ORIGINAL ARTICLE   **Open Access**

Gender and ethnic inequalities in LAC countries

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Abstract

This article examines the structure of gender and ethnic wage gaps and the distribution of both paid and unpaid work in LAC countries. Its main contribution is to expose the double discrimination endured by women in the region. Indeed, the results indicate that women are highly discriminated in the job market and undertake most of the domestic activities in the household, allocating in average 40 hours per week to paid market activities and another 40 hours to in-home unpaid activities. The indigenous population also suffers from discrimination, but the wage gap is mainly explained by the difference in endowments, highlighting their limited access to education and their concentration in rural areas. The wage quantile decomposition results suggest the presence of sticky floor effects for both women and indigenous workers.

JEL codes: J22; J31; J71

Keywords: Inequality; Ethnicity; Gender; Time-use

1   Introduction

Two important factors are generally associated with gender and ethnic discrimination in Latin America: the low level of human capital and the strength of social norms. The first one is usually captured by educational attainment and years of work experience. In Latin America, the average years of schooling is 8 which is relatively low compared to Europe and more advanced countries. Needless to say that ethnic minorities are the most disadvantaged in this respect. Concentrated mainly in rural areas their access to education and health services is precarious and limited. Moreover, occupational segregation is particularly high. Indigenous workers are mostly found in low-productivity activities either in the agricultural, manufacturing, and construction sectors or in domestic service.

The strength of social norms is particularly evident in the strict gender division of labor in the region. In line with traditional gender roles, women are mainly responsible for domestic activities and for looking after children, even though their participation in the labor market has increased over time, and men are perceived as breadwinners working primarily in outside-home activities. These gender stereotypes are culturally acceptable in most Latin American countries and little has been done to change them. Women in the region face premarket discrimination and exclusion in the labor market and they are double burned taking most of the housework in the household.

Ethnic and gender disparities have two main consequences in the job market. The first one is the existence of significant entry barriers to the formal job market and the second

one, is that even when these barriers are crossed, there is still a wage gap between the discriminated group and the non discriminated one. A priori, this wage differential could lead to a smaller labor force participation from the discriminated group, increasing the demand for domestic production on in-home activities. In this context, women may have a bigger incentive to stay at home and accomplish domestic tasks rather than participating in the labor market, especially when the wage differential is significant. But to what extend does the level of wages really influence the distribution of domestic activities within a couple?

The literature on gender and ethnic inequality is enormous, but much of the research focuses on wage differences neglecting the importance of domestic labor and time use. In this article, we examine the gender and ethnic gaps in wages and in the allocation of time to paid and unpaid work in Bolivia, Ecuador, and Guatemala. We pay particular attention to the role of education in explaining and reducing the gap along the wage and time distributions. The low level of human capital in the region is an important factor that determines women's expected social role in domestic activities and it certainly plays a significant part in the inequality of opportunities endured by ethnic minorities and women in these countries. Needless to say that human capital and social norms are highly correlated. Education, for instance, helps individuals changing existing norms by influencing their perceptions and behavior.

In order to assess the importance and determinants of the wage gap between the discriminated group and those who are not, we use the standard Blinder-Oaxaca decomposition (BO decomposition, hereafter) and complete the analysis with a quantile decomposition method proposed by Firpo et al. (2009). In order to explain the determinants of weekly allocation of time between domestic and paid market activities, while taking into account the inter-dependance of decision-making process inside the household, we use seemingly unrelated regressions.

The structure of the paper is as follows: Section 2 reviews the theoretical framework. Section 3 provides a literature review. Section 4 introduces the econometric methodology. Section 5 describes the data, and Section 6 presents the results and concludes.

2 Theoretical framework

In a broader sense, discrimination is defined as the unjustified difference in treatment between two distinct groups of the population based on cultural or physical characteristics such as gender, age, race, religion, or political views. In the labor market it is usually measured in terms of wage differentials between workers, the degree of segregation in different types of employment or sectors, and labor force participation, see Cain (1987) and Altonji and Blank (1999).

