and female workers. And finally, when we analyze the influence of type of employment, in the case of employed workers, women devoted less time to commuting compared to men in Peru, Ecuador and Chile and in the case of self-employed we find that only in the case of Ecuador, the gender gap in the time dedicated to commuting increase. In the case of Colombia, women (selfemployed) relative to men (self-employed) devoted 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. This analysis of commuting of workers in four Latin American countries gives us a picture of how gender, are related to this activity. Most of the existing applied empirical work has focused on analyzing the influence of socio-demographic factors as gender to commuting for developed countries. In this sense, more empirical research is needed on how the commuting affects economic behaviors in non-developed countries.

The rest of the paper is organized as follows. Section 2 describes the data. Section 3 describes the empirical strategy. Section 4 presents our results and Section 5 concludes.

2. Data and variables

We use time use data obtained from time use surveys from Peru (2010), Ecuador (2012), Chile (2015) and Colombia (2012, 2017)³. These surveys provide us with information on individual time use, and represent the typical instrument used to analyze the time-allocation decisions of individuals (Bianchi, 2000; Gershuny, 2000; Aguiar and Hurst, 2007; Folbre et al., 2015; Campaña et al., 2018; Gimenez-Nadal et al., 2021, Gimenez-Nadal and Molina, 2022). The targeted population in these surveys are all members of households, aged 12 and older for Peru, Ecuador, and Chile, and aged 10 and above for Colombia. The four surveys use a list of pre-coded activities to classify and order different

³The 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, INE (National Institute of statistics) in Chile, and DANE (National Administrative Department of statistics) in Colombia.

activities.⁴ 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. After these restrictions are fulfilled, our study sample is 5,555 individuals in Peru, 16,312 individuals in Ecuador, 9,706 individuals in Chile, and 102,832 individuals in 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.⁵

Commuting is defined as the time between home and the workplace. Prior research has pointed to gender as an important determinant of commuting, from different perspectives, as women tend to have shorter commutes than men (Waldfogel, 2007; Sandow, 2008; Sandow & Westin, 2010; Dargay & Clark, 2012; McQuaid & Chen, 2012; Gimenez-Nadal & Molina, 2016). In Table 1, Column 1 for Peru, Column 2 for Ecuador, Column 3 for Chile, and Column 4 for Colombia, show the descriptive statistics for our analyzed samples, by gender. Regarding the time devoted to commuting, in the four countries, men devote more time to commuting than do women. In Peru, Ecuador and Chile men dedicate 5.05, 4.71, 6.63 hours per week respectively to commuting while women dedicate 3.74, 3.79 and 5.62 hours per week respectively to this activity (on average women devoted 1.08 hours less per week to commuting compared to men). And in Colombia men and women dedicate 0.46 and 0.39 hours per day to commuting (women devoted 0.07 hours less per day to commuting compared to men). These results are only a descriptive analysis, and we do not control for factors that may be affecting the results.

Among the main justifications for these gender differences in the time devoted to commuting, the presence of children in the home has been considered. Concerning the presence of children in the home, individuals (mainly women) may choose to work closer to home in order to fulfill their household responsibilities, which can affect their job search area and lead them to having 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,

⁴ For more information regarding Classification of Time-Use Activities for Latin America and the Caribbean see ECLAC (2015).

⁵ 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.

in terms of time spent on different time-use activities as paid work, unpaid work and child care.

Job characteristics, more specifically part-time employment, is linked to commutes of women (Fanning Madden, 1981). In this sense, it is important to analyze whether the gender gaps in the time dedicated to commuting vary when full-time or part-time workers are compared. Following Reuschke and Houston (2020), we consider as definition of parttime employment as working less than 30 hours per week. Furthermore, 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 selfemployed workers, finding a difference of about 17%. Also, 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%. Regarding gender differences in the time devoted to commuting, Rosenthal and Strange (2012) find that self-employed women, commute less than selfemployed men, while Reuschke and Houston (2020) find little evidence for a gender gap in the time devoted to commuting by self-employed, while the authors findings confirm existing evidence of a gender commuting gap for employees.

