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Exploring the changing structure of Latin American labor markets with a gender perspective[1]

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Abstract

Using household surveys' data for Argentina, Brazil, Chile, Colombia, Mexico and Peru between the mid-2000s and the late-2010s, we characterize the changing structure of the labor market focusing on the gender dimension. We follow the task-based approach and create indexes of routine task content (RTC) using data from the PIAAC-OECD surveys. We find that during the period under study there was a relative increase in the employment share of occupations with lower RTC, which was mainly driven by movements in the female occupational structure, especially for the group of young-age and middle-age workers. Wage increases were relatively higher for routine occupations, and this was more pronounced for males than females. While on average there was a modest reduction in the gender wage gap, gains were relatively larger for less routine occupations like managers, professionals and clerical jobs. As the current division of tasks in the labor market continues to assign a larger fraction of routine tasks to women than men, automation technologies that reshape the task content of some occupations may partially help to reduce the gender wage gap, especially for highly-educated women and for those with medium-education that are able to work in complement with new technologies. Finally, we notice that the current occupational structure of Latin America is considerably biased towards occupations with high RTC compared to high-income countries. While males in routine jobs work mainly in the primary, construction, manufacturing and transport sectors, females are over-represented in routine occupations in services such as sales and cleaners and helpers.

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1 Introduction

After severe economic crises at the end of the century, Latin American countries recovered and entered a path of sustained economic growth that contributed to strongly reduce poverty and inequality. The new century characterizes by large trade growth (led by the boom in commodity prices), the expansion of social safety nets, rapid technological change. However, many countries have faced serious limits to economic expansion after the global financial crisis, when the region entered a period of sluggish evolution of trade and capital flows, deterioration in its terms of trade, slower growth (or even stagnation stagnation in countries like Brazil and Argentina) and greater macroeconomic instability.

The recent COVID-19 pandemic exposes the great difficulties faced by Latin America to overcome the crisis, and reminds us of the social and economic duality that still define Latin American countries: while many people can eat properly, study, work, and progress, many others live in vulnerable socio-economic contexts that strongly condition their current and future opportunities. Distributional issues remain harsh, being poverty the most urgent. During the period under study (pre COVID-19), the region experienced modest gains in gender equality: the female labor force participation (LFP) grew slower than in previous years, especially for married women in disadvantaged households (Gasparini and Marchioni, 2015), and the gap in LFP between men and women is still very high. While on average there was a modest reduction in the gender wage gap, it exhibited a lot of heterogeneity across occupations and countries.[2]

In this paper, we aim to characterize the changing occupational structure of Latin American labor markets focusing on the gender dimension, in the six largest countries in the region (Argentina, Brazil, Chile, Colombia, Mexico, Peru) between the mid-2000s and late-2010s. The axis of this work follows an own variant of the task-based approach (Autor, Levy and Murnane 2003; Acemoglu and Autor 2011), and exploits recent surveys from the PIAAC-OECD for several countries including Latin America,[3] which will be combined with household surveys from the SEDLAC database.[4]

[2]In the countries under study in this paper, female LFP is on average 67.1 percent in the late-2010s (more than 25 p.p. lower than male LFP). The average gender wage gap (as measured by the median female wage divided by the median male wage in each occupation) is very high in Mexico and Peru (around 20.5 percent), high in Brazil and Chile (around 10.5 percent) and middle in Colombia and Argentina (7 percent and 8 percent, respectively).

[3]The Programme for the International Assessment of Adult Competencies (PIAAC) was conducted by the Organisation for Economic Co-operation and Development (OECD) in several countries since 2011 (including Chile, Ecuador, Mexico, Peru). Surveys collect worker-level information on job tasks and adult skills. These data are publicly available at https://www.oecd.org/skills/piaac/.

[4]The Socioeconomic Database for Latin America and the Caribbean (SEDLAC) is a joint project between

The PIAAC survey includes several questions related to job tasks, and we are interested in those allowing to define the routine task content (RTC) of each occupation. Tasks that demand creative thinking, problem solving and person abilities are flexible and more prone to be complementary with new technologies. Instead, tasks that are repetitive or follow a defined pattern are more likely to be codified and substitutable by automation technologies. We consider the main following tasks: (i) managing, supervising or instructing other workers; (ii) planning the activities of co-workers; (iii) confronting and solving complex problems; and (iv) writing articles or reports. All these tasks require a human input, can be performed both in manual and cognitive occupations, and are not codifiable. Indeed, we find that workers performing these tasks exhibit on average a higher probability of using a computer at work, which we interpret as partial evidence in favor of complementarity between flexible tasks and technology use.[5]

We find that women are less likely to perform each of these flexible tasks frequently, even after controlling for individual differences in age, education, computer use at work, country and occupation, which suggests that the current division of tasks in the labor market is characterized by assigning a greater fraction of routine tasks to women than men. Then, technologies that allow the automation of routine tasks (such as workplace computarization) may alter the task content of some occupations and partially contribute to reduce the gender wage gap (Autor et al. 2003; Black and Spitz-Oener 2010).

We construct different RTC indexes at the occupation level, to quantify the fraction/propensity of workers in each occupation that/to perform the aforementioned flexible tasks frequently. The lower (higher) the RTC of an occupation, the higher (lower) the possibilities of complementarity with new technologies. Seen otherwise, the higher the RTC of an occupation, the greater the chances of substitutability by labor-saving automation technologies. This is not a one-to-one mapping and it is not deterministic, but it provides a clear ranking of occupations that is useful to characterize the current state and the temporal evolution of the labor market structure and the associated wage distribution, enabling international comparability.

We also use the PIAAC data set to show that there is a high correlation in the share of females in each occupation (female intensity) between Latin America and high-income countries (HIC). So, we confirm that horizontal gender segregation is a pervasive feature of

CEDLAS at the Universidad Nacional de La Plata and the World Bank. Surveys are processed following a protocol of homogenization that make statistics comparable across countries and over time by using similar definitions of variables and by applying consistent methods of processing the data (SEDLAC, 2020). For more information visit http://www.cedlas.econo.unlp.edu.ar/wp/en/estadisticas/sedlac/.

[5]Importantly, these tasks are unambiguously related to the job performed and not to characteristics of the working environment, and they have high variability in responses across individuals.

labor markets in both sets of countries. We also show that the current occupational structure of Latin America is considerably biased towards occupations with high RTC compared to HIC, and this holds for both genders. However, while males in routine jobs work mainly in the primary, construction, manufacturing and transport sectors, females are over-represented in routine occupations in services such as sales and cleaners and helpers.

In most of the work conducted with household surveys, the unit of analysis is the occupation itself, as we match our indexes of RTC computed with the PIAAC dataset. We will perform a separate analysis for each country, and always use occupation-level employment weights to obtain estimates that are representative of the corresponding labor market. Additionally, we will run separate regressions by gender and age groups (16-24; 25-40; 41-65).

We find that on average there is a relative increase (decrease) in the employment share of occupations with lower (higher) RTC, which is mainly driven by movements in the female occupational structure. This happens in all age groups, but the magnitude is highest for the youngest and lowest for the oldest women, which is in line with greater labor mobility across occupations for younger than older individuals.[6] The largest shifts in the female occupational structure occur in Peru, Brazil, Argentina and, to a lower extent, in Chile. Mexico and Colombia exhibit different patterns.

The growing trend in the female labor force participation translated into a relative increase of women's participation in the labor market, as the female intensity grew on average by 2.6 p.p. during the period under study, being largest in Chile (6 p.p.), middle in Brazil (3.1 p.p.), Colombia (2.6 p.p.) and Argentina (2.1 p.p.), and lowest in Mexico and Peru (1.2 p.p. and 0.8 p.p., respectively). We find that on average there was a relative increase (decline) in the female intensity in more flexible (more routine) occupations. This correlation is driven by the group of old-age workers in Mexico, Peru and Brazil, while in Argentina it is more pronounced for the youngest.

Median hourly wages across occupations increased on average by 37.1 percent between the mid-2000s and late-2010s, and the rise was on average slightly higher for females than males (40.3 percent versus 36.3 percent). Although, there is a lot of heterogeneity across countries and occupations. Wage increases were on average relatively higher (lower) in occupations with more (less) RTC, and this was mas much more pronounced for males than females.

Relatedly, the average gender wage gap across occupations exhibits an small reduction

[6]This result is consistent with findings in Brambilla et al. (2020) suggesting that young workers in Chile are more easily displaced by automation than older workers of similar characteristics and, simultaneously, they are more skilled and more mobile, implying that they have more chances of working in complement with new technologies.

in some countries (Mexico, Brazil, Chile and Argentina) and a modest increase in others (Colombia and Peru). Again, there is wide variation across countries and occupations. We find that on average the reduction in the gender wage gap was relatively larger (smaller) in more flexible (routine) occupations. This was especially pronounced for old-age workers in Brazil, Colombia and Argentina, and for middle-age workers in Chile. The case by case analysis suggests that women's relative wage gains occurred mainly in fairly routine occupations such as secretaries and other clerical jobs, and in highly flexible occupations such as managers, professionals, and associated occupations in business, science, engineering, health, and legal/social/cultural. All these occupations are intensive in computer use. In this context, it seems that technological change might partially help to close the gender wage gap within occupations, especially for highly educated women and for those with middle education that were able to work in complement with computers and with the new digital technologies of the 21st century.

2 Literature review

This paper relates to several strands of the literature on labor economics, technological change and gender inequality. Technology has been one of the leading explanations for increasing inequality in the last decades. The early literature on skilled-biased technological change assumes that technology is complementary with skilled labor, therefore positively affecting the relative demand and wages of skilled workers (Katz and Murphy 1992; Bound and Johnson 1992; Card and Lemieux 2001). More recent theories argue that the complementarity or substitutability between technology and labor does not occur at the worker skill level but rather at the task level (Autor, Levy and Murnane 2003; Acemoglu and Autor 2011). Unlike the early literature, they assume that computers and automation technologies are more likely to substitute for routine tasks performed by workers in the middle of the skill distribution, that they complement for analytical and interactive tasks that are most often performed by high-skilled workers, and thay they have no predictable impact on routine manual tasks most commonly carried out by low-skilled workers. These assumptions lead to the polarization hypothesis, which was successful in rationalizing the changing pattern of labor markets in developed countries since the 1980s, as they characterize by employment and wage gains at both tails of the skill distribution, mostly in service occupations, at the expense of middle-skill workers mostly employed in manual, production and clerical jobs (Autor et al. 2003; Spitz-Oener 2006; Goos and Manning 2007; Autor and Dorn 2013; Michaels et al. 2014; Goos, Manning, and Salomons 2014).

However, the story seems to have been different in the developing world, where the evidence in favor of the polarization hypothesis is scant or non-existent (Messina and Silva 2017; Maloney and Molina 2018; Das and Hilgenstock 2018). Developing lag behind high-income countries in many dimensions, being the most obvious income per capita, investment, education, health, infrastructure and institutional quality. The adoption of new technologies had not been the exception. For instance, data from PIAAC surveys highlight that 35 percent of workers under age 16-65 report using a computer at work in LAC4, while this fraction is 62 percent in HIC. Relatedly, while East Asian countries lead by far the ranking of robot adoption in manufacturing, followed by Germany, Japan, Sweden, Denmark, US, and many other European countries, Latin American economies (mainly Brazil and Mexico) occupies the last positions in the list of robot adopters: for instance, in 2016 there were on average 74 industrial robots per 10,000 workers globally, while this ratio was about 5 and 10 in Brazil and Mexico, respectively (data from the International Federation of Robotics-IFR). This simple statistics suggest that Latin America is still at an early stage of technology adoption, which might be one of the reasons that explain the absence of labor market polarization.

Developed countries have also been experiencing a reduction in the gender wage gap, at least since the 1970s. The leading explanations point to supply side factors related to changes in education and experience that favored women relatively more than men, and a larger negative effect of deunionization for men than women (Blau and Kahn 1997, 2003, 2006).[7] On the demand-side, some authors argue that changes in product demand, associated with import competition and large trade deficits in the 1980s, were associated with a sharp decline in manufacturing employment and a shift in employment toward sectors that are education and female intensive like professional and personal services (Murphy and Welch, 1991; Katz and Murphy, 1992). Welch (2000) attributes the closing of the gender wage gap to the expansion in the value of intellectual skills relative to physical skills (or "brains relative to brawn"), given the assumption that women are relatively intensive in intellectual skills.

Other papers argue that the adoption of computers are associated with changes in the nature and conditions of work in forms that benefited women over men. Weinberg (2000) presents decompositions of the growth in women's employment and cross-industry-occupation regressions suggesting rising computer adoption can account for over half of the growth in demand for female workers. Bacolod and Blum (2010) argue that the large increase in the rewards of cognitive and people skills, with which women tend to be well endowed,

[7]Rising inequality delayed the progress of women in the labor market: around one-third to two-fhfths of females' potential relative wage gains (Blau and Kahn, 1997).

and a reduction in the price of motor/manual skills account for up to 40 percent of the rising inequality and 20 percent of the closing gender wage gap. Borghans, ter Weel, and Weinberg (2014) argue that technological and organizational changes have rose the importance of interactive/people skills in the workplace, affecting the labor-market outcomes of under-represented groups. Using data from the U.S., U.K. and Germany, they show that the relative employment of women is higher in occupations more intensive in people tasks, while the opposite is true for racial, ethnic, cultural and linguistic minorities in the U.S. Combining this evidence, and assuming that gender and cultural differences may impede cross-racial and ethnic interactions, they find that the increasing importance of people skills in the U.S. relate to the closing gender pay gap, and to the interruption in the narrowing ethnic wage gap.

In the task-based approach of ALM (2003) computers are substitutes for routine tasks. An implication of this assumption is that demographic groups who initially work in jobs with different routine task content will be affected differentially by workplace computerization. The model predicts that groups with higher initial routine task intensities will experience faster computer adoption; and that they will face larger relative shifts away from routine tasks toward non-routine tasks. Also, if one assumes that computer capital and labor are perfect substitutes in performing routine tasks, declining prices of computers translate to declining rewards for routine tasks. The model also assumes that computers are relative complements to non-routine analytical and interactive tasks (so computer technology increases the productivity of workers carrying out these tasks). Then, the reduction in the price of computers also lead to rising relative prices for non-routine cognitive tasks.

Based on this framework, Black and Spitz-Oener (2010) study the changing nature of tasks for men and women to explain the declining gender wage gap in West Germany between 1979 and 1999, and find that relative task changes explains half of the observed convergence.[8] In particular, they show that women experienced a relative increase in (non-routine) analytical and interactive tasks, which were associated with higher skill levels. Most notably, they find that females' routine task intensity in 1979 was much higher than that of males, that only females experienced a large relative decline in routine tasks, and that task changes were more pronounced in occupations that experienced greater workplace computerization. In line, they find that the polarization tendency in the labor market was larger

[8] In a previous contribution, Spitz-Oener (2006) document that in recent decades computer adoption relates to a shift from routine manual and routine cognitive tasks toward analytical and interactive non-routine tasks at all levels of aggregation (aggregate, within industry, and within occupation). Other factors that may explain the observed change in tasks are shifts in the selection of workers into the labor market, and changes in product market demand coming from increasing international trade or shifts in consumer preferences.

for females than males.

Finally, there are some papers studying the effects of technology adoption in Latin America. A regional study lead by the World Bank discusses case studies of digital technology adoption (Dutz et al. 2018). A paper by Almeida, Fernandez and Viollaz (2017) studies the impact of the adoption of complex software on the demand for different type of workers by Chilean firms.

3 Data, Methods, Results

3.1 Skills surveys

The skills surveys come from the Programme for the International Assessment of Adult Competencies (PIAAC) conducted by the OECD in several countries since 2011.[9] The data set includes demographic variables such as age and gender, a proxy for human capital as measured by formal education (three levels: less than high school, high school, or above high school/tertiary education), occupation at the four-digit International Standard Classification of Occupations (ISCO version 08), use of computer at work, adults' competences in crucial information-processing skills such as literacy, numeracy and problem solving, and organizational abilities related decision-making and teamwork like management and planning. For occupations we work at the two-digit level, which leaves us with a total of 40 occupational categories (see Table 1).

We exploit complete information for 24 countries.[10] Most PIAAC data covers high-income countries that are OECD members. Most surveys were carried out in the first round of the programme (2011-2012). The second round (2014-2015) included upper-middle-income economies such as Chile and Turkey, and the most recent wave (2017) covered middle-income countries like Ecuador, Mexico and Peru. Overall, we count on information for four Latin American countries (LAC4): Chile, Ecuador, Peru and Mexico. For simplicity we will call the remaining 20 countries as high-income countries (HIC), but it is worth noting that this group includes three upper-middle income economies (Kazakhstan, Russian Federation and Turkey).

[9] These data are publicly available at https://www.oecd.org/skills/piaac/.

[10] Although there is data for more countries (35 in total), in 11 of them there is no information on key variables such as occupations classified using the ISCO08. We include Belgium, Chile, Czech Republic, Denmark, Ecuador, France, Greece, Israel, Italy, Japan, Kazakhstan, Lithuania, Mexico, Netherlands, Peru, Poland, Republic of Korea, Russian Federation, Slovakia, Slovenia, Spain, Sweden, Turkey, United Kingdom.