Neoclassical theory of discrimination is divided in two classes of models: competitive and collective models. In collective models, as its name indicates, groups act collectively against each other, while competitive models focus on individual behavior. Competitive models are further divided in taste-based models with complete information and statistical models of discrimination with imperfect information. The former one is the primary interest of this article since it is the model introduced by Becker (1957), which gives the theoretical framework for the well known and widely used BO decomposition.

The main drawback of these models is that pre-market discrimination is not taken into account. Differences in endowments are certainly explained by the environment in which

each individual evolves. For instance, immigrants families usually live in sectors where criminality rates are high, integration with country natives is limited, and education is of low quality. In this context, the probability that children from immigrated families attend to college may be significantly reduced. Therefore, in average, these children have a clear disadvantage compare to those who have had access to a good education and have grown up far from violence and criminality.

Discrimination in the labor market is an open, pervasive, and persistent phenomenon as many of the empirical works have shown. But discrimination or disparities also exist inside the households. The gender differences in the allocation of time to housework and labor market activities is a recognized fact. Indeed, it is known that women spend more time in housework activities compared to men. It is more questionable why this is the case.

In order to explain the differences in time allocation three main theories have been proposed: The time availability hypothesis, the relative resource hypothesis, and the gender hypothesis. The time availability hypothesis argues that time spend on domestic chores is related to the amount of time available for each family member, thus there is an inverse correlation between the hours spend in market labor activities and the hours spend in domestic task, see Hiller (1984) and Coverman (1985). The relative resources perspective suggests that the amount of hours spend on household chores depends on the bargaining power of each partner, so that the member of the couple with the bigger bargaining power imposes his own housework preference on the other one, see Brines (1994). The gender hypothesis explains that the amount of housework done by women is bigger than those of men simply because the society automatically links housework and gender. This perspective highlights that there is no a real trade off between labor market activities and housework, since all the housework is dictated to women by the social norm, see Bianchi et al. (2000).

2.1 A model of allocation of time

Following Kooreman and Kapteyn (1987), the husband m and the wife f of a household h maximize the utility u represented by the function:

$$u = U(x_m, x_f, c_m, c_f, l_m, l_f), \tag{1}$$

subject to time and monetary constraints:

$$l_m + c_m + h_m = T_m, \tag{2}$$

$$l_f + c_f + h_f = T_f, \tag{3}$$

$$p(x_m + x_f) = w_m h_m + w_f h_f + v_h, \tag{4}$$

where x_i is the consumption of market goods, c_i the housework time, l_i the leisure time, h_i the labor market hours, w_i the net wage rates, p the market price of goods x_i, v_h other non-labor income of the household, and T_i fixed time endowments, with $i \in \{m, f\}$.

Combining the two constrains, under the assumption of perfect substitutability of time between activities, yields the full income constraint:

$$p(x_m + x_f) + w_m(l_m + c_m) + w_f(l_f + c_f) = w_m T_m + w_f T_f + v_h \equiv Y, \tag{5}$$

Solving this maximization problem yields solutions for x_i, c_i, l_i, h_i (endogenous variables of the model) as function of the exogenous variables $w_i, T_i, v_h,$ and Z_h.

$$q_k = f_k(w_m, w_f, T_m, T_f, v_h, Z_h), \tag{6}$$

with

$$q_k \subseteq (x_m, x_f, c_m, c_f, l_m, l_f, h_m, h_f), \tag{7}$$

where Z_h is the other exogenous variables affecting the utility, such as household's demographic characteristics.

3 Literature review

Empirical evidence on wage disparities is extensive. Results are well established, women and gender minorities are discriminated in the labor market with different degrees across countries. Among the works that use Latin America data we find those by Tenjo et al. (2005), who analyze the evolution of the gender gap in six LAC countries and find evidence of statistical discrimination. Ñopo (2012) finds that gender and ethnic earnings gaps persist in the region, even though the situation of these groups in the labor market and the society in general has improved over time. Finally, Popli (2013) uses a nonparametric-distributional approach to study gender wage differentials and finds evidence of a reduction of labor market discrimination against women due to a diminishing discrimination at the lower tail of the wage distribution.