Table 1 shows that 62.5% of households in Peru, 56.5% of households in Ecuador, 44.5% of households in Chile and 54% of households in Colombia have presence of children (0-12 years). Concerning weekly working hours, the percentage of women who work part time is higher than that of men. In Peru, Ecuador, Chile, and Colombia, 12%, 12%, 11% and 8% of men respectively and 36%, 26%, 22% and 20% of women respectively work part-time. About self-employment, in Peru and Ecuador the percentage of women who are self-employed is higher compared to men, while in Chile and Colombia it is the opposite. In Peru, Ecuador, Chile, and Colombia, 40%, 37%, 22% and 45% of men respectively and 50%, 45%, 21% and 43% of women respectively are self-employed.

Respect the rest of control variables, based in previous time use studies we consider the following variables: wages, non-labor household income, education level, sectorial composition, age, if individuals are married/cohabiting, number of household members, ethnicity (indigenous), urban/rural area, and the various regions of each country (Kalenkoski et al., 2005; Aguiar and Hurst, 2007; Campaña et al., 2017,2018,2020; Campaña and Ortega, 2021; Gimenez-Nadal et al., 2021). Higher wages are associated with longer commutes (Leigh, 1986; Zax, 1991; White, 1999; Crane, 2007; Ross & Zenou, 2008; Rupert et al., 2009; Mulalic et al., 2014; Gimenez-Nadal et al., 2018a;) and non-labour family income may also affect the time devote to different activities (Kalenkoski et al. 2005), this may also in the case of the time devoted to commuting by individuals.

Wages are measured as hourly wages, and non-labor household income 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), and also includes income from bank interest and income from stocks or dividends. Hourly wages and non-labor household income are expressed in US Dollars.⁶ 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 (Rouwendal and Nijkamp, 2004; Dargay and Van Ommeren, 2005; Sandow and Westin, 2010; Dargay and Clark, 2012).

The literature shows that there are significant differences in the times dedicated to commuting when workers' occupations are considered (McQuaid, 2009; McQuaid & Chen, 2012; Walks, 2014). Concerning occupations, 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 about 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

⁶ 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 <u>https://www.dane.gov.co/index.php/estadisticas-por-tema/precios-y-costos/indice-de-precios-al-consumidor-ipc</u>. 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). The official currency of Ecuador is the US Dollar, so it is not necessary to make any conversion in the case of this country.

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 (Kalenkoski et al., 2005; Aguiar and Hurst 2007) in order to take into account, 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 and less time to paid work and may less time to commuting, while the number of family members 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).

Regarding the area of residence, different behaviors are observed in terms of the time dedicated to commuting by individuals considering the area in which they live (Cropper and Gordon, 1991; Small and Song, 1992; Manning, 2003; Rodríguez, 2004; Schwanen et al., 2004; Susilo and Maat, 2007; Östh and Lindgren, 2012; Gimenez-Nadal et al., 2018b). It is important to distinguish between urban and rural areas because individuals have different behaviors in the time spent commuting, depending on the area in which they reside (Schwanen et al., 2004; Susilo and Maat, 2007; Östh and Lindgren, 2012).In the cases of Peru and Ecuador, their Time Use Surveys contains information if individuals live in urban or rural area, in the case of Colombia, urban refers to a municipality and rural refers to not being a municipality, and in the case of Chile their time use-survey only considers urban area. For the region of residence of respondents, 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 1 shows the average values for the samples of the 4 countries. In Peru, men earn \$1.65, while women earn \$1.59. In Ecuador, men earn \$1.96, while women earn \$1.86. In Chile, men earn \$4.13, while women earn \$3.13. And in Colombia, men earn \$1.99, while women earn \$2.04. Non-labor income in Ecuador for men is \$41.47 and for women is \$ 61.10. In Chile, non-labor income for men is \$36.66 and for women is \$ 50.50. And

in Colombia, non-labor income for men is \$52.38 and for women is \$70.34.⁷ In analyzed countries, non-labor income is higher for women compared to men. Respect to education 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 for men is primary education in Peru, Ecuador, and Colombia, with 39%, 65% and 49% respectively and university education the prevailing education level in Chile, with 37%. For women is primary education the prevailing education level in Peru and Ecuador, with 40% and 54% respectively and university education is the prevailing education level in Chile and Colombia with 40% and 39% respectively.