The sample represents individuals between 16 and 65 years old. We count on 71,107 observations which, using national-representative person weights, represent 310 million workers. Of this total, 13,157 observations correspond to the four Latin American countries (representing 67 million workers). Performing a separate analysis for each country proves challenging because sample size is relatively small, so in most of the work carried out with the PIAAC data we pull these countries together, or broadly separate across HIC and LAC4, in order to have a more representative sample and improve the precision of our estimates. The data contain less women than men, in line with a lower level of female than male labor force participation: 42 and 38 percent of the sample are females in HIC and LAC4 countries, respectively. The data also exhibit stark differences in the educational level of workers between both groups of countries, as 46 percent of workers in HIC have high-skills while this fraction is less than half in LAC4 (22 percent).[11] On average there are more highly educated women than men in both groups of countries: 50 percent and 27 percent of female workers have high-skills in HIC and LAC4, respectively. While for males these fractions are 43 percent and 18 percent, respectively. Also, there are differences in the age composition of the PIAAC sample in both sets of countries. The participation of young workers is larger in LAC4 than HIC (16 percent of workers in LAC4 belong to the age group 16-24, while this fraction is 8 percent in HIC). The percentage of middle-age workers (age 25-40) is similar in both groups of countries, around 41-42 percent. While the fraction of workers in the age group 41-65 is 51 percent in HIC and 42 percent in LAC4. Overall, the LAC4 labor market has a lower proportion of women, and a significantly minor fraction of highly-educated and old-age/experienced workers compared to HIC, which follow from the differential economic, demographic and educational patterns in both groups of economies.

The PIAAC survey includes several questions related to job tasks. We are interested in tasks that allow to define the routine task content (RTC) of each occupation. Tasks that require creative thinking, problem solving and person abilities are flexible and more prone to be complementary with new technologies, whereas activities that are repetitive or follow a defined pattern are more prone to be codified and replaced by automation technologies. We consider the main following questions/tasks: Do you manage or supervise other people? Do you plan activities of other workers? Are you confronted with complex problems? Do you write articles or reports? These tasks are not codifiable and require a human input. Also, we will show that workers performing these tasks exhibit a higher probability of using a computer use at work, *ceteris paribus*. We interpret this result as partial evidence of complementary between flexible tasks and technology use. These tasks can be performed

[11]We separate workers in two skill levels: a low-skills group (secondary or below) and a high-skills group (tertiary or university education).

both in manual and cognitive occupations. Importantly, they are unambiguously related to the job performed and not to characteristics of the working environment, and they have high variability in responses across individuals. For each individual in the survey we define a flexibility index F_1. The index is a dummy variable that is equal to one when the individual replies that he performs at least one of the four tasks often or very often.[12]

For robustness we define three additional flexibility indexes. Flexibility index F_2 is a dummy variable that is equal to one when the individual replies positively to at least one of the four questions above, or to the following two additional questions: Do you give presentations, talks or speeches? Do you calculate budgets or costs? Flexibility indexes F_3 and F_4 take values between 0 and 1 and capture the percentage of flexible tasks that the individual performs. For F_3 we consider the first four questions. The index can take values of 0, 1/4, 2/4, 3/4, 4/4 according to how many flexible tasks the worker performs. For F_4 we consider the longer list of six flexible tasks. The index can take values of 0, 1/6, 2/6, 3/6, 4/6, 5/6, 6/6 following the same logic. See Appendix A for more details on PIAAC data.

Table 2 presents the percentage of workers performing each flexible task, using a computer at work, and the average value of flexibility indexes (F_1, F_2, F_3, F_4) across all countries and separately for HIC and LAC4. It shows that 12 percent of workers report supervising others, 27 percent planning, 31 percent solving problems, and 30 percent producing written output. There is a lower fraction of workers in LAC4 performing these flexible tasks compared to HIC, with differences ranging from 1 p.p. for supervising to 4 p.p. for planning. This is reflected in the value of the flexibility index F_1, which has an intuitive interpretation as it represents the percentage of individuals that perform at least one of the main four flexible tasks frequently. The average F_1 across HIC and LAC4 are 59 and 54 percent, respectively. The difference is somewhat smaller for F_2 (which also includes tasks related to presentations and budgets) mainly because there is a larger fraction of workers preparing budgets in LAC4 than HIC (48 versus 33 percent) that is not compensated by the greater percentage of individuals giving presentations in HIC than LAC4 (54 versus 40 percent).

Notably, while 62 percent of workers in HIC report using a computer at work, this fraction is considerably smaller in LAC4 (35 percent). This is a large gap. The fact that computer adoption is still premature may help explain the absence of labor market polarization in Latin America (Maloney and Molina 2016; Messina, Pica and Oviedo 2017; Das and Hilgenstock 2018; Gasparini et al. 2020). Of course, there are many inter-related factors that determine

[12] Individuals respond with a number between 1 and 5 meaning: 1=never; 2=less than once a month; 3= less than once a week; 4=at least once a week; 5=every day. Our main definition considers replies of 4 and 5 to mean often. Results are very similar when we include option 3.

whether tasks are indeed automatized or not, such as the price and availability of new technologies (and labor), network and capital infrastructure, stock of human capital, credit constraints, government policies, labor market regulations and, more broadly, state of the art technology and production methods.[13] This evidence is in line with the idea that there is much more room for technology adoption in Latin America than is currently observed.

Table 3 keeps the format of previous table but separates workers by gender. It shows that there is a larger fraction of males than females performing flexible tasks often, both in HIC and LAC4. Differences are somewhat higher in HIC than in LAC4. For instance, the F_1 index in HIC is 7 p.p. higher for males than females, while the difference is 3 p.p. in LAC4. Again, as the regional difference in giving presentations does not compensate the one for preparing budgets, gender differences between F_2 and F_4 indexes for LAC4 are very small (about 1 p.p). In both groups of countries, females are more prone to use a computer at work than males (64 versus 60 percent in HIC, and 37 versus 33 percent in LAC4). Part of this is explained by the fact that women have a much greater participation than men in clerical, customer service and related occupations that are highly intensive in computer use.

Table 4 broadly separates workers by education level. High-skills workers (those with tertiary education) are more prone to perform flexible tasks often than low-skills individuals (secondary education or below), both in HIC and LAC4. Unlike what happens with gender, in this case differences in tasks across skill groups are much higher in LAC4 than in HIC. For instance, 33 percent of high-skills versus 23 percent of low-skills workers conduct planning activities in HIC, while these fractions are 39 percent and 19 percent in LAC4, respectively. For writing articles or reports, the fractions are 38 versus 24 percent in HIC, and 52 percent versus 21 percent in LAC4. In this line, the F_1 index highlights that 70 percent of high-skills workers versus 50 percent of low-skills individuals in HIC perform at least one flexible task often, while the gap is much more pronounced in LAC4 (79 percent versus 47 percent). Also, the skill gap in computer use is significantly larger in LAC4 than HIC (the difference in computer use across skill groups amounts 58 p.p. in LAC4 and 28 p.p. in HIC).

Finally, Table 5 presents these statistics separately for workers in different age groups. Youngest workers in the age group 16-24 tend to perform less flexible tasks than middle-age workers in the age group 25-40, both in HIC and LAC4. Differences are somewhat higher in HIC than LAC4. In the case of old-age workers (age group 41-65), on average they perform more flexible tasks than the young, but less than the middle-age individuals. But this pattern

[13] A simple descriptive regression analysis with these data highlights that differences in human capital (formal education) and occupational structure between LAC4 and HIC explain less than half of the lag in computer use, while gender and age structure do not seem to play a critical role.

is only present in HIC, as in LAC4 the fraction of old-age and young workers performing flexible tasks is similar.

3.1.1 Gender differences in job tasks

In this section we conduct some descriptive regression analyses to show that women are less likely to perform each of the flexible tasks frequently, even after controlling for individual differences in age, education, computer use at work, country and occupation, which suggests that the current division of tasks in the labor market is characterized by assigning a greater fraction of routine tasks to women than to men. To show that, we run the following regression:

$$Ftask_{ijc} = \beta_0 + \beta_1 Female_{ijc} + X'_{ijc}\beta + \mu_{jc} + \epsilon_{ijc} \quad (1)$$

where i, j and c index individuals, occupations at the 2-digit ISCO08, and countries, respectively. $Ftask_{ijc}$ is a binary variable that takes the value 1 if the person reports performing the corresponding flexible task often (=1), or 0 otherwise. We consider the main four flexible tasks discussed in the previous section: supervising, planning, solving problems, producing written output. X_{ijc} is a vector of control variables such as age, education and computer use at work. μ_{jc} are country-occupation fixed effects, and ϵ_{ijc} is a mean-zero disturbance. Assuming a linear probability model, we run this regression by OLS for all countries in the sample, and separately for HIC and LAC4.

Table 6 presents the estimated coefficients for the three main dummy variables: females, low-skills workers (non-tertiary education) and computer use at work. This sample includes all countries. Each panel corresponds to a different flexible task, and each column represents a different specification. All columns control for the age group variable, but we do not show these coefficients to simplify the exposition and because we present below an exercise that plots the conditional probability of performing each task across the age distribution. Estimates in column 1 show that females are less likely to perform each of the main four flexible tasks than males (from -3.2 p.p. for writing to -5.7 p.p. for solving problems). Column 2 highlights that less-educated workers exhibit fewer chances of doing flexible tasks than high-skills workers, and estimated coefficients for education are higher than those for females. The absolute magnitude of all estimated coefficients for females increase when controlling for education, because the gender gap in flexible tasks is higher within low-skills than high-skills workers. In column 3 we control for computer use at work, which is positive and statistically significant, in line with the idea that computers and flexible tasks are complementary. Controlling for computer use does not change the estimated coefficients for females significantly, while it reduces point estimates for low-skills workers considerably, in line with a positive correlation between skills and technology, a key assumption made by the theory of skilled-biased technical change (Katz and Murphy 1992; Bound and Johnson 1992; Card and Lemieux 2001).

Both differential probabilities of performing flexible tasks for females and less-educated workers diminish when controlling for occupation fixed effects, which suggests that part of these gaps are driven by the occupational structure itself as there might be (horizontal) segregation-or sorting of individuals- across occupations by gender and education level (Autor and Handel 2013). All estimated coefficients for females and low-skills workers remain negative and statistically significant when we partial out country differences (column 5) and country-occupation heterogeneity (column 6). While the magnitude of estimated coefficients of females and non-tertiary for supervising and writing present little changes, those for planning and solving problems present a non-trivial increase.

Overall, results in column 6 show that on average women have a lower probability than men of solving problems (-6.1 p.p.), planning (-5.9 p.p.), supervising (-4.1 p.p.) or writing output (-4.1 p.p.); and that workers with no-tertiary education have a lower probability than those with tertiary education of solving problems (-7 p.p.), writing output (-3.7 p.p.), planning (-2.5 p.p.) and supervising (-1.9 p.p.). In the case of planing and supervising, differential probabilities are significantly larger across genders than skill groups, which suggests that education might help to reduce the gender gap in tasks more related to cognitive skills such as writing and solving problems. However, for activities that demand social interaction like planning and supervising, in which cultural norms and discrimination play a more critical role, reducing the educational gap might not be enough to achieve gender equality.

As a robustness exercise, we replicate this table splitting the sample between HIC and LAC4 (see Tables 7 and 8 in the Appendix). All results remain robust and estimated coefficients change very little for HIC and somewhat more for LAC4. In HIC, differential probabilities for females slightly increase, especially for supervising and planning (from -4.1 p.p. to -4.8 p.p. and from -5.9 p.p. to -6.5 p.p., respectively). While the opposite happens in LAC4, as the magnitude of the four estimated coefficients for females diminish, with the largest changes for supervising (from -4.1 p.p. to -1.9 p.p.) and planning (from -5.9 p.p. to -4.1 p.p.). This is in line with descriptive statistics presented in Table 3. In contrast, the magnitude of the four estimated coefficients for low-skills workers slightly reduce in HIC, and augment in LAC4, with the largest increase for planning (from -2.5 p.p. to -5.2 p.p.)

and writing (from -3.7 p.p. to -5.8 p.p.). This is in line with descriptive statistics presented in Tables 3 and 4. We further discuss this issue below.

Now we compare the probability of performing flexible tasks for similar workers across HIC and LAC4. To simplify the exposition we employ the flexibility index F_1 as dependent variable. The index is a dummy variable that is equal to one when the individual replies that he performs at least one of the four tasks often or very often. We run the following regression:

$$F1_{ijc} = \beta_0 + +\beta_1 LAC4_{ijc} + \beta_1 Female_{ijc} + X'_{ijc}\beta + \mu_{jc} + \epsilon_{ijc} \tag{2}$$

The right hand side is equal to equation 1 except that it includes a dummy variable for workers in LAC4. We present results in Table 9. In line with previous findings, estimated coefficients for females and less-educated workers are negative and statistically significant across all specifications. Age coefficients show that individuals aged 25-40 and those aged 41-65 exhibit a higher probability of performing flexible tasks than the youngest workers aged 16-24. Again, the coefficient for computer use is positive and highly significant across all specifications suggesting complementarity between flexible tasks and technology use. That said, the point of this exercise is to show the changing nature of the estimated coefficient for Latin American workers when we add different controls, mainly education and computer use (or occupation fixed effects alone). The simplest specifications (columns 1 and 2) show that the probability of performing flexible tasks are about 5 p.p. lower for LAC4 workers (in line with descriptive statistics in Table 2). Controlling for education eliminates this difference as the estimated coefficient for LAC4 is statistically indistinguishable from zero, because the skill gap in flexible tasks is much higher in LAC4 than in HIC (as shown in Table 4). If we assume a competitive framework and a positive relation between flexible tasks and labor productivity, this result is consistent with a lower relative supply of high-skills workers in LAC4.[14] Controlling for computer use in column 5 makes the estimated coefficient for LAC4 positive and statistically significant, because Latin American workers using a computer at work have a higher probability of performing flexible tasks than those in HIC (0.78 versus 0.71, respectively). Finally, controlling for occupation fixed effects increases the magnitude of the LAC4 coefficient, reinforcing the idea that comparable workers employed in the same occupation have higher chances of doing flexible tasks in LAC4 than HIC. This result holds even without controlling for computer use, and it also holds when controlling for occupation

[14] While the difference in relative demand of skills may go in either direction. Unfortunately, the PIACC data set do not include wages and we cannot go beyond these exercises at this point. This is one of the reasons that justifies the use of household surveys, in addition to being able of making inter-temporal comparisons.

fixed effects alone (not shown), which suggests that differences in occupational structure across LAC4 and HIC are sufficient to explain this pattern.

If we add an interaction term for Latin America and females all results remain, while the interaction coefficients are positive and statistically significant at the 90 percent level across all specifications, suggesting that comparable female workers in Latin America have more chances of performing flexible tasks than their counterparts in HIC.

Now we proceed to perform a simple descriptive non-parametric analysis. We will confirm that females are less prone to perform all flexible tasks across the entire age distribution (but this pattern is less marked for the youngest). And this holds if we separate workers by educational level or by group of countries. Figure 1 (top panel) depicts the unconditional expectation of performing each of the four main flexible tasks often conditional on age, and separately for men and women (using all 24 countries in the sample). Results are smoothed with a local polynomial regression. Importantly, this figure does not exhibit the probabilities of a particular person along her career path. Instead, it shows the probabilities of performing these tasks across different cohorts of workers (from different countries in a recent year). Therefore, it may reflect both differences in the flexibility of the career-paths of individuals and compositional changes across cohorts.

We observe an asymmetric inverted U-shape for all flexible tasks and for both genders. The probability of performing planning and supervising is initially increasing (more rapidly for men) and peaks around 40 for males and around 35 for females. These are activities that reflect changes in the career paths of individuals, as they correlate with experience and job tenure, and they work in the direction of increasing job flexibility over time for a given individual. On the other side, the chance of solving problems and producing written output is growing at the beginning (again faster for men) and peaks at about age 35 for males and 30 for females. These activities relate to individual skills and human capital and need not change much along the career path, thus peaking earlier than planning and supervising. The group of youngest workers (age 16-24) represents early entrants in the labor market and has a lower level of education than individuals who have finished higher education and then join the labor market (presumably age 25-30). The youngest tend to be employed in repetitive low-skills occupations, and those with tertiary education in high-skills occupations with more cognitive and non-routine task content. Moreover, the positive association between education and the chance of realizing flexible tasks even within the same occupation (Table 6) also explains part of this conditional probability to be increasing in age for younger individuals. Second, as there is a general trend towards increasing education/skills over time in most countries, the cohort of older workers has on average less skills than the cohort of younger and middle-age workers, and thus less prone to perform flexible tasks frequently. Also, in most countries there is a general trend towards decreasing fertility rates which increases the job prospects of women.

Again, and in line with previous results, we observe that the probability of performing the four main flexible tasks is generally lower for women than men. The exceptions are planning and writing output for the youngest cohort (16-24). Gender differences in performing flexible tasks are very similar for early entrants, except for supervising (which might relate more to cultural norms and gender impositions), and they start to separate when individuals who have finished tertiary education join the labor market. At this point, gender-based selection of occupations might play a role as educated men have a higher participation in professional and associated occupations and thus exhibit a higher change of performing flexible tasks. Likely, motherhood might also play a role in shaping women's career paths, affecting the chance of reaching managerial and top-rank positions (and contributing to vertical gender segregation).

Figure 2 plots these conditional probabilities but separating workers by education level. The fraction of individuals performing each flexible task is higher for high-skills than low-skills workers of all ages. The patterns across cohorts for each task are similar across skill groups. Flexible tasks performed by high-skills men generally peak some years later than the same tasks performed by low-skills males (supervision and planning around age 45 for high-skills and 40 for low-skills, and for problem solving around 40 and 35, respectively), and this gap is much more pronounced for women performing tasks related to supervising (which peaks around age 50 for high-skills females and around 35 for those low-skills) and planning (45 versus 35, respectively). As discussed above, given that these activities relate more to changes in the career paths of workers, this result may suggest that females must work harder than males (in terms of acquiring experience and job tenure) to reach positions demanding these tasks. In contrast, this pattern is not present for solving problems and writing, which are flexible tasks more related to skills and human capital, and do not change much along individuals' career path.