Regarding the differences in the allocation of time to domestic and market activities, it has been shown that there is an important inequality in the time spend in housework activities between men and women, see Wales and Woodland (1977), Sousa-Poza et al. (2001), and Álvarez and Miles (2003). Indeed, women tend to spend more time doing household chores compared to men and men spend more time in paid work activities. Articles studying the determinants of the allocation of time in Latin American countries are limited, probably because of the scarcity of Time Use surveys in the region. Some of the few works found in the literature are those of Newman (2002) who uses survey data from Ecuador to examine the effects of women's employment on the allocation of paid and unpaid labor within the household. She finds that women's labor market opportunities have no effect on women's total time in paid labor but they increase men's time in unpaid labor, which in turn reflects women's increased bargaining power at home. Medeiros et al. (2007) analyze paid and unpaid work-time inequalities among Bolivian urban adults. They find that gender is an important variable to explain how much paid and unpaid work is done by individuals, but not so important to explain why some people have a higher total workload than others.

4 Methodology

4.1 The Blinder-Oaxaca decomposition

The standard approach for the study of earnings differentials was introduced in the economics literature by Blinder (1973) and Oaxaca (1973). From the estimation of wage equations this method allows us to decompose the mean wage difference between two groups into three effects: the "Endowments effect", that amounts to the part of the differential due to group differences in the vector of characteristics; the "Coefficient effect",

that corresponds to the differences in the coefficients; and the "Interaction effect", that accounts for the simultaneous existence of differences in endowments and coefficients.

In the original BO decomposition, one has to choose the reference group for the counterfactual. For instance, in assessing the potential wage of women in absence of discrimination, one usually assumes that the male wage structure provides a good counterfactual, but this is not always the case. Reimers (1983), Neumark (1988) and Oaxaca and Ransom (1994) suggest different alternatives for a new wage structure that can be used instead. One popular application is to calculate β^* (the estimated non-discriminatory earning structure) from a pooled regression over both groups, with the inclusion of a dummy variable as group indicator in order to avoid the transfer of parts of the unexplained component into the explained one, see Jann (2008). This is the procedure used in this article for the Oaxaca decomposition as well as for the Firpo et al. (2009) decomposition.

Concerning the wage equation, the usual regression model is based on the "human capital specification", but recent approaches additionally control for occupation and industry in order to reduce the error term and to take into account occupational segregation. As pointed out by Blau and Kahn (2000) any approach that relies on a statistical residual is open to questions regarding the inclusion of all necessary independent variables in the regression. Unobserved factors such as ability can overstate the size of the unexplained part of the wage gap. On the other hand, the inclusion of economic sectors and worker occupation may understate the part attributed to discrimination if occupational segregation is the result of discriminatory practices in the labor market.

4.2 The RIF regression

Decomposition methods for parameters other than the mean face econometric complications since the law of iterated expectations does not hold for them. Various methods to overcome this problem have been proposed. Among them, the most popular are the residual imputation method by Juhn et al. (1993), the conditional quantile regression method by Mata and Machado (2005) and Melly (2005), and the RIF regression method by Firpo et al. (2009). In this article we use the latter one since it allows us to compute the effect of each covariate on the unconditional wage distribution, and it is also less computational demanding than those proposed by Mata and Machado (2005) and Melly (2005).

A detailed explanation for the method used here and for all the other decomposition methods cited above, can be found in Firpo et al. (2010). In the following we give a short overview of the RIF-regression method.

Let Y be the output variable, in our case wages, and $\upsilon(F_Y)$ the distributional statistic of interest, in our case quintiles. The influence function $IF(y; \upsilon)$ of υ at the observed wage y is given by:

$$IF(Y, Q_\tau) = \frac{\tau - \mathbb{1}\{Y \leq Q_\tau\}}{f_Y(Q_\tau)}, \tag{8}$$

where τ represents the quantile of interest, $\mathbb{1}\{\cdot\}$ is an indicator function expressing whether the outcome variable is smaller or equal to the quantile, and $f_Y(\cdot)$ is the density of the marginal distribution on Y evaluated at the population τ-quantile of the unconditional distribution of Y.