Respect to sectorial composition we observe similarities between countries. We observe in Peru and Colombia men are mainly concentrated in the tertiary sector (30%, and 34% respectively) and in Ecuador men are mainly concentrated in the primary sector (32%). Women are mainly concentrated in Peru, Ecuador, and Colombia in the quaternary sector (40%, 40% and 53% respectively). Concerning occupations in Chile, men are mainly concentrated (22%) in occupation 7 (Craft and related trades workers) and women are mainly concentrated (27%) in occupation 9 (Elementary occupations). In terms of the age by ours samples the average age is very similar between men and women, in Peru is 36.6 years, in Ecuador is 42.1 years, in Chile is 42.37 years and in Colombia is 38.5 years. As for the individuals in our samples who are in a couple (Married / cohabiting), we observe that this percentage on average in the four countries is higher for men compared to women. In Peru, Ecuador, Chile, and Colombia, 63%, 73%, 65% and 62% of men respectively and 52%, 49%, 50% and 51% of women respectively are married/cohabiting. Regarding the number of household members, we find that on average there are four members in the households of our analyzed samples. Regarding ethnicity (indigenous), 16% in Peru, 6% in Ecuador, 7.5% in Chile and 4% in Colombia of the respondents of our samples correspond to this ethnicity. Regarding areas, the percentage of individuals of our samples who are living in rural area is 21% for Peru, 34% for Ecuador and 18% for Colombia.

⁷ In the case of the Peruvian Time Use Survey, information on non-labor income is not available.

3. Empirical strategy and results

For the time devoted to commuting by the 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 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:

$$T_{ik} = \alpha_t + \beta_1 woman_{ik} + \beta_2 x_{ik} + \beta_3 Interactions_{ik} + \beta_4 Z_{ik} + \varepsilon_{ik} \quad (1)$$

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. Xik is a vector of variables that includes dummies for the presence of children (between 0 and 12 in the household of respondent), if respondent work part-time, and if respondent is self-employed. Interactions_{ik} includes a vector of interactions between the variables included in vector X_{ik.} And Z_{ik} includes additional socio-demographic variables (log wage, non-labor income, education, sector/occupation, age, age squared, married/cohabiting, number of household members, ethnic origin (indigenous), rural area 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.

Table 2, Column 1 (Peru), Column 2 (Ecuador), Column 3 (Chile) and Column 4 (Colombia) show the results of estimating Equation 1. In these regressions, the reference category is men. In the four countries, 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 relative to men devoted 0.5, 0.6, 0.6 and 0,05 less hours to commuting in Peru, Ecuador, and Chile (hours per week) and Colombia (hours per day), respectively. These results are similar to those shown by the literature in developed countries (Turner and Neimeier, 1997; Waldfogel, 2007; Sandow, 2008; Sandow and Westin, 2010; Dargay and Clark, 2012; Groot et al., 2012; McQuaid and Chen, 2012;

Gimenez-Nadal and Molina, 2016). Respect to other variables, we observe interesting and statistically significant results at standard levels of the first equation. In the four countries log wages influence positively while non-labour income in Chile and Colombia influence negatively the time devoted to commuting by individuals. In the four countries age positively influences the time devoted by individuals to commuting. In Chile and Colombia to be in partner (married/cohabiting) negatively influences the time devoted to commuting. And, in Ecuador, Colombia and Chile, a greater number of household members influences positively the time devoted to commuting.

In Table 3, we analyze the influence of the presence of children on the time devoted to commuting. We include the following interactions: Presence of children $0 - 12^*$ women. The results shown for Peru are in column 1, for Ecuador in column 2, for Chile in column 3 and for Colombia in column 4. Firstly, we find that when we compare men and women without presence of children in the household, we find only gender gaps in commuting in Ecuador (hours per week) and Colombia (hours per day). In these two countries women relative to men devoted 0.4 an 0.03 less hours to commuting. While when we compare men and women with presence of children in the household, in the four countries we find gender gaps in the time devoted to commuting. Women relative to men devoted 0.8, 0.8, 0.9 and 0,07 less hours to commuting in Peru, Ecuador, and Chile (hours per week) and Colombia (hours per day), respectively. In the case of Ecuador and Colombia, the presence of children increases the gender gaps in the time devoted to commuting. These results are consistent with the idea that women with family responsibilities spend less time to commuting than women without family responsibilities (Gimenez-Nadal and Molina, 2016). Other interesting results are found in Peru and Chile. Men with presence of children in their households devoted 0,3 and 0,4 more hours to commuting per week respectively compared to men without the presence of children in their households.