Finally, Figure 3 exhibits the unconditional probabilities of performing each of the four main flexible tasks frequently across cohorts by gender separately for each region (HIC versus LAC4). Since we have a low number of observations for LA, these graphs should be interpreted with caution. When making this comparison we must remember that HIC have an older population and a higher fraction of high-skills workers. The asymmetric inverted U-shape is clear in HIC, while it is relatively flat in LAC4 (especially for planning and supervising). Then, the probability of performing these tasks is initially increasing on age but more rapidly in HIC than LAC4 (in both cases faster for men) and peaks some years later in HIC than in LAC4. The gender gap for younger versus older cohorts seems to have decreased more in HIC than LAC4, which is consistent with at least three hypotheses: a faster decrease in fertility rates in HIC than LAC4; a more rapid shift in the occupational structure in HIC (perhaps as a result of greater technology adoption); and a faster reduction in the gender gap in educational attainment.

3.1.2 Gender differences in occupational structure

In this section we compare the occupational structure of LAC4 and HIC and relate it to the routine task content of each occupation, taking into account both horizontal and vertical gender segregation. To do this we use our own index of RTC, which is inversely proportional to the F1 index discussed previously. The next section discusses the construction details, features and variants of this index, and presents some descriptive statistics. Results in the current section might be read with caution because the PIAAC samples are small. Although we use person weights that allow to emulate the occupational structure of each country, and we make two separate pooling of countries (LAC4 and HIC), which may also help to reduce statistical biases.

That males and females occupy different jobs (horizontal gender segregation) is an stylized fact for almost all countries in the world (Anker, 1998). Males and females also face different career paths within the same occupation (vertical segregation). Both factors seem to explain the gender wage gap, while differences in promotion and access to managerial positions is generally considered as the main cause of gender inequality (Ponthieux and Meurs, 2015). More generally, the causes are biological, historical, cultural, social and economic.

Figure 4 relates differences in occupational structure across LAC4 and HIC to the routine task content of each occupation, as defined by the RTC index 1. The vertical axis represents the difference in the employment share of each occupation between LAC4 and HIC. Positive (negative) values are occupations employing more (less) workers in LAC4 than in HIC. The size of each bubble is the employment share of each occupation in LAC4. The relation is quite clear: employment in LAC4 is significantly more (less) concentrated in occupations with high (low) RTC than in HIC. Part of this difference is explained by the existing educational and technological gaps between these regions. But the relation holds even after controlling for differences in computer use at the occupation level, education, and age. For instance, occupations that exhibit a high routine task content and employ a large fraction of workers in LAC4 are salespersons, cleaners and helpers, crafts, food preparation assistants, low-skills labourers which, all together, represent about 15 percentage points more employment in LAC4 than in HIC (17.5 percent of total employment in HIC versus 32.5 percent in LAC4).

To take into account horizontal segregation, Panel B of Figure 2 presents the same comparative relation but separately for males and females. The share of each occupation calculates over the total employment of each gender. The same pattern emerges: a larger fraction of both males and females in LAC4 employs in occupations with higher RTC than in HIC. However, males in routine jobs work mainly in the primary and industry sectors, presumably performing physical and repetitive manual tasks, while females tend to be employed in service occupations like sales, cleaners/helpers and food preparation assistants.[15]

Figure 5 (upper graph in panel A) shows that there is a high correlation in the share of females in each occupation between LAC4 and HIC. So, horizontal gender segregation is a pervasive characteristic of the labor market in both sets of countries. Lower graph in panel B-left shows that the share of females in each occupation in LAC4 is not related to the RTC index. While the graph in panel B-right shows that differences in the share of females in each occupation across LAC4 and HIC is slightly negative, suggesting that females in LAC4 have on average a relatively higher (lower) participation in occupations with low (high) RTC than in HIC. However, there is a lot of variability across occupations.

Overall, the main message from this section is that the occupational structure of LAC4 is considerably biased towards occupations with high routine task content compared to HIC, and this holds for both genders.

3.1.3 RTC indexes

For each individual in the PIAAC survey we know their occupation according to the ISCO 08 classification. We use the information related to job tasks (that we already discussed above) to define a routine task content index (RTC_1) at the occupation level, which represents the percentage of workers in each occupation that do not perform any of the four activities often. To have a better statistical representation and minimize matching errors with household surveys, occupations are defined at the 2-digit level, which gives us a total

[15]One exception is textile manufacturing, which employs a larger fraction of females than males.

of 40 occupations.[16] That is, for occupation i, the index is defined as

$$RTC_{1,i} = 1 - \frac{1}{n_i} \sum_h F_{1,h} \tag{3}$$

where h are individuals and n is the number of individuals in occupation i. The index captures the percentage of individuals within an occupation that mostly perform routine tasks. We analogously define routine task content indexes RTC_2, RTC_3, RTC_4, by computing weighted averages of the individual level flexibility indexes F_2, F_3, F_4. A similar approach is used by Autor, Levy, and Murnane (2003) and Autor, Katz, and Kearney (2006, 2008).

The lower the RTC of an occupation, the higher the possibilities of complementarity with new technologies. In contrast, the higher the RTC of an occupation, the lower the chances of complementarity with new technologies or, seen otherwise, the higher the chances of substitutability by labor-saving automation technologies. Of course, this is not a one-to-one mapping and it is not deterministic, but it provides a clear ranking of occupations that is useful to characterize the temporal evolution and the current state of the labor market structure and the associated wage distribution, enabling international comparability. To construct these indexes we pull together the 24 countries with complete information from the PIAAC surveys.[17]

Table 1 presents the complete list of occupations at the 2-digit ISCO08, ordered from the lowest to the highest RTC index 1. It also shows the percentage of workers that report using a computer at work. We classify occupations in three groups: (1) Highly flexible occupations (RTC index ranging from 0.09 to 0.29); (2) Fairly routine occupations (0.36 to 0.58); and (3) Highly routine occupations (0.66 to 0.78). The first group contains high skill jobs related to professional occupations such as managers, engineers, professors, doctors, which generally perform tasks that involve highly cognitive skills (such as creative thinking and problem solving), interpersonal abilities (managing, planning, organizing), and in most cases demand several years of formal education. The majority of workers in these jobs perform flexible tasks and have the adaptability required to benefit from technological change and work in complement with computers and other recent technologies. Indeed, computer use is very

[16] In principle, for occupations with a large participation in total employment (e.g. sales, building workers) a greater disaggregation could be made (to take into account job heterogeneity arising from different tasks, knowledge, or positions within a firm). However, we believe that this would not change the conclusions of this work too much. Instead, if one wants to study or decompose inequality within and between occupations, it would be convenient to do this work.

[17] If we construct the RTC index separately for LAC4 and HIC, the ranking of occupations is very similar (the Pearson rank correlation coefficient is 0.93 and statistically significant at the 99% confidence interval). However, we decided to work with all countries in order to have a more representative sample for each occupation.

high in this group (0.86).

The second group encompasses middle skill occupations related to the provision of services such as nursery, personal care, personal services, security, electrical repairs, customer services, sales, secretariat. It also include middle skill jobs in manufacturing, construction and transport such as welders, mechanics, builders, machine operators, assemblers, drivers. Most tasks in these jobs require job-specific knowledge, practical experience and, in the case of services, interpersonal abilities. Computer use in this group is medium (0.44) and exhibits high variability (being very high for clerical jobs and very low for crafts, drivers, assemblers and builders). Health and personal care tasks seem hardly automatable. The same for jobs related to repairs and electricity. There is some room for automation of tasks related to customer services and sales through digital sales platforms, programming, new software. While jobs that are physical, repetitive and risky are prone to be codified and substitutable by machines and robots. In fact, the literature points to many of these occupations as those displaced by the automation process that has occurred mostly in developed countries in recent decades, especially in industry and manufacturing (Autor and Dorn 2013; Goos et al. 2014).

The third group contains low skill occupations in agriculture, industry or services such as day labourers, elementary workers, assistants, street sellers, cleaners and helpers. Most of these jobs involve manual tasks related to essential activities such as cropping and farming, food preparation, cleaning, and community tasks that are physically intensive and very repetitive. Naturally, computer use in this group is very low (0.13). In Latin America, these jobs are generally precarious, informal and poorly paid. Although they have a high RTC, the actual risk of automation seems to be moderate because wages are low and a large fraction of individuals in this group are family workers or self-employed in the primary sector.[18]

There is a negative and statistically significant correlation between the RTC index and computer use across occupations (Figure 6). The Pearson rank correlation coefficient is -0.85 and it is statistically significant at the 99% confidence interval, and the pairwise correlation coefficient is -0.89. Again, workers in occupations with low (high) RTC are more (less) prone to use a computer at work. We will exploit this correlation to instrument the RTC index with computer use across occupations in HIC. The idea is exploit the variation in task content across occupations that is explained by differential use of computers at work. It is worth noting that both variables are in levels, fixed over time, and only exhibit variation

[18]Moreover, the agricultural revolution has occurred many decades ago with the advent of technical advances and mechanization such as seeders and harvesters, crop rotation and, more recently, genetic improvement of seeds, new tillage and storage methods. Recently, the region has experienced a strong advance of the agricultural frontier that was fostered mainly by the boom in commodity prices.

across occupations. They do not vary across countries or over time. What varies in these dimensions are labor market variables that we compute using information from households surveys: wages, gender wage gaps, employment structure across occupations, female intensity. Our estimates are not causal, but they will allow us to characterize the evolution of the labor market structure and relative wages in a comparable manner for the six largest Latin American countries over the last two decades.

3.2 Household surveys

We employ individual-level data from household surveys from Argentina, Brazil, Chile, Colombia, Mexico and Peru since the early 2000s. From now on we will refer to these countries as LAC6. We define two periods: mid-2000s (generally 2003-2005); and late-2010s (generally 2016-2018). In most countries we pull together three years of data in each period to increase the precision of our estimates.[19] Household surveys come from SEDLAC database and have individual information on wages, gender, age, household composition, education, occupation, informality condition, that we standardize over time and across countries.[20] The dataset is a repeated cross-section. We restrict our sample to individuals aged 16-65.

The sample begins in this date for various reasons: to avoid the confusing effect of the macroeconomic crises around the 2000s; to use more recent surveys with higher quality and comparability; to focus the study on a period of rapid technological change.

In most of the work conducted with household surveys, the unit of analysis is the occupation itself, as we match our indexes of RTC computed with the PIAAC dataset to labor market statistics for each occupation. We will perform a separate analysis for each country, and always use occupation-level employment weights to obtain estimates that are representative of the corresponding labor market. Additionally, we will run separate regressions by gender and age groups (16-24; 24-40; 41-65).

Table 10 presents the median wages across occupations, the gender wage gaps (defined as the median female wage divided by the median male wage in each occupation), the employment share of each occupation, and the female participation in each occupation (female intensity). All statistics refer to the simple average across LAC6 in the most recent years of our sample (late-2010s) and the average change during the studied period (mid-2000s to late-2010s). Tables X to X in the Appendix presents these statistics separately for each

[19] The only exception is Chile. The CASEN survey is quite big and it is generally conducted every three years, so we use 2003 and 2017.

[20] http://www.cedlas.econo.unlp.edu.ar/wp/en/estadisticas/sedlac/.

country. These tables uncover several facts. Some of them will be further discussed below in the regression analyses.

The majority of workers belong to the group of fairly routine occupations (53.9 percent on average across LAC6), which *a priori* is the most exposed to labor-saving automation technologies. This is also true if we separate workers by gender, but it is somewhat more accentuated for men than women (55.7 percent of working males belong to this group while this fraction is 51.3 for females). Salespersons and cashiers is the occupational category that employs most workers in Latin American countries (12.5 percent on average across LAC6, going from 8.4 percent in Chile to 15.5 percent in Argentina). And this occupation is more relevant for females than males: on average 17.9 percent of employed women are salespersons (going from 11.7 percent in Chile to 25.9 percent in Peru). Other occupations in this group that are relevant for women are personal services (7.5 percent on average across LAC6), general clerks and secretaries (4.7 percent), personal care (4.5 percent) and food processing, woodworking, textile and other craft workers (3.5 percent). The second occupation that employs the most workers in this group is drivers and mobile plant operators (7.8 percent on average) and, since these are jobs mainly carried out by men (male share is on average 97.2 percent), this occupation represents on average 12.4 percent of male employment across LAC6. Other occupations in this group that employ a good fraction of males are sales (9 percent) and building and related trades (8.3 percent). The participation of fairly routine occupations increased in LAC6 during the studied period (on average by 3.3 p.p.). This increase was largest in Brazil (7.1 p.p.), Peru (4.7 p.p.), Colombia (5.2 p.p.) and Argentina (3 p.p.). However, there is some heterogeneity. For instance, there are three occupations that exhibit a decreasing participation in all countries: metal, machinery and related trades workers (-0.5 p.p. on average), handicraft and printing workers (-0.5 p.p.) and food processing, woodworking, textile and other craft workers (-0.8 p.p.). Although these are occupations that could have been replaced by labor-saving automation technologies, and also by import competition from low-wage countries, the decline in the share of such occupations is small compared to what has occurred in developed countries.[21] The occupations that present a growing trend in all countries are personal services (1.3 p.p. on average) and drivers and mobile plant operators (0.9 p.p.).

Highly routine occupations represent on average around one quarter of employment in LAC6 in the late-2010s, going from 14.5 percent in Argentina to 35.2 percent in Peru. There is a large reduction in the employment share of these occupations during the period under

[21] Assemblers is another occupation commonly displaced by automation. However, its participation has changed little on average across LAC6, decreasing only in Argentina (-0.2 p.p.) and Peru (-0.1) but increasing in Mexico (0.5 p.p) and Brazil (0.2 p.p.).

study (-5.2 p.p. on average across LAC6). This decrease was generalized across all countries in our sample, across all occupations within this group, and across both genders, except for laborers in mining/construction/manufacturing (which on average grew by 1.1 p.p.) and for agricultural laborers in Mexico (which increased by 2.7 p.p.). The countries exhibiting the largest reduction are Brazil (-10.3 p.p.), Peru (-9.2 p.p.) and Colombia (-6.6 p.p.). Given the existing horizontal gender segregation, there is some heterogeneity in this dimension across occupations and countries. For females, the most important occupation in this group (always in terms of employment share) is cleaners and helpers (9.8 percent on average, reaching 14.5 percent in Argentina and Brazil), and it depicts on average a decrease of 1.6 p.p. (-5.5 p.p. in Chile, -4.6 p.p. in Brazil, and -3 p.p. in Argentina). For males, agricultural workers and laborers together add to 11.8 percent (representing as much as 21.4 percent of male employment in Peru and 18.3 percent in Colombia), and exhibit on average a reduction of 2.9 p.p. (-7.6 p.p. and -4.4 p.p. in Peru and Colombia, respectively).

The fraction of workers employed in highly flexible occupations in LAC6 is on average 21 percent (being around 17-18 percent in Colombia, Mexico and Peru, around 22 percent in Argentina and Brazil, and 29 percent in Chile), after moderately increasing during the period under study (1.7 p.p. on average). The rise was highest in Peru (4.5 p.p.), Brazil (3.2 p.p.) and Chile (2.7 p.p.), while Argentina and Mexico exhibit small decreasing trends (-0.5 and -1.5 p.p., respectively). If we separate employment by gender, this group is more relevant for female than male employment in all countries (24 percent versus 19.1 percent on average across LAC6). For males, the most important occupations in this group are associate professionals in science and engineering (2.7 percent), associate professionals in business (2.6 percent) and production managers (1.9 percent). For females, these are teaching professionals (5.8 percent), associate professionals in business (4.1 percent) and health professionals (2.6 percent). Notably, production managers exhibit a decreasing participation in all countries (on average -1.1 p.p.). In line with the growing trend of college and university graduates, most professional and associated occupations present a growing trend in all countries, specially in science and engineering (on average around 1 p.p. each adding both professionals and associates), health (1 p.p.), legal/social/cultural (0.6 p.p.), business (0.3 p.p.), and teaching (0.2 p.p.).

The female participation in each occupation in the late 2020s is on average 44.6 percent in highly flexible occupations, 37.2 percent in fairly routine occupations, and 39.5 percent in highly routine occupations. On average there is an increase in the female intensity in most occupational categories, which is in line with the growing trend in female LFP. In the first group, the occupations with the largest fraction of females are health and teaching professionals (61.7 percent and 69.2 percent, respectively). Notably, health professionals exhibit on average an increase in the female intensity of 10 p.p., and the largest rise occurs in Brazil (13.8 p.p.) and Colombia (13.7 p.p.). Managerial occupations in production, administrative, and services have on average a female intensity of 32.3, 42.8 and 38.7 percent, respectively. On average, females are gaining participation in managerial positions in administrative and commerce (the average increase across LAC6 is 15.7 percent) and production and specialized services (6.4 percent), and this holds for all countries in LAC6. Although there is a growing trend in the female share in professional occupations in science and engineering (on average 6.9 percent), females are still very under-represented in this group (25.5 percent for professionals and 15.7 for associates) and also in ICT occupations (18.9 percent for professionals and 13.1 percent for technicians). For fairly routine occupations, the jobs with a largest fraction of women are personal care (85.8 percent on average across LAC6), associate professionals in health (72.9 percent), general clerks (71.9 percent) and customer service clerks (64.3 percent). The first three categories present on average a decreasing trend in the female intensity during the period under study, which works in the direction of balancing this gender disparity. On the other side, there are some occupations in this group that are almost entirely dominated by men, and this fact holds in all countries, presenting minor changes during the period under study: building and related trades, electrical and electronic trades, metal and machinery workers, and drivers and mobile plant operators. For highly routine occupations, the female intensity increased in Chile (6.7 p.p.), Peru (4.5 p.p.), Colombia (4.3 p.p.) and Mexico (2.6 p.p.), and decreased in Argentina (-2.7 p.p.) and Chile (-0.2 p.p.). The female share is largest in cleaners and helpers (78.3 percent on average) and food preparation assistants (65.3 percent), after presenting on average a modest decrease in the first case (-1.4 p.p.), and a small rise in the second (2 p.p.). On the other side, the participation of women is very low in agricultural jobs, subsistence workers and laborers in the primary sector, and elementary occupations (in all cases below 25 percent). Notably, there are three occupations in this group that exhibit a growing trend in the female intensity in all countries: street sales/service workers (6.6 p.p. on average), laborers in agriculture (4.2 p.p.) and laborers in mining/construction/manufacturing (4.1 p.p.).