Since the recentered influence function is defined as $RIF(y; \upsilon) = \upsilon(F_Y) + IF(y; \upsilon)$, for the quantile case it is written as:

$$RIF(Y, Q_\tau) = Q_\tau + \frac{\tau - \mathbb{1}\{Y \le Q_\tau\}}{f_Y(Q_\tau)}. \qquad (9)$$

After computing the RIF, usually by kernel methods, it replaces the outcome variable in the regression over the covariates. The RIF regression is carried out in a standard OLS framework. Once this has been done, the estimated coefficients are used to perform a detailed decomposition in the same spirit of the classical Blinder-Oaxaca methodology.

4.3 Seemingly unrelated regressions

Theoretical models suggest that both spouses' decision of time allocation between housework hours and labor market activities are determined simultaneously. In order to take into account the inter-dependance of the decision-making process, we use seemingly unrelated regressions. The reduced equations based on the (Kooreman and Kapteyn 1987) model explained above, leads to the following estimation specification:

$$h_m = \alpha w_m + \beta w_f + \gamma_j Z_{mj} + \theta_k Z_{hk} + \epsilon_m, \qquad (10)$$

$$c_m = \alpha w_m + \beta w_f + \gamma_j Z_{mj} + \theta_k Z_{hk} + \epsilon_m, \qquad (11)$$

$$h_f = \alpha w_m + \beta w_f + \gamma_j Z_{fj} + \theta_k Z_{hk} + \epsilon_f, \qquad (12)$$

$$c_f = \alpha w_m + \beta w_f + \gamma_j Z_{fj} + \theta_k Z_{hk} + \epsilon_f, \qquad (13)$$

where Z_m and Z_f includes all the individual characteristics $j \in \{1, \ldots, n\}$ that affect labor and domestic activities, Z_h all the other household demographic characteristics $k \in \{1, \ldots, m\}$, and ϵ_i is the regression residual, with $i \in \{m, f\}$.

A usual problem that we face with the above estimation, is the presence of zero observations. This is a common characteristic of time use data and there are two possible explanations: either the individual in question does not participate in domestic activities at all, or the individual usually participates but for some reason he/she did not do it during the recording period. Since one cannot differentiate one from the other, this fact needs to be taken into account during the estimation. Common procedures include the Tobit and the Heckman selection model. The choice of the model depends on the results of the normality and homoskedasticity tests, hypothesis that our results reject[1]. In this article we use the Heckman two stages procedure for men's time allocation in domestic activities. Since the proportion of women that shows zero observations for housework activities correspond, in average, to 1% of each country sample, there is no need to perform this procedure for them.

4.4 Selectivity issues

This article does not address selection into the job market when estimating wage differentials at quantile levels. The reasons are as follows: First, we are interested in studying wage disparities conditional on being employed. Second, selection bias correction in a quantile framework requires techniques that are less developed, with just few studies addressing

the problem. These studies, in turn, rely on the validity of instruments and the correct identification of the intercept of the wage equation[2].

The second problem concerns the time equations. Since for the second part of the study, we use a sample of couples where both individuals work, it is easy to imagine that women who are working in the labor market, especially when their husbands are also working, are very positively selected. We correct this problem using the Heckman selection model for the equation corresponding to the hours allocated to paid market activities by women. The other two equations are performed by OLS, and the whole system is estimated as seemingly unrelated regressions. The errors are corrected using a standard bootstrap procedure with 1200 replications.

5   Data

The vast majority of indigenous people in Latin America lives in Bolivia, Ecuador, Guatemala, Mexico, and Peru. Altogether, the five countries, account for almost 90 per cent of the indigenous population in the region. Due to data limitations, we carry out the analysis using data from Bolivia, Ecuador, and Guatemala, but it would be ideal to do it for all of them.

The analysis in this paper draws on individual level data from the Bolivian National Living Standards Survey (MECOVI) 2001 conducted by the Bolivian National Institute of Statistics (INE), the Ecuadorian Survey of Employment and Unemployment (ENEMDU) 2007 conducted by the Ecuadorian National Institute of Statistics and Census (INEC), and the Guatemalan National Living Standards Survey (ENCOVI) 2000 conducted by the Guatemalan National Institute of Statistics (INE).

For the three countries, individuals answered questions regarding ethnic background, income, and time use on domestic activities. Information on wages, transfers, and other non labor income was collected, as well as common socio-demographic characteristics such as level of education, age, gender, marital status, area of residence, etc.