In Table 4, we analyze the influence of working hours on the time devoted to commuting. We include the following interactions: part-time*women. The results shown for Peru are in column 1, for Ecuador in column 2, for Chile in column 3 and for Colombia in column 4. When we compare men and women who work full-time, we find for all four countries that women spend less time commuting compared to men. Women (full-time) relative to men (full time) devoted 0.6, 0.6, 0.6 and 0,05 less hours to commuting in Peru, Ecuador, and Chile (hours per week) and Colombia (hours per day), respectively. Later,

when we compare men and women who work part-time, we find that only in the case of Colombia, the gender gaps in the time dedicated to commuting increase. In Colombia when we compare part time workers, women relative to men devoted 0.08 less hours per day to commuting. Other interesting results are found in the four countries, men who work-part time relative to men who work full time devoted 1.9, 0.9, 2.4 and 0,13 less hours to commuting in Peru, Ecuador, and Chile (hours per week) and Colombia (hours per day), respectively.

In Table 5, we analyze the influence of type of employment on the time devoted to commuting. We include the following interactions: self-employed*women. The results shown for Peru are in column 1, for Ecuador in column 2, for Chile in column 3 and for Colombia in column 4. When we compare men and women who work as employed, we find for Peru, Ecuador, and Chile that women spend less time commuting compared to men. Women (employed) relative to men (employed) devoted 0.4, 0.4, and 0.6 less hours to commuting in Peru, Ecuador, and Chile (hours per week), respectively. Next, when we compare men and women who work as self-employed, we find that only in the case of Ecuador, the gender gap in the time dedicated to commuting increase. In Ecuador when we compare self-employed workers, women relative to men devoted 0.9 hours per week to commuting. And in the case of Colombia, women (self-employed) relative to men (self-employed) devoted 0.1 less hours per day to commuting. These mixed results are consistent with previous literature (Rosenthal and Strange, 2012 and Reuschke and Houston, 2020). Other interesting results are found in the four countries, men who work as self-employed relative to men who work as employed devoted 1.0, 1.5, 2.6 and 0,1 less hours to commuting in Peru, Ecuador, and Chile (hours per week) and Colombia (hours per day), respectively.

4. Conclusions

In this paper, we analyze the difference in the time devoted by men and women to commuting in four Latin American countries, 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 the time use surveys from Peru (2010), Ecuador (2012), Chile (2015), and Colombia (2012 and 2017), employing linear models on the time devoted to commuting for our econometric estimates. Our principal results show that female workers devote less hours to commuting in comparison to their male counterparts. We find that when there

are no children in the households, gender gaps in the time dedicated to commuting are present in Ecuador and Colombia only, but when the presence of children is analyzed, we observe gender gaps in the time devoted to commuting in the four countries. Furthermore, we find that the hours of working and the type of employment influence in the gender gaps in the time devoted to commuting. These results are similar to those shown in developed countries.

Regarding public policies, it is noteworthy that the fact of being a woman influences dedicating less time to commuting compared to men. Our results show that the presence of children partially explains the gender gaps in the time devoted to commuting. The literature shows that domestic responsibilities influence women to dedicate less time to commuting compared to men (Johnston-Anumonwo, 1992; Turner and Neimeier, 1997) and in countries as traditional as those analyzed, the greater unpaid work workload is done by women (Campaña et al., 2018). So, it is recommended that policy makers work to provide households with young children access to formal childcare services. Hallman et al., (2005), Contreras et al., (2012) and Mateo Díaz and Rodriguez-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 time spent by women to commuting.

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.

Disclosure statement

No potential conflict of interest was reported by the authors.

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Table 1. Descriptive statistics of the data