Median wages are on average larger for highly flexible occupations and lower for jobs with high routine task content (the pairwise correlation coefficient is -0.83 and statistically significant at the 99% confidence level). Highest paid occupations are administrative and commercial managers (9 USD per hour at PPP 2011 on average across LAC6), science and engineering professionals (8.6 USD), and public administration officials (8.5 USD). The lowest paid occupations (below 3 USD per hour on average) are all categories in the group of highly routine occupations, and workers in handicraft and printing, crafts, and personal services. Hourly wages in highly flexible occupations are highest in Chile and Argentina (on average 8.5 and 7.9 USD, respectively), followed by Brazil (6.8 USD), Colombia (5.5 USD), Mexico (5.2 USD) and Peru (4.5 USD). The ranking is relatively similar for fairly and highly routine occupations, although differences across countries are smaller than in the highly flexible group. The percentage change in median wages during the early 2000s and the late 2010s is on average higher for occupations with high RTC and lower for more flexible occupations, and this holds for all countries in our sample. This is in line with the decreasing trend in income inequality that have occurred in Latin America in the 2000s and 2010s. Messina et al. (2016) suggest that currency appreciation triggered by the commodity boom increased the relative demand for workers in the non-traded sector, which reduced returns to education and compressed the wage distribution. There was also a general expansion of minimum wages that mostly benefited low-wage workers. Technological change should have moved relative wages in the opposite direction. If the technology channel had dominated the others, on average we might observe higher relative wage gains for more flexible occupations (which use technology more intensively) and lower relative wage gains for more routine occupations (which are less complementary to technology and substitutable by the automation process).

Finally, in most occupations the median wage for females is lower than the median wage for males (e.g. the coefficient is lower than 1). The median female wage is on average 11 percent lower than the median male wage for highly flexible occupations, 12 percent for fairly routine, and 11 percent for highly routine occupations. In the first group, the gender wage gap is largest for ICT technicians (-20 percent), health professionals (-18 percent), and business professionals and associates (-17/18 percent). In the second group, on average the gender gap is very large for plant and machine operators (-41 percent), handicraft and printing workers (-39 percent), crafts (-24 percent) and sales workers (-23 percent). In the third group, this gap is on average larger for subsistence workers in the primary sector (-36 percent) and for agricultural workers and laborers (-21 percent). On average, gender differences in median wages across occupations in the late 2010s are lowest in Colombia (-7 percent) and Argentina (-8 percent), somewhat higher in Brazil and Chile (-10.3 and -11 percent, respectively) and highest in Mexico and Peru (around -21 percent). Notably, although there is a lot of heterogeneity across occupations in each country, on average the gender wage gap decreased for highly flexible occupations (-5 p.p.), and this is an stylized fact for all countries in our sample. On average the largest reduction in the gender wage gap occurs in managerial occupations (-13 p.p. for production and administrative managers, and -9 p.p. for services managers), science and engineering professionals (-12 p.p.) and health professionals (-12 p.p.). These occupations are relatively intensive in the use of new technologies. Although the gender wage gap did not change on average across LAC6 for fairly routine occupations, it increased by 8 p.p. in Peru and decreased by the same proportion in Mexico. In this group, occupations that present a decrease in the gender wage gap in most countries are general clerks (3.2 p.p. on average), customer service clerks (4.2 p.p. on average) and sales workers (3.7 p.p.), all of which are relatively intensive in computer use. For highly routine occupations, the gender wage gap increased on average by 2 p.p., with the largest increase in Colombia and Mexico (7 p.p. and 3 p.p., respectively).

3.2.1 Changes in the employment structure

In this section we run simple descriptive regressions of the change in the employment share of each occupation between the mid-2000s and the late-2010s on the RTC index. We run separate regressions for each country, and one common regression for LAC6 that controls for country fixed effects and clusters standard errors at the country level. We compute the participation of each occupation in total employment for all individuals aged 16-65 using the reported hours of work, separately by gender, age (16-24; 25-40; 41-65) and and gender-age groups. First we run regressions by OLS. Then we run regressions by 2SLS using computer use in HIC to instrument the RTC index. The idea is to predict the variation of the RTC index that is explained by computer use in each occupation, trying to proxy for the complementarity between flexible tasks and computer use.

We present these results in Table 11. The general finding for LAC6 is that on average there is a relative increase (decrease) of the female employment share in occupations with lower (higher) routine task content. The estimated coefficients exhibit a negative sign for females in all age groups, and the magnitude is highest for the youngest and lowest for the oldest women, which is in line with higher labor mobility across occupations for younger than older individuals. The largest shifts in the female occupational structure happen in Peru, Brazil, Argentina and, to a lower extent, Chile. Colombia and Mexico present different patterns. The general coefficient for Colombia is negative, and it is driven by movements in the male employment structure towards occupations with lower RTC, while on average female employment structure moves in the opposite direction (however no coefficient is statistically significant and standard errors are relatively large). In Mexico, the main coefficient is positive and statistically significant, and driven by a relative movement of male employment structure towards occupations with higher RTC (especially in the middle-age and old-age groups).

All these results are reinforced by the regressions run by 2SLS (Table 12). In all cases the first-stage regressions largely pass the weak IV test, as there is a high correlation between the RTC index and computer use. Results show that there is an increase in the magnitude and precision of estimated coefficients. This may be partly explained by the fact that these estimates give less weight to highly routine occupations in the primary sector (that practically do not use computers) which are mostly carried out by males. In contrast, they give more weight to fairly routine occupations such as secretaries and related clerical jobs that are mostly performed by females, and also to managerial, professional and associated occupations that are intensive in the use of computers and present a relative increase in the female employment share during the period under study.

We also run similar regressions for the change in the female intensity in each occupation. Naturally, in this case we do not separate our estimates by gender because male and female shares are complements. Still, we compute separate estimates by age groups. Tables 13 and 14 presents these results. In line with the previous results, we find that on average the relative increase in female intensity is higher for more flexible occupations and lower for occupations with more routine task content (while it is mainly driven by changes in the group of old-age workers). This result is especially pronounced in Argentina but it also holds in Mexico, Peru and, to a lower extent, Brazil.

3.2.2 Changes in relative wages and gender wage gaps

Here we will run regressions that follow a similar format than those presented in the previous section. First the dependent variable is the change in the log median wage of each occupation. Then we use the change in the gender wage gap which, like before, is defined as the ratio between the median female wage and the median male wage in each occupation. In both cases, we run OLS regressions with the RTC index as explanatory variable, and 2SLS regressions instrumenting this variable with computer use in HIC.

We present these results in Table 15. We find that on average wage increases were relatively higher (lower) for occupations with more (less) routine task content, and this was mas much more pronounced for males than females, especially in the middle-age and old-age groups.[22] In contrast, the estimated coefficient for the RTC index is on average higher for females than males in the youngest group, especially in Argentina, Mexico and Chile.

Results 2SLS regressions confirm these results (Table 16). The magnitude of estimated

[22]Indeed, the estimated coefficient is positive but not statistically significant for females in Chile, Colombia and Mexico. Old-age workers in Peru represent an exception (the estimated coefficient is higher for women than men).

coefficients for the RTC index slightly increase on average compared to OLS coefficients, suggesting that different factors related to the routine task content of occupations (other than the predictability of RTC by computer use) and to their rewards, work in the direction of biasing the estimated coefficients towards zero.

Finally, Table 17 presents the results of running these regressions using the gender wage gap as dependent variable. In line with the above results, that men exhibit a higher gradient of wage changes on the RTC index than women, we fint that, on average, the reduction in the gender wage gap was relatively higher (smaller) for more flexible (routine) occupations. This was especially pronounced for old-age workers in Brazil, Colombia and Argentina, and for middle-age workers in Chile. Results from the 2SLS regressions confirm this finding, and reinforce the idea that relative wage gains for females were much more pronounced for workers aged 41-65. Again, these results are driven by Brazil, Colombia and, to a lower degree, by Argentina and Mexico.

The case by case analysis suggests that reductions in the gender wage gap occurred mainly in fairly routine occupations such as secretaries and related clerical jobs, and also in highly flexible occupations such as managers, professionals and associated occupations in business, science/engineering, health, and legal/social/cultural. All of them are relatively intensive in computer use. In this context, it seems that technological change could help, at least partially, to reduce the gender wage gap within occupations, especially for highly-educated women and for those with middle-education that were able to work in complement with computers and with the new digital technologies of the 21st century.

4 Conclusion

This paper empirically characterizes the changing structure of Latin American labor markets, with a particular focus on the gender dimension, in the six largest countries of the region between the mid-2000s and the late-2010s. We exploit micro-data from household surveys for Argentina, Brazil, Chile, Colombia, Mexico and Peru, which was previously homogenized following the SEDLAC procedures maximizing comparability over time and across countries.

Following the task-based approach, we create indexes of routine task content (RTC) at the occupation level (2-digits of the ISCO08) using recent data from the PIAAC-OECD surveys for several countries. The main variant of the RTC index has an intuitive interpretation, as it represents the fraction of workers in each occupation that do not perform any of the main four flexible tasks frequently.[23] Seen otherwise, it captures the percentage of workers that mostly perform routine tasks. We assume that the lower the RTC of an occupation, the higher the possibilities of complementarity with new technologies. In contrast, the higher the RTC of an occupation, the greater the chances of substitutability by technology and automation. Indeed, we find that workers performing these tasks exhibit on average a higher probability of using a computer at work, which we interpret as partial evidence in favor of a complementarity between flexible tasks and technology use.

We find that women are less likely to perform each of the flexible tasks frequently, even after controlling for individual differences in age, education, computer use at work, country and occupation, which suggests that the current division of tasks in the labor market is characterized by assigning a greater fraction of routine tasks to women than men. Then, technologies that allow the automation of routine tasks (such as workplace computarization) may alter the task content of some occupations and partially contribute to reduce the gender wage gap (Autor et al. 2003; Black and Spitz-Oener 2010).

We exploit the cross-occupation correlation between the RTC index and computer use in high-income countries. The idea is predict the variation in routine task content across occupations that is explained by differential use of computers at work. A caveat is that both variables are in levels, fixed over time, and only exhibit variation across occupations. What varies in these dimensions are labor market variables that we compute using information from households surveys: employment structure across occupations, female intensity, wages, gender wage gaps. Our estimates are not causal, but they allow us to characterize the evolution of the labor market structure and relative wages in a comparable manner for the six largest Latin American countries over the last two decades.

Our findings suggest that during the period under study there was a relative increase (decrease) in the employment share of occupations with lower (higher) RTC, which was mainly driven by movements in the female occupational structure, especially for the group of young-age and middle-age workers. Wage increases were relatively higher (lower) for more (less) routine occupations, and this was much more pronounced for males than females.

While on average there was a modest reduction in the gender wage gap, gains were relatively larger (smaller) for less (more) routine occupations like managers, professionals and clerical jobs. Again, as the current division of tasks in the labor market continues to

[23] Flexible tasks are: (i) managing, supervising or instructing other workers; (ii) planning the activities of co-workers; (iii) confronting and solving complex problems; and (iv) writing articles or reports. All of them require a human input, can be performed both in manual and cognitive occupations, and are not codifiable. Importantly, these tasks are unambiguously related to the job performed and not to characteristics of the working environment, and they have high variability in responses across individuals.

assign a larger fraction of routine tasks to women than men, automation technologies that reshape the task content of some occupations may partially help to reduce the gender wage gap, especially for highly-educated women and for those with medium-education that are able to work in complement with new technologies.

Finally, we notice that the current occupational structure of Latin America is considerably biased towards occupations with high RTC compared to high-income countries. While males in routine jobs work mainly in the primary, construction, manufacturing and transport sectors, females are over-represented in routine occupations in services such as sales and cleaners and helpers.

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Tables and Figures

Table 1: Routine task content index (RTC) and computer use across occupations

	ISCO08 (2-digits)	RTC index	Computer use
Highly flexible occupations		*0.22*	*0.86*
Managers: Production	13	0.09	0.91
Managers: Administrative	12	0.11	0.95
Managers: Services	14	0.16	0.81
Professionals: ICT	25	0.19	1.00
Public administration officials	11	0.19	0.82
Professionals: Business and administration	24	0.20	0.99
Professionals: Science and engineering	21	0.21	0.91
Associate Prof: Science and engineering	31	0.21	0.74
Professionals: Health	22	0.25	0.79
Professionals: Legal, social, cultural	26	0.25	0.85
Associate Prof: Business and administration	33	0.26	0.91
Associate Prof: Legal, social, cultural	34	0.28	0.81
Professionals: Teaching	23	0.29	0.81
Technicians: ICT	35	0.29	0.96
Fairly routine occupations		*0.50*	*0.44*
Workers: Protective service	54	0.36	0.43
Workers: Electrical and electronic trades	74	0.36	0.55
Clerks: Numerical/Material recording	43	0.38	0.82
Workers: Personal care	53	0.38	0.46
Associate Prof: Health	32	0.38	0.77
Clerks: Other	44	0.40	0.82
Clerks: Customer service	42	0.40	0.88
Workers: Metal and machinery	72	0.42	0.40
Workers: Handicraft and printing	73	0.47	0.45
Clerks: General, Keyboard, Secretaries	41	0.47	0.96
Workers: Building and related trades	71	0.50	0.21
Workers: Sales and cashiers	52	0.51	0.51
Plant and machine operators	81	0.52	0.33
Workers: Forestry, Fishery, Hunting	62	0.54	0.16
Assemblers	82	0.57	0.35
Workers: Crafts (Food, Wood, Garment, others)	75	0.58	0.24
Workers: Personal services	51	0.58	0.28
Drivers and mobile plant operators	83	0.58	0.23
Highly routine occupations		*0.71*	*0.13*
Workers: Agriculture	61	0.66	0.17
Elementary workers	96	0.66	0.29
Laborers: Mining, construction, manuf., transport	93	0.67	0.24
Food preparation assistants	94	0.70	0.09
Street sales and service workers	95	0.70	0.07
Workers: Subsistence primary sector	63	0.74	0.02
Laborers: Agriculture, forestry, fishing	92	0.77	0.06
Cleaners and helpers	91	0.78	0.06

Notes: Data from PIAAC pooled surveys for 24 countries. Sample represents employed individuals between 16 and 65 years old, that can be matched to an ISCO 08 occupation. Routine task content (RTC) index represents the fraction of workers in each occupation that do not perform any flexible task frequently. Flexible tasks are managing, planning, writing, solving problems. Computer use is the fraction of workers in each occupation that report using a computer at work. Occupations are ranked from lowest to highest RTC index.

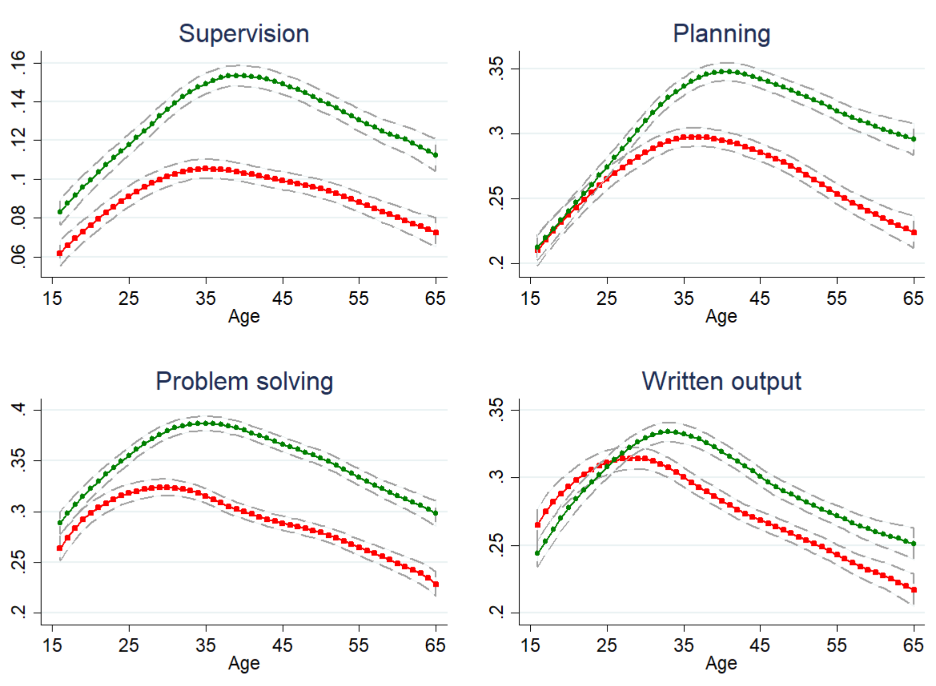
Table 2: Flexible tasks, F indexes and computer use
HIC versus LAC4

	All countries (1)	High-income (2)	Latin America (3)
Supervising	0.12	0.12	0.11
Planning	0.27	0.28	0.24
Solving problems	0.31	0.32	0.29
Written output	0.30	0.30	0.28
Presentations	0.51	0.54	0.40
Budgets	0.36	0.33	0.48
Using computer	0.56	0.62	0.35
F1	0.58	0.59	0.54
F2	0.77	0.78	0.76
F3	0.25	0.25	0.23
F4	0.31	0.31	0.30
Observations	71107	57950	13157

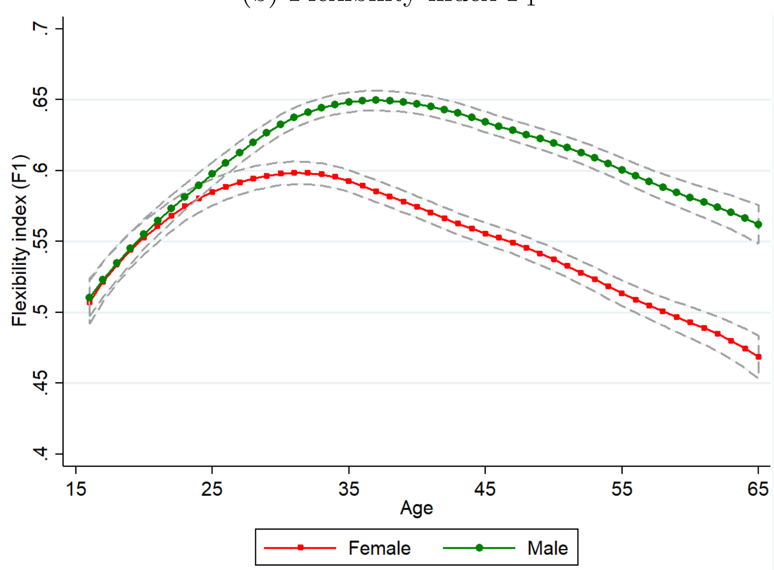
Notes: Data from PIAAC pooled surveys for 24 countries. Sample represents individuals between 16 and 65 years old. Table shows the percentage of workers that that respond "yes" to performing six flexible tasks often (Supervising, Planning, Solving problems, Producing written output, Giving presentations or making speeches, Calculating budgets), the fraction of workers using a computer at work, the average of the four flexibility indexes across individuals (F_1, F_2, F_3, F_4), and the number of observations, separately across high-income (HIC) and Latin American countries (LAC4: Chile, Ecuador, Peru and Mexico). Calculations are based on employed individuals that can be matched to an ISCO 08 occupation.