From the initial sample we selected working individuals aged between 20 and 70 years, living in nuclear families, either in couple or alone. Descriptive statistics of the final sample are shown in Table 1.

Table 1 Descriptive statistics (whole sample)

Variables	Bolivia		Ecuador		Guatemala	
	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
Income per capita	889.29	(897.40)	240.23	(234.30)	7153.08	(7976)
Household size	4.34	(2.06)	3.89	(1.70)	4.97	(2.13)
Age	39.86	(11.77)	42.59	(11.77)	39.34	(11.65)
Male	0.63	(0.48)	0.65	(0.47)	0.70	(0.46)
Indigenous	0.63	(0.48)	0.07	(0.26)	0.35	(0.47)
Urban households	0.53	(0.50)	0.60	(0.49)	0.54	(0.50)
Primary education	0.55	(0.50)	0.52	(0.50)	0.75	(0.43)
Secondary education	0.31	(0.46)	0.29	(0.45)	0.19	(0.39)
Tertiary education	0.14	(0.34)	0.19	(0.39)	0.06	(0.23)
Observations	5617	-	12046	-	4492	-

Note.- Income data is shown in local currency, Peso Boliviano, American Dollar, Quetzales.
Income: sum of wages/salaries, net income from self-employment, and other non labor income.

The set of explanatory variables in the wage equations includes a constant, age, education (primary, secondary, and higher), occupational tenure, area of residence, region, social security, industry of employment constructed using the International Standard Industrial Classification of All Economic Activities (ISIC) published by UN, and occupation using the International Standard Classification of Occupations (ISCO) published by the ILO.

Working individuals are defined as those reporting positive hours and earnings. Wages are computed using the labor income from the primary occupation. Earnings are reported in several frequencies (daily, weekly, biweekly, monthly, quarterly, semester, and annual). We standardize the data to a weekly frequency. Hourly wages are obtained by dividing wages by the number of hours worked. Indigenous people are identified using the "self-identification" variable available in the three surveys. Note however, that using the variable "spoken language at home" yields similar results. Table 2 shows labor market indicators for the whole sample and by subpopulations.

For the second part of the study, following the theoretical model, the paper considers a restricted dataset consisting on couples where both individuals work. This allows us to specifically address the unequal distribution of domestic activities within Latin American two-earner couples, that is, to compare spouses in similar conditions. Moreover, one of the main objectives of the paper is to test whether or not the wage received by women acts as a bargaining tool for the decision process inside the household. From a policy perspective, if this is the case, improving women's conditions on the labor market by reducing the wage gap can also have a positive equalizing effect, through the level of wages, in housework shares. So, in line with the first part of the study, we focus on labor and domestic inequalities conditional on being employed. Hence, our restricted sample consists of 651 working couples for Bolivia, 2,097 couples for Ecuador, and 363 couples for Guatemala.

Table 2 Labor market indicators

Variables	Total	Ethnic origin		Gender		Indigenous		Non-Indigenous	
	All	Indigenous	Non-Indig	Male	Female	Male	Female	Male	Female
Bolivia									
Working hours	43.93	43.82	44.12	47.06	37.40	46.38	38.09	48.11	36.33
Hourly wage	5.94	5.12	7.33	5.80	6.23	5.01	5.37	7.21	7.56
Labor force participation rate	78.83	80.26	76.50	96.02	57.07	96.02	58.68	96.02	54.73
Ecuador									
Working hours	42.20	39.92	42.38	45.30	36.48	42.05	35.79	45.56	36.53
Hourly wage	1.38	0.93	1.42	1.43	1.30	0.97	0.84	1.47	1.34
Labor force participation rate	86.92	74.44	88.09	96.24	73.73	95.29	52.32	96.32	76.11
Guatemala									
Working hours	43.67	41.25	44.98	47.83	33.83	45.38	29.70	49.26	35.70
Hourly wage	7.24	5.48	8.198	7.29	7.11	5.65	5.01	8.25	8.07
Labor force participation rate	50.89	46.66	53.52	73.38	29.52	68.39	24.73	76.64	32.36

Notes.- Sample: individuals aged between 20 and 70 years living in nuclear families.
Wages are shown in local currency, Peso Boliviano, American Dollar, Quetzales.
Labor force participation rate: number of working individuals divided by the number of people in the sample.