	Р	eru	Ecu	ador	Cl	hile	Colo	mbia
	(1)	(2)	((3)	(4)
Commuting time								
Commuting work (men)	5.05	(4.07)	4.71	(4.17)	6.63	(6.61)	0.46	(0.46)
Commuting work (women)	3.74	(3.77)	3.79	(3.93)	5.62	(5.50)	0.39	(0.57)
Children								
Presence of children 0-12 (men)	0.63	(0.48)	0.57	(0.50)	0.42	(0.49)	0.52	(0.50)
Presence of children 0-12 (women)	0.62	(0.48)	0.56	(0.50)	0.47	(0.50)	0.56	(0.50)
Working hours								
Part time (men)	0.12	(0.32)	0.12	(0.33)	0.11	(0.31)	0.08	(0.27)
Part time (women)	0.36	(0.48)	0.26	(0.44)	0.22	(0.41)	0.20	(0.40)
Laboral activity								
Self-employed (men)	0.40	(0.49)	0.37	(0.48)	0.22	(0.42)	0.45	(0.50)
Self-employed (women)	0.50	(0.50)	0.45	(0.50)	0.21	(0.41)	0.43	(0.50)
Other interest variables								
Hourly wage (men)	1.65	(1.52)	1.96	(1.69)	4.13	(3.56)	1.99	(1.98)
Hourly wage (women)	1.59	(1.68)	1.86	(1.81)	3.13	(2.52)	2.04	(2.04)
Non-labor Income (men)	-	-	41.47	(170.5)	36.66	(194.8)	52.38	(216.5)
Non-labor Income (women)	-	-	61.10	(238.6)	50.05	(142.2)	70.34	(249.1)
Primary education (men)	0.39	(0.49)	0.65	(0.48)	0.29	(0.45)	0.49	(0.50)
Primary education (women)	0.40	(0.49)	0.54	(0.50)	0.26	(0.44)	0.33	(0.47)
Secondary education (men)	0.34	(0.47)	0.21	(0.41)	0.34	(0.47)	0.28	(0.45)
Secondary education (women)	0.27	(0.44)	0.22	(0.41)	0.34	(0.47)	0.28	(0.45)
University education (men)	0.27	(0.44)	0.14	(0.35)	0.37	(0.48)	0.24	(0.42)
University education (women)	0.33	(0.47)	0.25	(0.43)	0.40	(0.49)	0.39	(0.49)
Sector 1/Occupation 1 (men)	0.24	(0.43)	0.32	(0.47)	0.03	(0.17)	0.20	(0.40)
Sector 1/Occupation 1 (women)	0.12	(0.33)	0.16	(0.37)	0.01	(0.11)	0.04	(0.20)
Sector 2/Occupation 2 (men)	0.24	(0.43)	0.23	(0.42)	0.15	(0.36)	0.23	(0.42)
Sector 2/Occupation 2 (women)	0.12	(0.33)	0.14	(0.34)	0.18	(0.38)	0.15	(0.35)
Sector 3/Occupation 3 (men)	0.30	(0.46)	0.27	(0.44)	0.14	(0.35)	0.34	(0.47)
Sector 3/Occupation 3 (women)	0.36	(0.48)	0.30	(0.46)	0.16	(0.37)	0.28	(0.45)
Sector 4/Occupation 4 (men)	0.21	(0.41)	0.18	(0.38)	0.04	(0.20)	0.24	(0.42)
Sector 4/Occupation 4 (women)	0.40	(0.49)	0.40	(0.49)	0.10	(0.30)	0.53	(0.50)
Occupation 5 (men)	-	-	-	-	0.14	(0.34)	-	-
Occupation 5 (women)	-	-	-	-	0.20	(0.40)	-	-
Occupation 6 (men)	-	-	-	-	0.02	(0.15)	-	-
Occupation 6 (women)	-	-	-	-	0.01	(0.07)	-	-
Occupation 7 (men)	-	-	-	-	0.22	(0.41)	-	-
Occupation 7 (women)	-	-	-	-	0.06	(0.24)	-	-
Occupation 8 (men)	-	-	-	-	0.14	(0.34)	-	-
Occupation 8 (women)	-	-	-	-	0.01	(0.11)	-	-
Occupation 9 (men)	-	-	-	-	0.11	(0.32)	-	-
Occupation 9 (women)	-	-	-	-	0.27	(0.45)	-	-
Occupation 10 (men)	-	-	_	-	0.01	(0.08)	-	-
Occupation 10 (women)	-	-	-	-	0.001	(0.03)	-	-
Age (men)	36.19	(12.44)	42.57	(14.75)	42.61	(14.26)	38.77	(13.76)
Age (women)	36.91	(12.43)	41.64	(13.69)	42.13	(13.39)	38.41	(12.68)
Married/cohabiting (men)	0.63	(0.48)	0.73	(0.44)	0.65	(0.48)	0.62	(0.48)
Married/cohabiting (women)	0.52	(0.50)	0.49	(0.50)	0.50	(0.50)	0.51	(0.50)
N. household members (men)	4.63	(2.23)	4.21	(2.10)	3.68	(1.76)	4.05	(1.99)
N household members (women)	<u>1</u> <u>1</u> <u>0</u>	(2.23)	4 00	(1.95)	3 71	(1.70)	3.9/	(1.95)