Figure 1: Probability of performing flexible tasks across cohorts by gender

(a) Flexible tasks



(b) Flexibility index F_1



Notes: Data from PIAAC pooled surveys for 24 countries. Local polynomial regressions of each flexible task on age, separately by gender. Kernel bandwidth equal to 5. Dependent variable in the bottom panel is the flexibility index F_1. The index is a dummy variable that is equal to one when the individual replies that he performs at least one of the four tasks often or very often.

Table 3: Flexible tasks, F indexes and computer use by gender
HIC versus LAC4

	All countries		High-income		Latin America	
	Male	Female	Male	Female	Male	Female
	(1)	(2)	(3)	(4)	(5)	(6)
Supervising	0.14	0.09	0.14	0.09	0.11	0.09
Planning	0.29	0.25	0.30	0.25	0.24	0.22
Solving problems	0.34	0.28	0.35	0.28	0.31	0.26
Written output	0.31	0.28	0.32	0.28	0.29	0.27
Presentations	0.50	0.52	0.54	0.55	0.40	0.40
Budgets	0.37	0.35	0.34	0.31	0.46	0.50
Using computer	0.54	0.59	0.60	0.64	0.33	0.37
F1	0.60	0.54	0.62	0.55	0.55	0.52
F2	0.78	0.77	0.78	0.77	0.76	0.77
F3	0.27	0.22	0.28	0.23	0.24	0.21
F4	0.32	0.29	0.33	0.29	0.30	0.29
Observations	38138	32969	30668	27282	7470	5687

Notes: Data from PIAAC pooled surveys for 24 countries. Sample represents individuals between 16 and 65 years old. Table shows the percentage of workers that that respond "yes" to performing six flexible tasks often (Supervising, Planning, Solving problems, Producing written output, Giving presentations or making speeches, Calculating budgets), the fraction of workers using a computer at work, the average of the four flexibility indexes across individuals (F_1, F_2, F_3, F_4), and the number of observations, separately by gender and across high-income (HIC) and Latin American countries (LAC4: Chile, Ecuador, Peru and Mexico). Calculations are based on employed individuals that can be matched to an ISCO 08 occupation.

Table 4: Flexible tasks, F indexes and computer use by skill group
HIC versus LAC4

	All countries		High-income		Latin America	
	Tertiary (1)	Non-tert. (2)	Tertiary (3)	Non-tert. (4)	Tertiary (5)	Non-tert. (6)
Supervising	0.16	0.08	0.16	0.09	0.20	0.08
Planning	0.34	0.22	0.33	0.23	0.39	0.19
Solving problems	0.42	0.24	0.42	0.24	0.43	0.25
Written output	0.39	0.23	0.38	0.24	0.52	0.21
Presentations	0.62	0.43	0.62	0.47	0.63	0.33
Budgets	0.37	0.36	0.34	0.31	0.52	0.46
Using computer	0.78	0.41	0.77	0.49	0.80	0.22
F1	0.71	0.49	0.70	0.50	0.79	0.47
F2	0.86	0.72	0.85	0.71	0.92	0.72
F3	0.33	0.19	0.32	0.20	0.38	0.18
F4	0.38	0.26	0.38	0.26	0.45	0.26
Observations	28833	42274	25440	32510	3393	9764

Notes: Data from PIAAC pooled surveys for 24 countries. Sample represents individuals between 16 and 65 years old. Table shows the percentage of workers that that respond "yes" to performing six flexible tasks often (Supervising, Planning, Solving problems, Producing written output, Giving presentations or making speeches, Calculating budgets), the fraction of workers using a computer at work, the average of the four flexibility indexes across individuals (F_1, F_2, F_3, F_4), and the number of observations, separately by education level (tertiary degree) and across high-income (HIC) and Latin American countries (LAC4: Chile, Ecuador, Peru and Mexico). Calculations are based on employed individuals that can be matched to an ISCO 08 occupation.

Table 5: Flexible tasks, F indexes and computer use by age group
HIC versus LAC4

	All countries			High-income			Latin America		
	16-24	25-40	41-65	16-24	25-40	41-65	16-24	25-40	41-65
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Supervising	0.08	0.13	0.12	0.07	0.13	0.12	0.09	0.13	0.09
Planning	0.20	0.28	0.27	0.19	0.29	0.28	0.22	0.26	0.22
Solving problems	0.27	0.34	0.30	0.27	0.35	0.30	0.28	0.30	0.29
Written output	0.25	0.33	0.28	0.25	0.33	0.28	0.25	0.32	0.25
Presentations	0.47	0.54	0.49	0.52	0.57	0.52	0.38	0.43	0.37
Budgets	0.38	0.38	0.34	0.32	0.35	0.31	0.50	0.48	0.46
Using computer	0.48	0.62	0.52	0.56	0.68	0.57	0.34	0.41	0.29
F1	0.49	0.61	0.56	0.48	0.62	0.58	0.52	0.57	0.51
F2	0.74	0.80	0.76	0.74	0.81	0.76	0.75	0.78	0.75
F3	0.20	0.27	0.24	0.19	0.28	0.25	0.21	0.25	0.21
F4	0.27	0.33	0.30	0.27	0.34	0.30	0.29	0.32	0.28
Observations	7142	28407	35558	5502	22980	29468	1640	5427	6090

Notes: Data from PIAAC pooled surveys for 24 countries. Sample represents individuals between 16 and 65 years old. Table shows the percentage of workers that that respond "yes" to performing six flexible tasks often (Supervising, Planning, Solving problems, Producing written output, Giving presentations or making speeches, Calculating budgets), the fraction of workers using a computer at work, the average of the four flexibility indexes across individuals (F_1, F_2, F_3, F_4), and the number of observations, separately by age group and across high-income (HIC) and Latin American countries (LAC4: Chile, Ecuador, Peru and Mexico). Calculations are based on employed individuals that can be matched to an ISCO 08 occupation.

Table 6: Differential probabilities of performing in flexible tasks

	(1)	(2)	(3)	(4)	(5)	(6)
Supervising						
Female	-0.045^{***}	-0.052^{***}	-0.053^{***}	-0.041^{***}	-0.042^{***}	-0.041^{***}
	(0.004)	(0.005)	(0.004)	(0.005)	(0.005)	(0.005)
Non-tertiary		-0.082^{***}	-0.043^{***}	-0.021^{***}	-0.020^{***}	-0.019^{***}
		(0.005)	(0.006)	(0.006)	(0.006)	(0.005)
Computer			0.108^{***}	0.073^{***}	0.075^{***}	0.075^{***}
			(0.005)	(0.006)	(0.006)	(0.007)
Planning						
Female	-0.039^{***}	-0.050^{***}	-0.052^{***}	-0.048^{***}	-0.058^{***}	-0.059^{***}
	(0.006)	(0.006)	(0.006)	(0.006)	(0.007)	(0.007)
Non-tertiary		-0.120^{***}	-0.057^{***}	-0.018^{**}	-0.024^{***}	-0.025^{***}
		(0.007)	(0.008)	(0.008)	(0.008)	(0.008)
Computer			0.177^{***}	0.133^{***}	0.145^{***}	0.139^{***}
			(0.007)	(0.008)	(0.008)	(0.008)
Solving problems						
Female	-0.057^{***}	-0.073^{***}	-0.075^{***}	-0.049^{***}	-0.062^{***}	-0.061^{***}
	(0.006)	(0.006)	(0.006)	(0.007)	(0.007)	(0.007)
Non-tertiary		-0.176^{***}	-0.118^{***}	-0.068^{***}	-0.072^{***}	-0.070^{***}
		(0.007)	(0.008)	(0.009)	(0.009)	(0.009)
Computer			0.164^{***}	0.100^{***}	0.120^{***}	0.118^{***}
			(0.008)	(0.009)	(0.009)	(0.009)
Written output						
Female	-0.032^{***}	-0.046^{***}	-0.050^{***}	-0.044^{***}	-0.040^{***}	-0.041^{***}
	(0.006)	(0.006)	(0.006)	(0.007)	(0.007)	(0.007)
Non-tertiary		-0.161^{***}	-0.080^{***}	-0.040^{***}	-0.041^{***}	-0.037^{***}
		(0.007)	(0.008)	(0.008)	(0.008)	(0.009)
Computer			0.229^{***}	0.174^{***}	0.170^{***}	0.157^{***}
			(0.007)	(0.008)	(0.009)	(0.009)
Obs.	71107	71107	71107	71107	71107	71107
Occupation FE	-	-	-	Yes	Yes	-
Country FE	-	-	-	-	Yes	-
Country x Occ. FE	-	-	-	-	-	Yes

Notes: Data from PIAAC pooled surveys for 24 countries. Sample represents employed individuals between 16 and 65 years old, whose occupations can be matched to the ISCO 08 classification.

Table 7: Differential probabilities of performing in flexible tasks (HIC)

	(1)	(2)	(3)	(4)	(5)	(6)
Supervising						
Female	-0.051^{***}	-0.057^{***}	-0.058^{***}	-0.048^{***}	-0.049^{***}	-0.048^{***}
	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)	(0.006)
Non-tertiary		-0.077^{***}	-0.047^{***}	-0.026^{***}	-0.020^{***}	-0.019^{***}
		(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Computer			0.105^{***}	0.071^{***}	0.070^{***}	0.070^{***}
			(0.005)	(0.007)	(0.007)	(0.007)
Planning						
Female	-0.045^{***}	-0.053^{***}	-0.056^{***}	-0.050^{***}	-0.063^{***}	-0.065^{***}
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Non-tertiary		-0.102^{***}	-0.054^{***}	-0.017^{+}	-0.020^{**}	-0.021^{**}
		(0.007)	(0.008)	(0.009)	(0.009)	(0.008)
Computer			0.175^{***}	0.130^{***}	0.143^{***}	0.137^{***}
			(0.008)	(0.009)	(0.009)	(0.009)
Solving problems						
Female	-0.059^{***}	-0.074^{***}	-0.076^{***}	-0.046^{***}	-0.064^{***}	-0.062^{***}
	(0.007)	(0.007)	(0.007)	(0.008)	(0.008)	(0.008)
Non-tertiary		-0.177^{***}	-0.128^{***}	-0.077^{***}	-0.074^{***}	-0.069^{***}
		(0.008)	(0.009)	(0.009)	(0.009)	(0.009)
Computer			0.175^{***}	0.110^{***}	0.127^{***}	0.123^{***}
			(0.009)	(0.010)	(0.010)	(0.010)
Written output						
Female	-0.037^{***}	-0.048^{***}	-0.051^{***}	-0.047^{***}	-0.044^{***}	-0.044^{***}
	(0.007)	(0.007)	(0.007)	(0.008)	(0.008)	(0.008)
Non-tertiary		-0.136^{***}	-0.077^{***}	-0.049^{***}	-0.036^{***}	-0.033^{***}
		(0.008)	(0.008)	(0.009)	(0.009)	(0.009)
Computer			0.214^{***}	0.175^{***}	0.157^{***}	0.144^{***}
			(0.008)	(0.009)	(0.010)	(0.010)
Obs.	57950	57950	57950	57950	57950	57950
Occupation FE	-	-	-	Yes	Yes	-
Country FE	-	-	-	-	Yes	-
Country x Occ. FE	-	-	-	-	-	Yes

Notes: Data from PIAAC pooled surveys for 20 high-income countries. Sample represents employed individuals between 16 and 65 years old, whose occupations can be matched to the ISCO 08 classification.

Table 8: Differential probabilities of performing in flexible tasks (LAC4)

	(1)	(2)	(3)	(4)	(5)	(6)
Supervising						
Female	-0.025^{***}	-0.035^{***}	-0.034^{***}	-0.018^{+}	-0.018^{+}	-0.019^{+}
	(0.009)	(0.009)	(0.009)	(0.010)	(0.010)	(0.010)
Non-tertiary		-0.116^{***}	-0.037^{**}	-0.017	-0.021	-0.023
		(0.013)	(0.014)	(0.016)	(0.017)	(0.017)
Computer			0.138^{***}	0.095^{***}	0.093^{***}	0.094^{***}
			(0.012)	(0.015)	(0.015)	(0.015)
Planning						
Female	-0.022^{+}	-0.040^{***}	-0.038^{***}	-0.043^{***}	-0.043^{***}	-0.041^{***}
	(0.012)	(0.012)	(0.012)	(0.014)	(0.014)	(0.014)
Non-tertiary		-0.203^{***}	-0.092^{***}	-0.048^{**}	-0.048^{**}	-0.052^{**}
		(0.016)	(0.019)	(0.020)	(0.021)	(0.021)
Computer			0.194^{***}	0.149^{***}	0.145^{***}	0.146^{***}
			(0.016)	(0.019)	(0.019)	(0.019)
Solving problems						
Female	-0.052^{***}	-0.068^{***}	-0.067^{***}	-0.057^{***}	-0.056^{***}	-0.055^{***}
	(0.013)	(0.013)	(0.013)	(0.015)	(0.015)	(0.015)
Non-tertiary		-0.186^{***}	-0.094^{***}	-0.066^{***}	-0.073^{***}	-0.075^{***}
		(0.016)	(0.019)	(0.021)	(0.022)	(0.022)
Computer			0.161^{***}	0.102^{***}	0.096^{***}	0.098^{***}
			(0.017)	(0.019)	(0.019)	(0.019)
Written output						
Female	-0.018	-0.045^{***}	-0.043^{***}	-0.027^{+}	-0.025^{+}	-0.029^{**}
	(0.013)	(0.012)	(0.012)	(0.014)	(0.014)	(0.014)
Non-tertiary		-0.311^{***}	-0.125^{***}	-0.047^{**}	-0.055^{**}	-0.058^{***}
		(0.016)	(0.020)	(0.021)	(0.021)	(0.022)
Computer			0.326^{***}	0.209^{***}	0.205^{***}	0.205^{***}
			(0.017)	(0.019)	(0.019)	(0.019)
Obs.	13157	13157	13157	13157	13157	13157
Occupation FE	-	-	-	Yes	Yes	-
Country FE	-	-	-	-	Yes	-
Country x Occ. FE	-	-	-	-	-	Yes

Notes: Data from PIAAC pooled surveys for Chile, Ecuador, Mexico and Peru. Sample represents employed individuals between 16 and 65 years old, whose occupations can be matched to the ISCO 08 classification.