Note that by studying three countries with marked differences in welfare, educational attainment, geography, and ethnic composition, may be helpful in identifying, indirectly, the effect of stereotypes and social norms on the intra-household allocation of time.

The set of explanatory variables in the time equations includes a constant, husband's wage, wife's wage, age, age squared, educational attainment, area of residence, dummy variables indicating whether the individual is indigenous, if there are kids in the household, and the presence of female kids over 12.

6 Results

Table 3 shows the descriptive statistics of the weekly hours spent on domestic and paid market activities for the male, female, indigenous, and non-indigenous population of the sample. A quick glance at the table tells us that in average people devote twice as much time to paid labor activities than to domestic activities. In general, men spend more time in the job market compared to women, but women spend in average four times more hours performing domestic tasks than men. Women dedicate almost the same amount of time in domestic chores than in the paid market activities (around 35 hours for each of them). In fact, women are double burdened and tend to accumulate both types of work, while men concentrate only on paid market work. Concerning the indigenous population, they spend similar amount of hours doing domestic activities than the rest of the population, but spend around 3 hours less in the paid market activities.

The large differential between the numbers of hours spent on domestic activities for men and women may be driven by lower wages for women in the paid market activities compared to men, pushing them to carry out most of the housework activities. The bigger the wage gap, the larger the incentive for women to stay at home. In order to test this assumption we study the determinants of the allocation of time and look for the magnitude and significance of the wage coefficients.

6.1 Wage gap decompositions

The results of the BO decomposition are shown in Table 4. As explained in Section 4, the decomposition method divides the wage gap into two components: the explained component, which is the part of the gap that is attributed to the difference of endowments between the discriminated population and those who are not, and the unexplained

Table 3 Descriptive statistics: time allocation

Bolivia	Whole sample	Male	Female	Indigenous	Non-indigenous
Domestic work	17.735	10.351	33.459	17.391	18.322
Market work	43.939	47.006	37.407	43.827	44.129
Ecuador	Whole sample	Male	Female	Indigenous	Non-indigenous
Domestic work	19.902	11.148	36.079	20.247	19.875
Market work	42.206	45.304	36.480	39.920	42.386
Guatemala	Whole sample	Male	Female	Indigenous	Non-indigenous
Domestic work	19.725	9.259	33.833	20.624	19.237
Market work	43.672	47.837	44.45	41.252	44.987

Note.-Average hours per week, working individuals.

Table 4 Blinder-Oaxaca decomposition

	Bolivia			Ecuador			Guatemala		
Variables	Ethnic	Gender	Gender†	Ethnic	Gender	Gender†	Ethnic	Gender	Gender†
Total Gap	0.538***	-0.062	-0.012	0.426***	0.167***	0.136***	0.408***	0.085**	0.171**
Explained	0.365***	-0.279***	-0.281***	0.282***	-0.082***	-0.078***	0.256***	-0.127***	0.191***
Unexplained	0.174***	0.216***	0.268***	0.144***	0.248***	0.214***	0.152***	0.212***	-0.019

$*p<0.05$, $**p<0.01$, $***p<0.001$.
†Corrected for selectivity.

component, which is the difference on the wage usually attributed to discrimination. As a reference, Table 4 also includes the gender results based on the Heckman selection correction.

The case of Bolivia, is of particular interest, since the wage gap seems to be in favor of women (significant at 10% level). A couple of reasons can explain these results. First, the lower labor market participation of Bolivian women with respect to men. Either for self-selection out of the job market or because the entry barriers are stronger. Second, ethnic discrimination is significant in a country where the majority of the population is indigenous, so average wages of men along the distribution may be pulled down due to the important presence of male indigenous workers.

The Oaxaca decomposition also shows that, in average, the explained effect accounts for the biggest proportion of the wage gap between indigenous and non-indigenous workers. Indeed, even if indigenous workers are also discriminated in the job market, the difference in wages is mainly driven by the difference of endowments. This fact highlights the importance of public policies conceived to improve educational attainment in these countries.

Table 5 shows the decomposition of the gender and ethnic wage gap at different points of the distribution. In general, the wage gap is wider at the lower tail of the distribution for both the gender and ethnic perspective, suggesting the presence of a "sticky floor" effect.