Table 1. (Continued)

	Pe	eru	Ecu	ador	Cł	nile	Colo	mbia
	(1)	(2)	()	3)	(4	4)
Indigenous (men)	0.16	(0.37)	0.06	(0.24)	0.07	(0.26)	0.04	(0.20)
Indigenous (women)	0.16	(0.36)	0.06	(0.23)	0.08	(0.27)	0.04	(0.19)
Rural	0.21	(0.40)	0.34	(0.47)	-	-	0.18	(0.39)
Region 1	0.25	(0.44)	0.41	(0.49)	0.07	(0.25)	0.20	(0.40)
Region 2	0.30	(0.46)	0.55	(0.50)	0.05	(0.21)	0.25	(0.43)
Region 3	0.11	(0.31)	0.05	(0.21)	0.67	(0.47)	0.17	(0.38)
Region 4	0.33	(0.47)	-	-	0.14	(0.35)	0.18	(0.38)
Region 5	-	-	-	-	0.06	(0.24)	0.20	(0.40)
Region 6	-	-	-	-	0.02	(0.13)	0.001	(0.04)
Observations	55	55	16	312	97	06	102	.832

Notes: 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

	Peru	Ecuador	Chile	Colombia
VARIABLES	(1)	(2)	(3)	(4)
Women	-0.514***	-0.622***	-0.549***	-0.0513***
	(0.124)	(0.120)	(0.159)	(0.00468)
Presence of children 0-12	0.0645	-0.221*	0.130	-0.00838
	(0.137)	(0.129)	(0.182)	(0.00529)
Part-time	-1.680***	-0.974***	-2.496***	-0.157***
	(0.134)	(0.125)	(0.171)	(0.00586)
Self-employed	-1.139***	-1.594***	-2.583***	-0.116***
1 2	(0.132)	(0.118)	(0.196)	(0.00483)
Log wage	0.131*	0.140**	0.683***	0.00298**
6	(0.0741)	(0.0655)	(0.124)	(0.00140)
Non-labor Income	-	0.000108	-0.000831***	-4.33e-05***
	-	(0.000256)	(0.000316)	(7.14e-06)
Secundary education	0.185	-0.148	-0.116	0.00279
Securically concerning	(0.140)	(0.139)	(0.195)	(0.00607)
University education	0 318**	-0 330**	-0.0964	0.00222
	(0.155)	(0.168)	(0.253)	(0.00620)
Sector 1/Occupation 1	(0.155)	(0.100)	-1 341	(0.00020)
Sector 1/Occupation 1	_	_	(1.682)	_
Sector 2/Occupation 2	1 /83***	_0 192	-1 859	_0.0035***
Sector 2/Occupation 2	-1.405	(0.144)	(1.580)	(0.0105)
Sector 3/Occupation 3	2 403***	(0.144)	(1.580)	(0.0103)
Sector 3/Occupation 5	-2.403	(0.137)	(1.582)	-0.147
Sector 4/Occupation 4	(0.165)	0.260*	(1.382)	(0.0103)
Sector 4/Occupation 4	(0.102)	-0.200°	-1.224	-0.130***
Occupation 5	(0.192)	(0.148)	(1.508)	(0.0105)
Occupation 5	-	-	-1.396	-
Occuration 6	-	-	(1.362)	-
Occupation 6	-	-	(1.702)	-
Oceanization 7	-	-	(1.703)	-
Occupation 7	-	-	-0.532	-
Occurrentian 8	-	-	(1.585)	-
Occupation 8	-	-	-1.078	-
	-	-	(1.593)	-
Occupation 9	-	-	-0.210	-
	-	-	(1.584)	-
Age	0.113***	0.0561***	0.04/3*	0.00456***
	(0.0279)	(0.01/8)	(0.0285)	(0.000846)
Age squared	-0.138***	-0.0784***	-0.0417	-0.00626***
	(0.0346)	(0.0185)	(0.0316)	(0.000966)
Married/cohabiting	-0.116	0.0134	-0.381**	-0.0167***
	(0.136)	(0.116)	(0.173)	(0.00479)
N. household members	-0.0276	0.126***	0.133***	0.0121***
	(0.0258)	(0.0269)	(0.0511)	(0.00137)
Indigenous	0.776***	0.879***	0.345	-0.0215**
	(0.168)	(0.178)	(0.272)	(0.0108)
Rural	0.267*	-0.615***	-	-0.0633***
	(0.160)	(0.107)	-	(0.00792)

Table 2. OLS estimates on the time devoted to commuting.