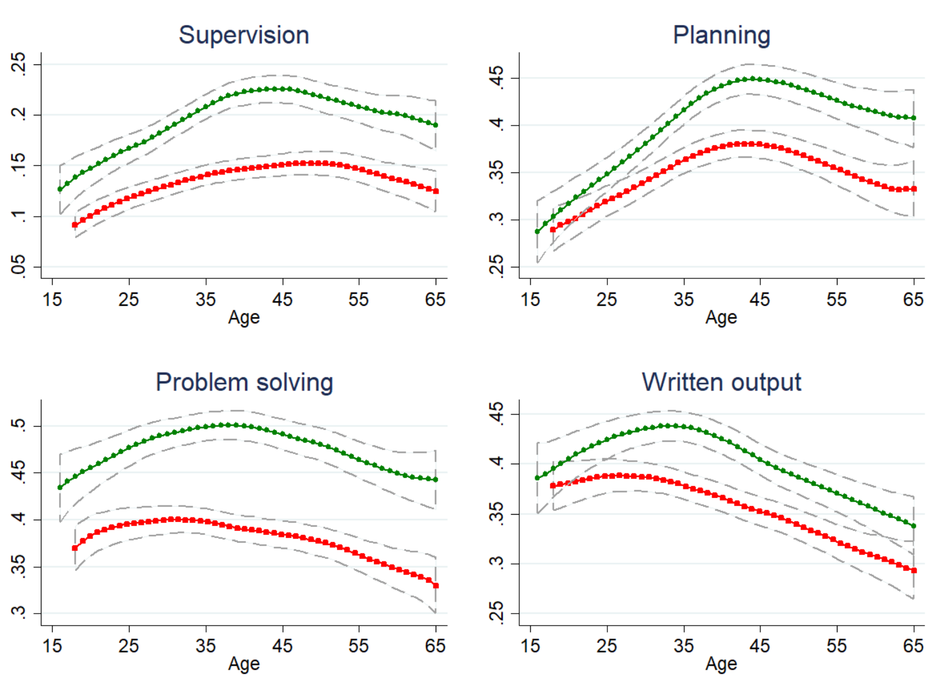
Table 9: Differential probability of performing flexible tasks in LAC4

	(1)	(2)	(3)	(4)	(5)	(6)
Latin America	-0.051^{***}	-0.053^{***}	0.000	0.003	0.059^{***}	0.070^{***}
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.007)
Female		-0.061^{***}	-0.078^{***}	-0.077^{***}	-0.081^{***}	-0.068^{***}
		(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Non-tertiary			-0.225^{***}	-0.219^{***}	-0.126^{***}	-0.064^{***}
			(0.007)	(0.007)	(0.008)	(0.009)
Age 25-40				0.071^{***}	0.060^{***}	0.049^{***}
				(0.012)	(0.011)	(0.011)
Age 41-65				0.048^{***}	0.058^{***}	0.040^{***}
				(0.011)	(0.011)	(0.011)
Computer					0.288^{***}	0.210^{***}
					(0.008)	(0.009)
R-squared	0.00	0.01	0.05	0.05	0.13	0.16
Obs.	71107	71107	71107	71107	71107	71107
Occupation FE	-	-	-	-	-	Yes

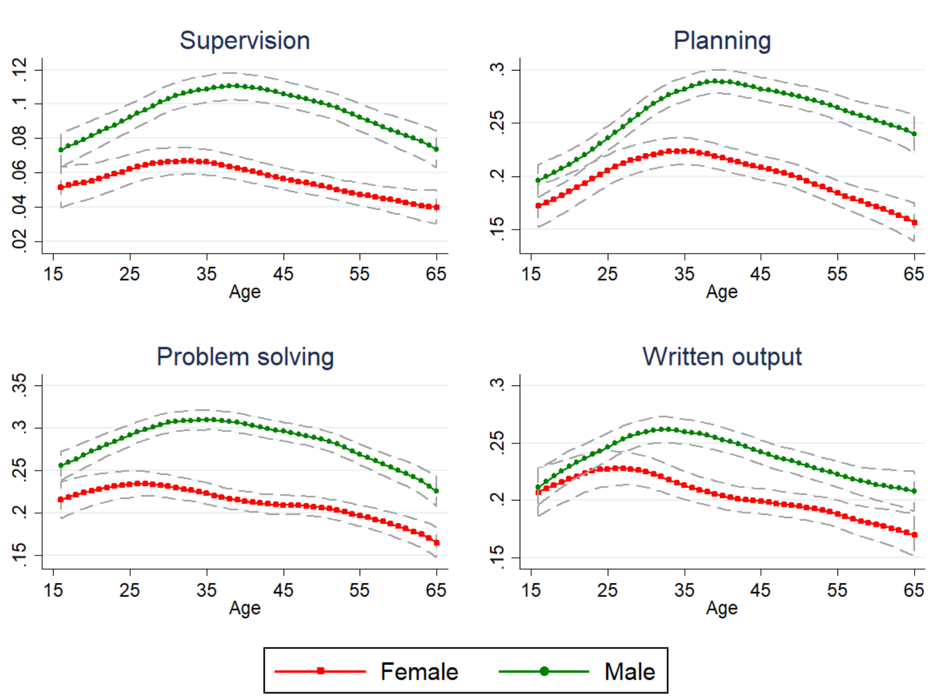
Notes: Data from PIAAC pooled surveys for 24 countries. Sample represents individuals between 16 and 65 years old. Latin America dummy variable is equal to 1 for Chile, Ecuador, Peru and Mexico. Calculations are based on employed individuals that can be matched to an ISCO 08 occupation.

Figure 2: Probability of performing flexible tasks across cohorts by gender and skill

(a) Skilled workers



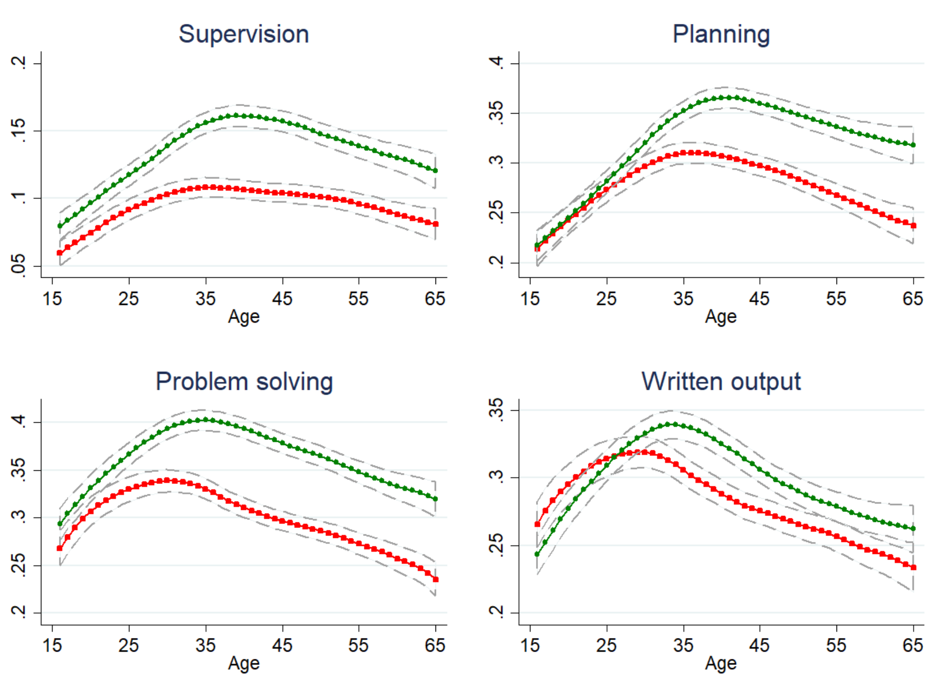
(b) Unskilled workers



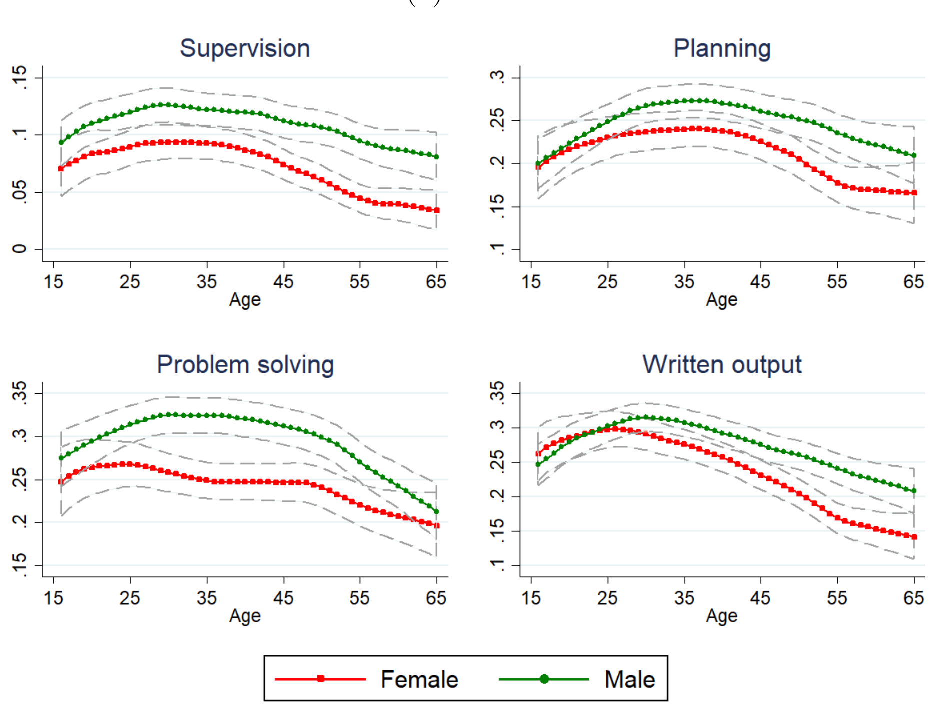
Notes: Data from PIAAC pooled surveys for 24 countries. Local polynomial regressions of each flexible task on age, separately by gender and skill groups. Kernel bandwidth equal to 5. Top panel restricts the sample to skilled workers (tertiary education) and bottom panel keeps unskilled individuals (secondary education or below).

Figure 3: Probability of performing flexible tasks across cohorts by gender and region

(a) HIC



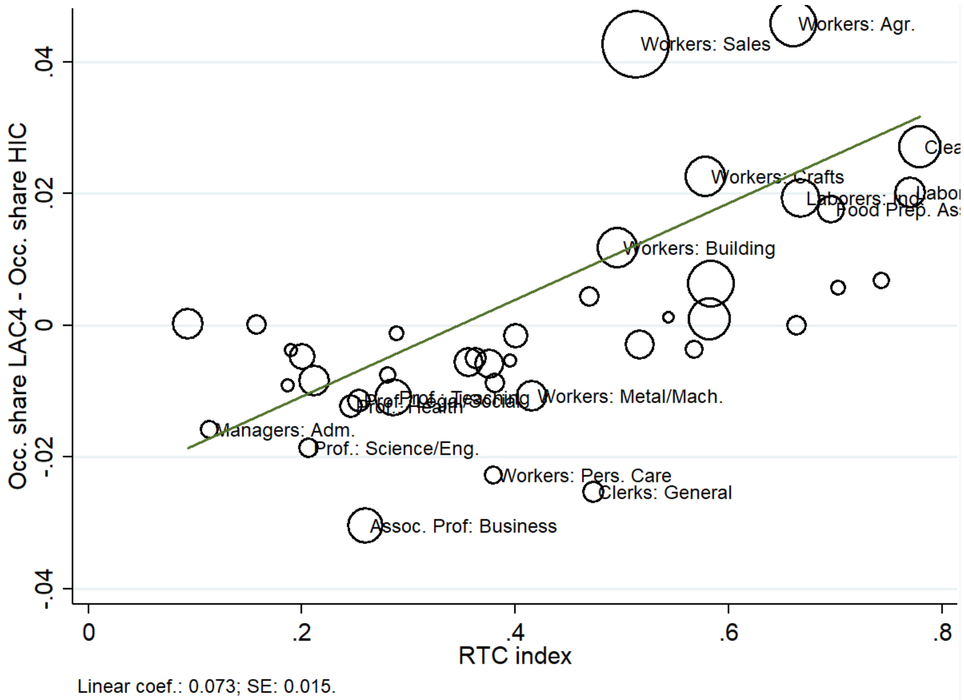
(b) LAC4



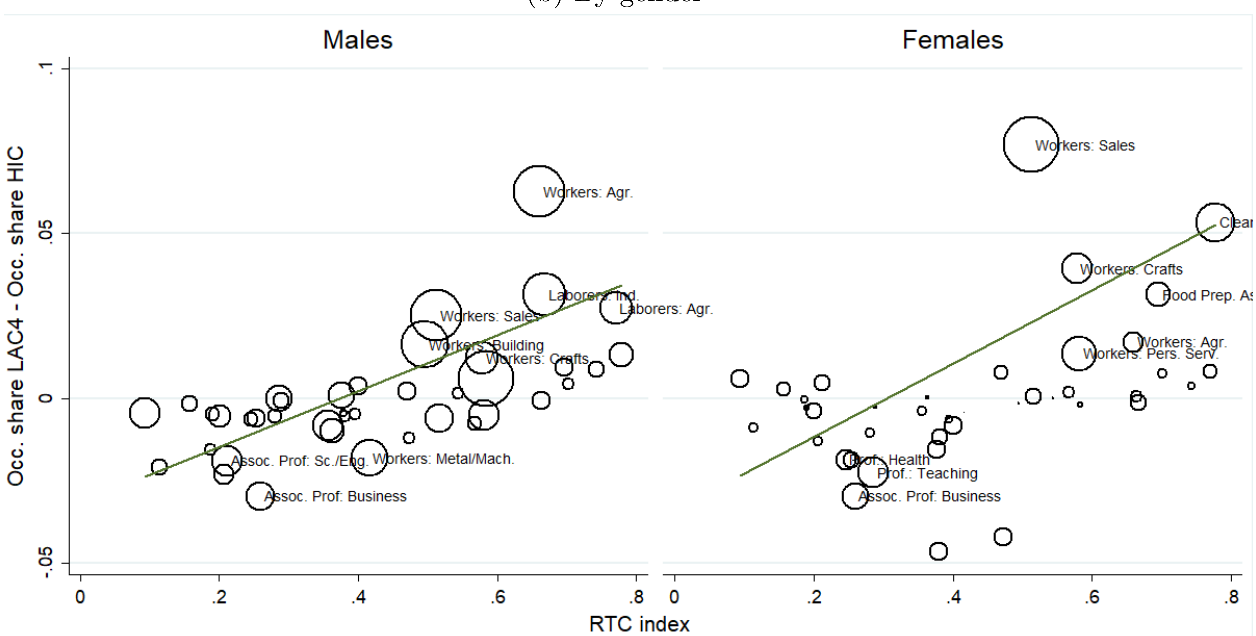
Notes: Data from PIAAC pooled surveys for 20 high-income countries (top panel) and 4 Latin American countries (bottom panel). Local polynomial regressions of each flexible task on age, separately by gender. Kernel bandwidth equal to 5.

Figure 4: Differences in occupational structure and RTC

(a) All workers



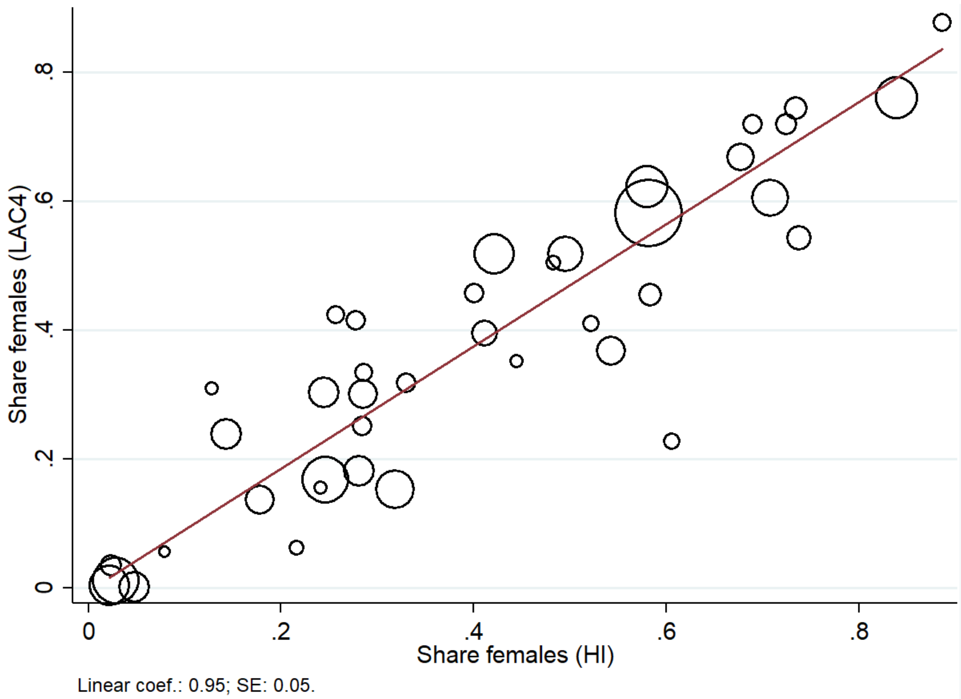
(b) By gender



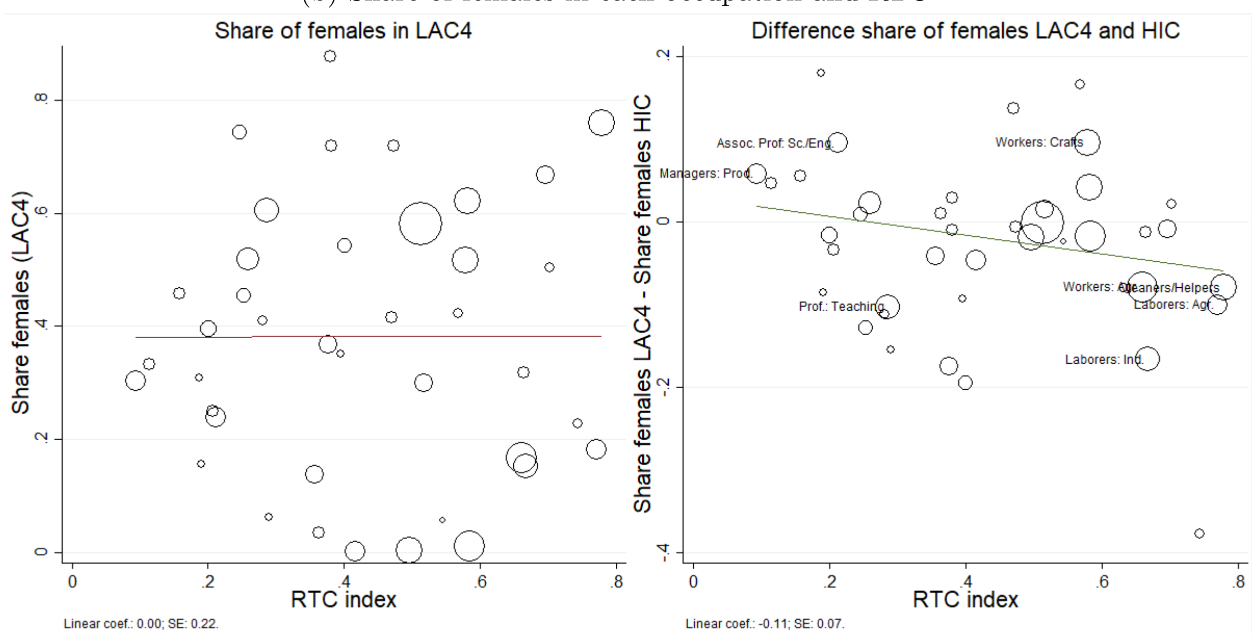
Notes: Data from pooled skills surveys (Programme for the International Assessment of Adult Competencies-PIAAC) conducted by the OECD since 2011. Occupations classified at the 2-digit ISCO08 level (N=40). Panel A depicts the relation between the difference in employment share of each occupation across LAC4 and HIC and the RTC index 1. Weights (bubble size) represent occupation shares in employment in LAC4. Labels for occupations with employment share above 2.5 percent (which is the equally distributed fraction across 40 occupations) and an absolute difference in employment shares above 1 p.p. In Panel B occupation shares are gender-specific. Weights represent occupation shares for each gender in LAC4. Labels for occupations with gender-employment share above 2.5 percent and absolute differences in gender-employment shares above 1 p.p.