The RIF method allows to analyze the contribution of each explanatory variable to the endowment and coefficient effects[3]. Along with the human capital specification, we have also controlled for economic sector and occupation. As pointed out in Section 3, results must be interpreted carefully since if occupational segregation is due to discriminatory practices in the labor market, it will understate the measure of discrimination.

For the case of Ecuador, we notice that the gender wage gap is primarily due to the effects on the coefficients, while the ethnic wage gap is due to differences in endowments or characteristics. An important point is that the explained part of the gender gap is negative through all different quantiles of the distribution (this is true for the three countries). This pattern is increasing and suggest that women in our sample have better endowments than men, specially at the upper part of the wage distribution.

Looking at the detailed decomposition, one can see that tertiary education accounts for approximately one third of the explained component for the higher quantiles. Indeed, women advantages in terms of education and job related characteristics, at the top of the distribution, offset almost the totality of the unexplained part, reducing significantly the total wage gap in that part of the distribution. Moreover, around 50% of the coefficients effect on the upper part of the distribution is due to the different returns to education that

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Table 5 RIF- OLS Regressions

Quantile	Gender wage gap					Ethnic wage gap				
	0.1	0.3	0.5	0.7	0.9	0.1	0.3	0.5	0.7	0.9
Bolivia										
Difference	-0.139	-0.013	0.003	-0.045	-0.045	0.991***	0.669***	0.425***	0.335***	0.330***
Explained	-0.439***	-0.407***	-0.177***	-0.106***	-0.109**	0.655***	0.517***	0.309***	0.240***	0.177***
Unexplained	0.300***	0.394***	0.180***	0.061	0.064	0.336**	0.152**	0.116**	0.095*	0.153*
Ecuador										
Difference	0.340***	0.268***	0.191***	0.068**	0.033	0.582***	0.464***	0.343***	0.335***	0.485***
Explained	-0.063***	-0.061***	-0.078***	-0.117***	-0.114***	0.440***	0.294***	0.290***	0.348***	0.289***
Unexplained	0.403***	0.328***	0.270***	0.186***	0.147***	0.142*	0.170***	0.053	-0.013	0.196***
Guatemala										
Difference	0.234***	0.171***	0.109**	−0.008	−0.042	0.319***	0.377***	0.463***	0.515***	0.496***
Explained	−0.162***	−0.123***	−0.125***	−0.141***	−0.180***	0.151***	0.221***	0.312***	0.331***	0.309***
Unexplained	0.396***	0.293***	0.234***	0.133**	0.139*	0.168***	0.156***	0.150***	0.184***	0.187***

*p<0.05, **p<0.01, ***p<0.001.

women perceive with respect to men, implying that even when women in our sample are more qualified than men in terms of education, possibly due to a strong selection into the job market, they still perceive lower wages.

Regarding the ethnic wage gap, we see that the explained part accounts for a bit more than half of the gap at the lower and upper quantiles, and almost the totality of the gap at the median and the 0.7 quantile, implying that ethnic discrimination is stronger at the extremes of the distribution.

The ethnic wage gap in the Bolivian case is of particular interest since more than 60% of the population is indigenous. The gap is mainly driven by differences in endowments, but the distance between the explained and unexplained components at the upper part of the distribution is extremely small.

The Guatemalan case is outstanding to the extent that both, gender and ethnic wage gaps are important. The ethnic wage gap is primarily driven by the endowments effect from the median and upper quantiles, but at the lower quantile the coefficients effect represents more than half of the wage gap. Difference in education and working in the agricultural sector contribute to more than half of the endowments effect for the upper tail of the distribution, but being a skilled agricultural worker, the absence of social security, and living in the urban areas is what explains the endowments effect at the lower quintiles.

As for the case of Bolivia, the wage gap at the upper part of the distribution seems to be in favor of women. This can also be explained by a strong positive selection of women into the job market.

Overall, the wage gap is bigger at the lower tail of the distribution, for both women and indigenous population, suggesting a sticky floor effect. In all three countries education and living in the urban areas constitute a large portion of the endowments effect of the ethnic wage gap, which suggest that indigenous population have limited access to education and are concentrated in rural areas with a limited access to the job market.