Table 2. (Continued)

	Peru	Ecuador	Chile	Colombia
	(1)	(2)	(3)	(4)
Region 1	-2.287***	0.702***	0.632*	0.196***
	(0.149)	(0.108)	(0.359)	(0.00724)
Region 2	-1.927***	0.319***	0.972**	0.213***
	(0.159)	(0.116)	(0.391)	(0.00697)
Region 3	-3.001***	-	2.667***	0.169***
	(0.160)	-	(0.296)	(0.00741)
Region 4	-	-	0.661**	0.233***
	-	-	(0.300)	(0.00794)
Region 5	-	-	0.482	0.494***
	-	-	(0.341)	(0.00831)
Year 2	-	-	-	0.0109**
	-	-	-	(0.00450)
Constant	6.416***	4.177***	4.202**	0.0520**
	(0.530)	(0.429)	(1.640)	(0.0223)
R-squared	0.197	0.091	0.112	0.126
Observations	5 555	16 312	9 706	102 832

Observations5,55516,3129,706102,852Notes: 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</th>

Table 5. OLS estimates on the time devoted to commuting (considering the presence of children).						
	Peru	Ecuador	Chile	Colombia		
VARIABLES	(1)	(2)	(3)	(4)		
Women	-0.148	-0.379**	-0.271	-0.0325***		
	(0.194)	(0.171)	(0.206)	(0.00627)		
Presence of children 0-12	0.299*	-0.0675	0.425*	0.00609		
	(0.169)	(0.154)	(0.242)	(0.00684)		
Presence of children 0-12*women	-0.597**	-0.441**	-0.650**	-0.0357***		
	(0.232)	(0.213)	(0.289)	(0.00874)		
Constant	6.301***	4.123***	4.062**	0.0463**		
	(0.531)	(0.428)	(1.638)	(0.0223)		
R-squared	0.198	0.091	0.112	0.126		
Observations	5,555	16,312	9,706	102,832		

Table 3. OLS estimates on	the time devoted to	commuting (conside	ring the 1	presence of children).
			0	

Notes: 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

		UN	U	0/
	Peru	Ecuador	Chile	Colombia
VARIABLES	(1)	(2)	(3)	(4)
Women	-0.593***	-0.595***	-0.527***	-0.0468***
	(0.144)	(0.134)	(0.179)	(0.00509)
Part time	-1.886***	-0.907***	-2.417***	-0.138***
	(0.202)	(0.180)	(0.288)	(0.00971)
Part time*women	0.352	-0.141	-0.139	-0.0331***
	(0.255)	(0.247)	(0.340)	(0.0117)
Constant	6.499***	4.154***	4.189**	0.0472**
	(0.534)	(0.435)	(1.642)	(0.0225)
R-squared	0.197	0.091	0.112	0.126
Observations	5,555	16,312	9,706	102,832

Table 4. OLS estimates of	on the time devoted	1 to commuting	(considering hours	s of working).
		a to commutating	(compressing mouris	$, or mormin_{n}$

Notes: 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

		U		,
	Peru	Ecuador	Chile	Colombia
VARIABLES	(1)	(2)	(3)	(4)
Women	-0.377**	-0.432***	-0.564***	-0.00246
	(0.166)	(0.162)	(0.180)	(0.00627)
Self-employed	-1.023***	-1.457***	-2.612***	-0.0753***
	(0.163)	(0.141)	(0.258)	(0.00614)
Self-employed*women	-0.317	-0.456**	0.0729	-0.115***
	(0.226)	(0.209)	(0.346)	(0.00878)
Constant	6.340***	4.078***	4.203**	0.0179
	(0.533)	(0.432)	(1.640)	(0.0226)
R-squared	0.197	0.091	0.112	0.128
Observations	5,555	16,312	9,706	102,832
N. D.	C D (0010			

Table 5. OLS estimates on the time devoted to commuting (considering type of employment).

Notes: 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