Figure 5: Differences in the share of females in each occupation and RTC

(a) Share of females in LAC4 and HIC



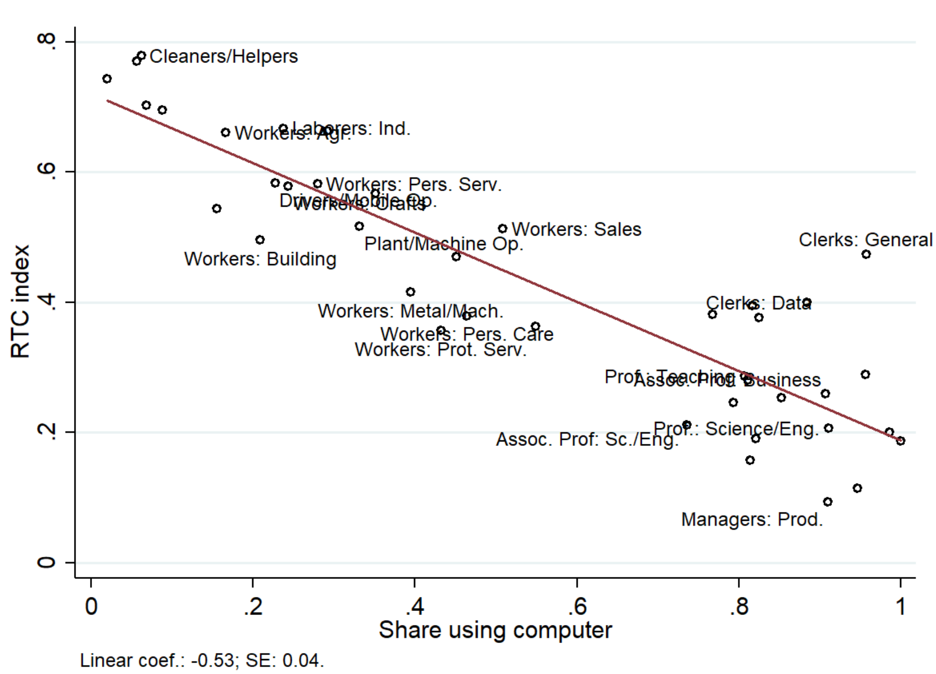
(b) Share of females in each occupation and RTC



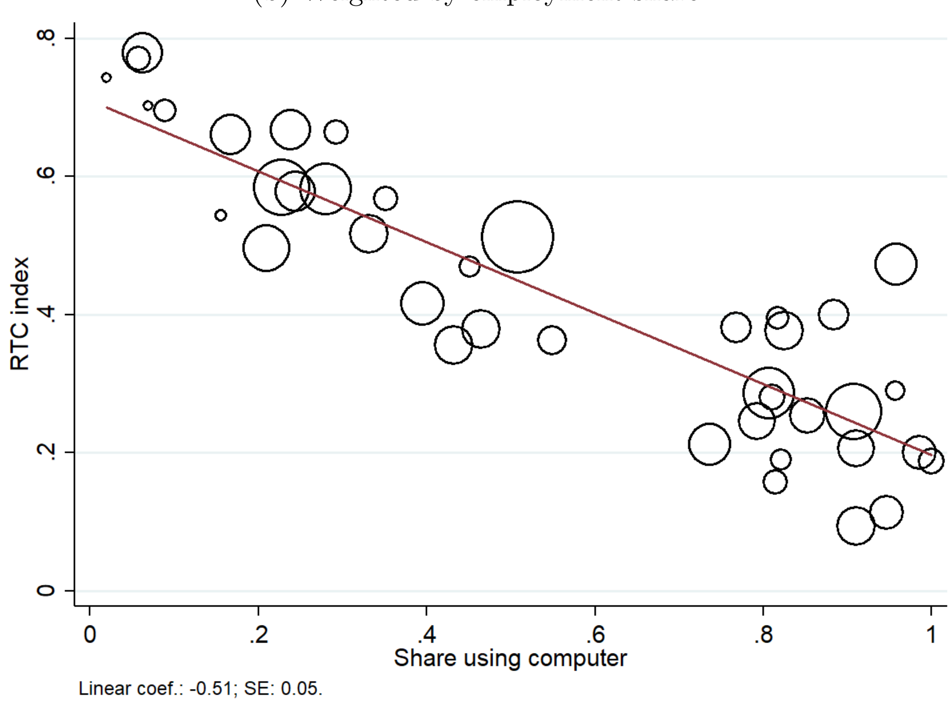
Notes: Data from pooled skills surveys (Programme for the International Assessment of Adult Competencies-PIAAC) conducted by the OECD since 2011. Occupations classified at the 2-digit ISCO08 level (N=40). Panel A depicts the relation between females' employment share in each occupation across LAC4 and HIC. Weights (bubble size) represent employment share of each occupation in LAC4. Panel B (left) plots the relation between females' employment share and RTC index 1. Panel B (right) plots the relation between the difference in females' employment share across LAC4 and HIC and RTC index 1. Labels for occupations with employment share above 2.5 percent and absolute differences in females' employment shares above 5 p.p.

Figure 6: Correlation RTC and computer use

(a) Unweighted



(b) Weighted by employment share



Notes: Data from pooled skills surveys (Programme for the International Assessment of Adult Competencies-PIAAC) conducted by the OECD since 2011. Occupations classified at the 2-digit ISCO08 level (N=40). Panel A includes labels for occupations with employment shares above 2.5 percent (which is the equally distributed fraction across 40 occupations). Panel B weights each occupation by employment share (bubbles size).

Table 10: Wages and employment structure by gender in LAC6: Levels (Late 2010s) and Changes (Early 2000s - Late 2010s)

	Employment structure (LAC6)								Wages (LAC6)			
	All		Males		Females		Female intensity		Median Wage		Gender wage gap	
	Level	Change	Level	Change	Level	Change	Level	Change	Level	Change	Level	Change
Highly flexible occupations	*21.0*	*1.7*	*19.1*	*1.3*	*24.0*	*1.9*	*44.6*	*3.5*	*6.4*	*19.9*	*0.89*	*0.05*
Managers: Production	1.8	-1.1	1.9	-1.4	1.5	-0.6	32.3	6.4	7.9	27.2	1.05	0.13
Managers: Administrative	1.0	0.3	1.0	0.3	1.0	0.3	42.8	15.7	9.0	12.5	0.92	0.13
Managers: Services	1.7	-0.2	1.6	-0.1	1.8	-0.4	38.7	-0.9	5.1	17.4	0.90	0.09
Professionals: ICT	0.5	0.2	0.6	0.3	0.2	0.0	18.9	-4.2	8.2	4.1	0.94	-0.06
Public administration officials	0.2	0.0	0.3	0.0	0.1	0.0	29.7	2.0	8.5	19.0	0.86	-0.39
Professionals: Business	1.4	0.4	1.3	0.4	1.7	0.5	47.2	4.9	7.5	20.9	0.83	0.05
Professionals: Science and engineering	1.2	0.3	1.5	0.4	0.8	0.4	25.5	6.9	8.6	3.7	0.90	0.12
Associate Prof: Science and engineering	2.0	0.7	2.7	1.0	0.8	0.3	15.7	0.4	4.9	24.9	0.89	0.08
Professionals: Health	1.6	0.5	1.0	0.1	2.6	0.9	61.7	10.0	8.2	1.8	0.82	0.12
Professionals: Legal, social, cultural	1.4	0.2	1.1	0.1	1.7	0.3	45.6	4.8	7.2	20.9	1.01	0.00
Associate Prof: Business	3.2	-0.1	2.6	-0.2	4.1	-0.1	50.0	6.2	5.1	27.4	0.84	0.06
Associate Prof: Legal, social, cultural	1.3	0.4	1.0	0.3	1.9	0.5	45.3	-2.7	4.3	24.7	0.90	0.06
Professionals: Teaching	3.2	0.2	1.6	0.1	5.8	0.0	69.2	1.1	7.2	20.8	0.87	0.00
Technicians: ICT	0.5	0.0	0.8	0.1	0.2	0.0	13.1	-0.7	4.4	24.1	0.80	-0.06
Fairly routine occupations	*53.9*	*3.3*	*55.7*	*3.3*	*51.3*	*3.8*	*37.2*	*1.4*	*3.2*	*37.0*	*0.88*	*0.00*
Workers: Protective service	2.6	0.4	*3.7*	*0.4*	*0.8*	0.4	11.8	5.9	3.7	33.2	1.11	-0.09
Workers: Electrical and electronic trades	0.8	-0.1	1.3	-0.1	0.0	0.0	1.7	-0.4	3.7	36.8	0.93	0.16
Clerks: Data	2.0	0.0	1.9	0.1	2.1	-0.3	37.7	-4.7	3.9	20.1	1.00	0.03
Workers: Personal care	1.9	0.3	0.2	0.1	4.5	0.3	85.8	-2.5	2.8	48.6	0.84	0.12
Associate Prof: Health	1.4	0.5	0.6	0.3	2.5	0.7	72.9	-2.7	4.2	16.9	0.91	0.00
Clerks: Other	0.8	-0.2	0.7	-0.3	1.0	0.1	43.6	12.2	4.2	40.8	0.89	-0.11
Clerks: Customer service	1.5	0.1	0.8	-0.1	2.6	0.1	64.3	6.1	3.3	27.3	0.90	0.04
Workers: Metal and machinery	2.4	-0.5	3.9	-0.5	0.1	-0.1	2.4	-0.6	3.6	40.9	0.94	0.05
Workers: Handicraft and printing	1.2	-0.5	1.4	-0.6	1.0	-0.3	30.0	4.5	2.4	25.9	0.61	-0.03
Clerks: General	2.8	0.8	1.7	0.7	4.7	0.8	71.9	-6.0	4.1	28.5	0.87	0.03
Workers: Building and related trades	5.1	0.2	8.3	0.7	0.2	0.1	1.4	0.5	3.4	49.9	0.98	0.09
Workers: Sales	12.5	0.9	9.0	0.6	17.9	1.1	55.7	3.5	2.7	38.1	0.77	0.04
Plant and machine operators	2.2	0.0	2.5	0.1	1.7	-0.1	31.7	1.9	3.2	32.3	0.59	-0.02
Workers: Forestry, Fishery, Hunting	0.3	-0.1	0.5	-0.1	0.1	0.0	6.9	2.6	2.9	47.3	0.90	0.04
Assemblers	0.5	0.1	0.6	0.1	0.4	0.1	13.9	1.3	3.6	31.3	0.91	0.16
Workers: Crafts	3.1	-0.8	2.8	-0.6	3.5	-1.2	43.1	-0.1	2.7	37.4	0.76	-0.02
Workers: Personal service	5.0	1.3	3.5	0.8	7.5	1.9	55.7	3.4	2.9	41.1	0.89	0.01
Drivers and mobile plant operators	7.8	0.9	12.4	1.8	0.6	0.2	2.8	1.0	3.4	38.1	0.99	-0.14
Highly routine occupations	*25.3*	*-5.2*	*25.6*	*-4.7*	*24.9*	*-5.8*	*39.5*	*2.5*	*2.5*	*49.0*	*0.87*	*-0.02*
Workers: Agriculture	4.4	-0.9	6.1	-1.4	1.8	0.0	15.4	0.8	2.4	56.3	0.79	0.04
Elementary workers	1.9	-1.2	*2.3*	*-1.3*	*1.2*	-0.8	24.1	-1.1	2.9	37.1	0.94	-0.06
Laborers: Mining, constr., manuf., transport	4.5	1.1	6.4	1.6	1.5	0.7	15.9	4.1	2.6	43.2	0.91	-0.06
Food preparation assistants	1.6	-0.5	0.6	-0.1	3.1	-1.0	65.3	2.0	2.6	46.0	0.90	0.01
Street sales and service workers	2.3	-1.0	1.8	-1.1	3.2	-1.0	46.9	6.0	2.3	36.2	0.87	-0.08
Workers: Subsistence primary sector	0.7	-1.2	0.9	-1.1	0.4	-1.3	18.4	-3.1	1.3	92.8	0.64	-0.18
Laborers: Agriculture, forestry, fishing	5.0	-1.3	5.7	-1.5	3.8	-0.7	23.5	4.2	2.5	57.2	0.79	-0.12
Cleaners and helpers	4.9	-0.3	1.7	0.1	9.8	-1.6	78.3	-1.4	2.6	47.8	0.87	0.05

Notes: Statistics computed using household survey data from Argentina, Brazil, Chile, Colombia, Mexico and Peru. In all cases we present the simple average across countries.

Table 11: Change in the employment share of each occupation (mid-2000s to late-2010s). OLS

	Age 16-65			Age 16-24			Age 25-40			Age 41-65		
	All	Males	Females	All	Males	Females	All	Males	Females	All	Males	Females
Argentina												
RTC index	-0.008	0.005	-0.055***	-0.020	-0.007	-0.114**	-0.009	0.005	-0.065**	0.004	0.008	-0.035***
	(0.006)	(0.008)	(0.013)	(0.012)	(0.011)	(0.048)	(0.009)	(0.009)	(0.028)	(0.006)	(0.008)	(0.008)
Brazil												
RTC index	-0.017	-0.005	-0.065*	-0.038	-0.023	-0.126	-0.023	-0.008	-0.096*	-0.002	0.005	-0.031
	(0.024)	(0.028)	(0.033)	(0.031)	(0.025)	(0.083)	(0.025)	(0.027)	(0.054)	(0.037)	(0.036)	(0.033)
Chile												
RTC index	-0.011	-0.011	-0.050	0.001	-0.006	-0.069	-0.037***	-0.031**	-0.090	0.013	0.005	-0.025
	(0.011)	(0.011)	(0.043)	(0.022)	(0.021)	(0.063)	(0.013)	(0.013)	(0.068)	(0.017)	(0.012)	(0.045)
Colombia												
RTC index	-0.026	-0.045	0.020	-0.064	-0.105	0.100	-0.025	-0.053	0.024	-0.013	-0.026	-0.007
	(0.020)	(0.035)	(0.029)	(0.059)	(0.073)	(0.089)	(0.019)	(0.034)	(0.033)	(0.014)	(0.021)	(0.016)
Mexico												
RTC index	0.028*	0.039*	0.025	0.030	0.031	0.005	0.028*	0.043*	0.020	0.026	0.048**	0.034
	(0.014)	(0.021)	(0.020)	(0.046)	(0.051)	(0.012)	(0.015)	(0.024)	(0.014)	(0.016)	(0.021)	(0.039)
Peru												
RTC index	-0.071**	-0.064**	-0.106***	-0.232***	-0.156	-0.211***	-0.052***	-0.061**	-0.065**	-0.052**	-0.027	-0.087*
	(0.028)	(0.029)	(0.030)	(0.077)	(0.096)	(0.075)	(0.019)	(0.026)	(0.030)	(0.021)	(0.032)	(0.044)
LAC6												
RTC index	-0.016	-0.012	-0.040*	-0.050	-0.041	-0.070	-0.019	-0.017	-0.050*	-0.002	0.003	-0.025
	(0.012)	(0.014)	(0.018)	(0.034)	(0.027)	(0.040)	(0.011)	(0.016)	(0.022)	(0.010)	(0.011)	(0.014)
Obs.	238	238	236	232	230	216	237	237	234	237	237	232
R-squared	0.068	0.036	0.130	0.123	0.061	0.082	0.076	0.041	0.149	0.046	0.031	0.083

Notes: regressions run at the occupation level. Employment share of each occupation computed using total hours worked. Regressions are weighted by the employment share of each occupation in mid-2000s. Standard errors are heteroscedasticity-consistent. Last panel pools the six countries, controls for country fixed effects and clusters standard errors at the country level.

Table 12: Change in the employment share of each occupation (mid-2000s to late-2010s). 2SLS

	Age 16-65			Age 16-24			Age 25-40			Age 41-65		
	All	Males	Females	All	Males	Females	All	Males	Females	All	Males	Females
Argentina												
RTC index	-0.014	0.010	-0.071***	0.003	0.028	-0.130***	-0.015	0.013	-0.083***	-0.011	-0.002	-0.053**
	(0.014)	(0.014)	(0.022)	(0.025)	(0.029)	(0.050)	(0.016)	(0.014)	(0.030)	(0.015)	(0.014)	(0.025)
Brazil												
RTC index	-0.028	-0.015	-0.072**	-0.058	-0.049*	-0.131	-0.034	-0.021	-0.102**	-0.017	-0.004	-0.047
	(0.026)	(0.028)	(0.034)	(0.044)	(0.028)	(0.082)	(0.025)	(0.027)	(0.052)	(0.038)	(0.034)	(0.038)
Chile												
RTC index	-0.016*	-0.010	-0.055	0.006	-0.003	-0.062	-0.043***	-0.037***	-0.092	0.006	0.007	-0.041
	(0.009)	(0.011)	(0.039)	(0.023)	(0.018)	(0.069)	(0.012)	(0.012)	(0.067)	(0.016)	(0.012)	(0.036)
Colombia												
RTC index	-0.025	-0.030	-0.000	-0.063	-0.077	0.026	-0.025	-0.041	-0.002	-0.010	-0.012	-0.004
	(0.020)	(0.033)	(0.020)	(0.049)	(0.067)	(0.039)	(0.019)	(0.033)	(0.020)	(0.015)	(0.023)	(0.020)
Mexico												
RTC index	0.023*	0.032*	0.025	0.021	0.025	-0.002	0.019	0.029	0.020	0.023	0.044**	0.036
	(0.014)	(0.019)	(0.022)	(0.047)	(0.048)	(0.016)	(0.015)	(0.023)	(0.015)	(0.016)	(0.018)	(0.039)
Peru												
RTC index	-0.065**	-0.052	-0.107***	-0.233***	-0.135	-0.245***	-0.041*	-0.052	-0.058*	-0.051**	-0.022	-0.080*
	(0.027)	(0.032)	(0.030)	(0.072)	(0.089)	(0.093)	(0.023)	(0.032)	(0.032)	(0.024)	(0.037)	(0.043)
LAC6												
RTC index	-0.020**	-0.010	-0.049***	-0.052	-0.034	-0.091***	-0.024***	-0.018	-0.058***	-0.009	0.002	-0.033**
	(0.010)	(0.010)	(0.017)	(0.032)	(0.022)	(0.033)	(0.009)	(0.012)	(0.019)	(0.008)	(0.008)	(0.014)
Obs.	238	238	236	232	230	216	237	237	234	237	237	232
R-squared	0.065	0.036	0.125	0.123	0.060	0.076	0.074	0.041	0.147	0.039	0.031	0.079

Notes: regressions run at the occupation level. RTC index instrumented with the percentage of workers using computer in each occupation in high-income countries. Employment share of each occupation computed using total hours worked. Regressions are weighted by the employment share of each occupation in mid-2000s. Last panel pools the six countries, controls for country fixed effects and clusters standard errors at the country level.

Table 13: Change in Female Intensity in each Occupation (Mid 2000s-Late 2010s). OLS

	All	Age 16-24	Age 25-40	Age 41-65
Argentina				
RTC index	-0.114***	-0.275*	-0.131***	-0.091***
	(0.027)	(0.155)	(0.047)	(0.026)
Brazil				
RTC index	-0.052	-0.123	-0.039	-0.119
	(0.075)	(0.173)	(0.065)	(0.103)
Chile				
RTC index	0.062	0.052	0.070	0.041
	(0.062)	(0.213)	(0.095)	(0.047)
Colombia				
RTC index	-0.025	0.010	-0.022	-0.038
	(0.049)	(0.048)	(0.058)	(0.052)
Mexico				
RTC index	-0.068	0.038	-0.057	-0.131**
	(0.040)	(0.086)	(0.043)	(0.049)
Peru				
RTC index	-0.008	-0.021	-0.008	-0.117
	(0.030)	(0.070)	(0.053)	(0.077)
LAC6				
RTC index	-0.032	-0.048	-0.028	-0.073*
	(0.026)	(0.048)	(0.027)	(0.030)
Obs.	236	217	235	232
R-squared	0.109	0.127	0.065	0.126

Notes: regressions run at the occupation level. Female intensity computed using total hours worked by females over total hours worked by males in each occupation. Regressions are weighted by the employment share of each occupation in mid-2000s. Standard errors are heteroscedasticity-consistent. Last panel pools the six countries, controls for country fixed effects and clusters standard errors at the country level.

Table 14: Change in Female Intensity in each Occupation (Mid 2000s-Late 2010s). 2SLS

	All	Age 16-24	Age 25-40	Age 41-65
Argentina				
RTC index	-0.098***	-0.334**	-0.106*	-0.074**
	(0.033)	(0.149)	(0.056)	(0.030)
Brazil				
RTC index	-0.019	-0.018	-0.005	-0.126
	(0.103)	(0.200)	(0.094)	(0.114)
Chile				
RTC index	0.026	0.067	0.036	-0.013
	(0.066)	(0.207)	(0.095)	(0.049)
Colombia				
RTC index	-0.030	0.004	-0.016	-0.056
	(0.054)	(0.052)	(0.064)	(0.054)
Mexico				
RTC index	-0.058	0.064	-0.043	-0.136**
	(0.072)	(0.132)	(0.079)	(0.067)
Peru				
RTC index	-0.017	-0.004	0.004	-0.132*
	(0.035)	(0.081)	(0.056)	(0.074)
LAC6				
RTC index	-0.030*	-0.029	-0.018	-0.088***
	(0.016)	(0.049)	(0.017)	(0.020)
Obs.	236	217	235	232
R-squared	0.109	0.126	0.064	0.124

Notes: regressions run at the occupation level. RTC index instrumented with the percentage of workers using computer in each occupation in high-income countries. Female intensity computed using total hours worked by females over total hours worked by males in each occupation. Regressions are weighted by the employment share of each occupation in mid-2000s. Last panel pools the six countries, controls for country fixed effects and clusters standard errors at the country level.

Table 15: Change in Log Median Wage of each Occupation (Mid 2000s-Late 2010s). OLS

	Age 16-65			Age 16-24			Age 25-40			Age 41-65		
	All	Males	Females	All	Males	Females	All	Males	Females	All	Males	Females
Argentina												
RTC index	0.433***	0.457***	0.409***	0.361*	0.148	0.498*	0.359***	0.281***	0.419***	0.440***	0.476***	0.318***
	(0.052)	(0.079)	(0.078)	(0.185)	(0.165)	(0.284)	(0.076)	(0.101)	(0.109)	(0.068)	(0.083)	(0.043)
Brazil												
RTC index	0.453***	0.491***	0.340**	0.345**	0.373***	0.420**	0.396***	0.377**	0.382***	0.500***	0.625***	0.420**
	(0.106)	(0.108)	(0.138)	(0.134)	(0.122)	(0.190)	(0.125)	(0.142)	(0.120)	(0.132)	(0.139)	(0.170)
Chile												
RTC index	0.301**	0.446***	0.201	0.255***	0.193	0.245	0.334**	0.461***	0.179	0.407***	0.495***	0.316**
	(0.122)	(0.107)	(0.137)	(0.092)	(0.122)	(0.151)	(0.130)	(0.134)	(0.159)	(0.142)	(0.100)	(0.147)
Colombia												
RTC index	0.380***	0.502***	0.125	0.501***	0.476***	0.352***	0.379***	0.440***	0.240*	0.311**	0.535***	-0.006
	(0.126)	(0.111)	(0.133)	(0.118)	(0.103)	(0.126)	(0.105)	(0.120)	(0.124)	(0.153)	(0.152)	(0.199)
Mexico												
RTC index	0.322**	0.362**	0.292	0.463*	0.270	0.439	0.314**	0.364**	0.361**	0.328**	0.341**	0.368***
	(0.132)	(0.140)	(0.178)	(0.235)	(0.241)	(0.273)	(0.116)	(0.148)	(0.169)	(0.133)	(0.129)	(0.122)
Peru												
RTC index	0.394***	0.374***	0.516***	0.236***	0.357**	0.177	0.351***	0.348***	0.415**	0.323*	0.374**	0.666**
	(0.112)	(0.111)	(0.180)	(0.072)	(0.150)	(0.119)	(0.102)	(0.101)	(0.157)	(0.176)	(0.142)	(0.245)
LAC6												
RTC index	0.380***	0.442***	0.306***	0.361***	0.307***	0.356***	0.357***	0.382***	0.325***	0.392***	0.481***	0.343***
	(0.027)	(0.024)	(0.053)	(0.045)	(0.051)	(0.049)	(0.013)	(0.026)	(0.045)	(0.033)	(0.045)	(0.078)
Obs.	238	238	236	232	230	214	237	237	234	237	237	232
R-squared	0.651	0.676	0.544	0.606	0.433	0.510	0.641	0.637	0.555	0.575	0.608	0.418

Notes: regressions run at the occupation level. Wages measured in constant 2011 USD (PPP). Regressions are weighted by the employment share of each occupation in mid-2000s. Standard errors are heteroscedasticity-consistent. Last panel pools the six countries, controls for country fixed effects and clusters standard errors at the country level.

Table 16: Change in Log Median Wage of each Occupation (Mid 2000s-Late 2010s). 2SLS

	Age 16-65			Age 16-24			Age 25-40			Age 41-65		
	All	Males	Females	All	Males	Females	All	Males	Females	All	Males	Females
Argentina												
RTC index	0.436***	0.484***	0.358***	0.375*	0.176	0.597**	0.409***	0.371***	0.339**	0.436***	0.509***	0.282***
	(0.057)	(0.081)	(0.105)	(0.212)	(0.185)	(0.260)	(0.079)	(0.111)	(0.147)	(0.066)	(0.081)	(0.042)
Brazil												
RTC index	0.568***	0.657***	0.406***	0.514***	0.529***	0.484***	0.504***	0.555***	0.457***	0.616***	0.827***	0.534***
	(0.117)	(0.139)	(0.118)	(0.150)	(0.159)	(0.181)	(0.135)	(0.172)	(0.105)	(0.146)	(0.198)	(0.159)
Chile												
RTC index	0.377***	0.539***	0.236**	0.295***	0.232*	0.289**	0.433***	0.579***	0.272**	0.525***	0.646***	0.387***
	(0.124)	(0.120)	(0.117)	(0.086)	(0.121)	(0.115)	(0.128)	(0.142)	(0.134)	(0.152)	(0.133)	(0.127)
Colombia												
RTC index	0.415***	0.555***	0.141	0.539***	0.548***	0.373***	0.441***	0.497***	0.297***	0.352**	0.580***	0.061
	(0.112)	(0.094)	(0.121)	(0.119)	(0.114)	(0.124)	(0.089)	(0.095)	(0.106)	(0.145)	(0.130)	(0.200)
Mexico												
RTC index	0.359***	0.373**	0.415***	0.580**	0.257	0.635**	0.359***	0.358**	0.516***	0.341***	0.355***	0.435***
	(0.127)	(0.145)	(0.157)	(0.261)	(0.254)	(0.276)	(0.112)	(0.149)	(0.165)	(0.131)	(0.136)	(0.133)
Peru												
RTC index	0.413***	0.393***	0.527***	0.226***	0.363**	0.216*	0.385***	0.393***	0.414***	0.310*	0.365**	0.682***
	(0.119)	(0.126)	(0.178)	(0.067)	(0.163)	(0.112)	(0.110)	(0.121)	(0.158)	(0.175)	(0.152)	(0.230)
LAC6												
RTC index	0.431***	0.507***	0.343***	0.424***	0.359***	0.430***	0.425***	0.466***	0.380***	0.443***	0.559***	0.402***
	(0.031)	(0.041)	(0.048)	(0.053)	(0.061)	(0.060)	(0.020)	(0.037)	(0.036)	(0.048)	(0.070)	(0.072)
Obs.	238	238	236	232	230	214	237	237	234	237	237	232
R-squared	0.648	0.672	0.542	0.603	0.431	0.507	0.636	0.630	0.552	0.572	0.603	0.414

Notes: regressions run at the occupation level. RTC index instrumented with the percentage of workers using computer in each occupation in high-income countries. Wages measured in constant 2011 USD (PPP). Regressions are weighted by the employment share of each occupation in mid-2000s. Last panel pools the six countries, controls for country fixed effects and clusters standard errors at the country level.

Table 17: Change in gender wage gap across occupations (Mid 2000s-Late 2010s). OLS

	All	Age 16-24	Age 25-40	Age 41-65
Argentina				
RTC index	-0.079	-0.070	-0.014	-0.158*
	(0.139)	(0.272)	(0.158)	(0.082)
Brazil				
RTC index	-0.230*	-0.114	-0.131	-0.364**
	(0.121)	(0.140)	(0.085)	(0.158)
Chile				
RTC index	-0.115	-0.409	-0.211*	0.032
	(0.113)	(0.439)	(0.110)	(0.176)
Colombia				
RTC index	-0.109	-0.009	0.048	-0.222**
	(0.080)	(0.221)	(0.085)	(0.094)
Mexico				
RTC index	-0.225	0.167	-0.134	-0.188
	(0.209)	(0.420)	(0.178)	(0.286)
Peru				
RTC index	0.014	-0.094	-0.029	0.185
	(0.153)	(0.123)	(0.161)	(0.211)
LAC6				
RTC index	-0.131**	-0.100	-0.084*	-0.135
	(0.036)	(0.081)	(0.041)	(0.078)
Obs.	236	212	235	232
R-squared	0.079	0.007	0.049	0.046

Notes: regressions run at the occupation level. Gender wage gap is the ratio of the median male wage over the median female wage in each occupation. Regressions are weighted by the employment share of each occupation in mid-2000s. Standard errors are heteroscedasticity-consistent. Last panel pools the six countries, controls for country fixed effects and clusters standard errors at the country level.

Table 18: Change in gender wage gap across occupations (Mid 2000s-Late 2010s). 2SLS

	All	Age 16-24	Age 25-40	Age 41-65
Argentina				
RTC index	-0.021	0.179	0.083	-0.110
	(0.134)	(0.277)	(0.172)	(0.078)
Brazil				
RTC index	-0.250**	-0.123	-0.123	-0.413**
	(0.119)	(0.129)	(0.089)	(0.163)
Chile				
RTC index	-0.078	-0.372	-0.093	0.001
	(0.149)	(0.497)	(0.158)	(0.200)
Colombia				
RTC index	-0.177*	0.016	-0.035	-0.270***
	(0.092)	(0.198)	(0.092)	(0.103)
Mexico				
RTC index	-0.035	0.481	0.107	-0.192
	(0.256)	(0.460)	(0.271)	(0.280)
Peru				
RTC index	-0.094	-0.051	-0.140	0.009
	(0.170)	(0.135)	(0.180)	(0.203)
LAC6				
RTC index	-0.114***	-0.004	-0.038	-0.172***
	(0.035)	(0.107)	(0.038)	(0.066)
Obs.	236	212	235	232
R-squared	0.079	0.005	0.047	0.045

Notes: regressions run at the occupation level. RTC index instrumented with the percentage of workers using computer in each occupation in high-income countries. Gender wage gap is the ratio of the median male wage over the median female wage in each occupation. Regressions are weighted by the employment share of each occupation in mid-2000s. Last panel pools the six countries, controls for country fixed effects and clusters standard errors at the country level.

Appendix B: Data

PIAAC surveys

The PIAAC surveys are the Survey of Adult Skills conducted in several countries by the OECD as part of the Programme for the International Assessment of Adult Competencies. The surveys are publicly available at the OECD-PIAAC website https://www.oecd.org/skills/piaac/.

We base our index definitions of the following questions:

1. The Supervision task dummy is based on the following two questions. Do you manage or supervise other employees? (Possible answers: 1, 2) (d–q08a). How often does your

job usually involve instructing, training or teaching people, individually or in groups? (Possible answers: 1, 2, 3, 4, 5) (f–q02b). The Supervision dummy is defined as positive when the first answer is equal to one, or the second answer is equal to 4 or 5.

2. The Planning task dummy is based on the following question. How often does your job usually involve planning the activities of others? (Possible answers: 1, 2, 3, 4, 5) (f–q03b). The Planning dummy is defined as positive when the answer is equal to 4 or 5.

3. The Problem solving task dummy is based on the following question. How often are you confronted with more complex problems that take at least 30 minutes to find a good solution? The 30 minutes only refers to the time needed to think of a solution, not the time needed to carry it out. (Possible answers: 1, 2, 3, 4, 5) (f–q05b). The Problem solving dummy is defined as positive when the answer is equal to 4 or 5.

4. The Written output task dummy is based on the following two questions. In your job, how often do you write reports? (Possible answers: 1, 2, 3, 4, 5) (g–q02c). In your job, how often do you write articles for newspapers, magazines or newsletters? (Possible answers: 1, 2, 3, 4, 5) (g–q02b). The written output dummy is defined as positive when at least one of the two answers is equal to 4 or 5.

5. The Presentations task dummy is based on the following three questions. How often does your job usually involve making speeches or giving presentations in front of 5 or more people? (Possible answers: 1, 2, 3, 4, 5) (f–q02c). How often does your job usually involve advising people? (Possible answers: 1, 2, 3, 4, 5) (f–q02e). How often does your job usually involve selling a product or selling a service? (Possible answers: 1, 2, 3, 4, 5) (f–q02d). The Written output dummy is defined as positive when at least one of the three answers is equal to 4 or 5.

6. The Budget task dummy is based on the following question. In your job, how often do you calculate prices, costs, or budgets? (Possible answers: 1, 2, 3, 4, 5) (g–q03b). The Budget dummy is defined as positive when the answer is equal to 4 or 5.

The aggregate routine tasks content indexes RTC_1 and RTC_3 are based on the first four dummies, while RTC_2 and RTC_4 are based on the six dummies (as a previous step to the aggregation across individuals we compute the individual level indexes F_1, F_2, F_3, and F_4). Figure **??** shows that the correlation across aggregate indexes is high. In our empirical analysis we use the four indexes to check robustness to different definitions.

SEDLAC database

SEDLAC is a database of socio-economic statistics constructed from microdata of household surveys from the Latin American and Caribbean (LAC) developed by CEDLAS (Universidad Nacional de La Plata) and The World Bank's LAC poverty group (LCSPP).[24]

We use the SEDLAC database to obtain worker-level data for wages, occupations (at the 2-digit ISCO08 level), gender, education and age across seven Latin American countries.

[24] http://www.cedlas.econo.unlp.edu.ar/wp/en/estadisticas/sedlac/

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About FoWiGS

The Future of Work in the Global South (FoWiGS) is an initiative supported by the International Development Research Centre (IDRC) and coordinated by the Center for the Implementation of Public Policies Promoting Equity and Growth (CIPPEC).

It aims at understanding the implications of technological change on jobs from a Global South perspective bringing data, knowledge, and policy frameworks to build evidence-based narratives on the future of work in developing countries.

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