6.2 The determinants of the allocation of time

Table 6 shows the coefficient estimates of the seemingly unrelated regressions of weekly hours of work spend on labor market and domestic activities for selected variables[4]. The results concern only gender differences in housework shares, since the intra-household allocation of time to domestic activities does not seem to depend on ethnic origin.

From the regression on the number of hours spent in paid market activities, one can see that the bigger determinants of weekly paid working hours are wage and living in urban areas. Among them, only the area of residence increases the hours spend in the labor market for both men and women in all three countries, what suggests that demand for labor is still higher in bigger cities. The impact is more evident in Bolivia, where men's coefficient is multiplied by 2 compared to Ecuador and Guatemala. The significant negative impact of the person's ethnic origin in Guatemala, reflects the restricted access of the indigenous population to labor markets. The effect is stronger for female indigenous workers who in average work 10 hours less in paid marked activities than the rest of the population.

Regarding the results from the regression of the number of hours per week spent on domestic activities, one can see that tertiary education, in Bolivia and Ecuador, decreases the time that women spend on domestic activities. This is important since the level of education in the three countries is very low. As it has been pointed out in the wage

Table 6 SUR (Couples)

	Male paid work	Female paid work	Male housework	Female housework
Bolivia				
Tertiary education	-3.141	-2.591	2.577	-5.086*
Female wage	0.248	-9.141***	0.252	-0.106
Male wage	-7.979***	-1.213	-0.034	-0.539
Female child +12	-	-	-0.733	-0.827
Ecuador				
Tertiary education	1.602	6.322***	2.249	-3.328*
Female wage	0.104	-5.182***	0.386	-0.967
Male wage	-4.041***	-0.497	0.036	0.927
Female child +12	-	-	-0.454	-4.366***
Guatemala				
Tertiary education	−6.870*	-4.314	-2.355	2.297
Female wage	2.723*	-8.946***	3.338*	4.276
Male wage	-8.684***	2.424	-1.305	-1.980
Female child +12	-	-	-1.702	-7.320*

All dependent variables are in weekly hours.
Bootstrapped standard errors.
*p<0.05, **p<0.01, ***p<0.001.

decomposition results, education explains a significant part of the wage gap, in particular for the indigenous population. It also reduces the gap in the upper quantiles, especially for women. In this context, investing in women's education becomes an effective tool for reducing gender and ethnic inequalities in the labor markets and inside the household, considering that Bolivia and Guatemala have an important proportion of indigenous population.

Concerning labor earnings, we observe that wages have no effect on unpaid work activities neither for women nor for men, except for Guatemala where the wife's wage increases by 3 hours per week the participation of men to domestic tasks. This suggest that social norms play a significant role in the allocation of time to domestic activities. Once again, the importance of increasing the level of education of the population becomes evident; education helps individuals changing existing norms by influencing their perceptions and behavior.

Finally, it is interesting to see how the presence of a female child over 12 years old, reduces the female's housework time in Guatemala and Ecuador, suggesting that young female children help their mothers with domestic tasks. The rest of the variables present different signs and magnitudes among the countries. Their effects can be attributed to cultural differences and respective development levels.

6.3 Robustness checks

First, we re-estimate Equations 10 to 13 without correcting for women's selection in the labor market. These estimates, available from the authors upon request, remain statistically significant and with similar magnitude to the previous estimates (Table 6). Thus, the main conclusion from before -that wages do not affect the housework shares- is maintained.

Second, we re-estimate Equations 10 to 13 allowing for corner solutions, that is, we do not restrict the sample to couples in which both husbands and wives work and so, the unrestricted dataset also considers individuals that recorded zero hours of work or domestic activities during the week. This indeed change the magnitude of the coefficients

of interest by 1 to 2 hours per week, but the sign and significance level remain the same. Except for Bolivia, where women's tertiary education reduces the time allocated to domestic activities by 12 hours per week. These estimates, reinforce the principal finding that housework shares are not determined by economic variables such as the level of wages. Instead, the allocation of time to domestic activities is due, to a large extend, to gender identities and the strength of social norms in each country.

7   Conclusions

This paper studies gender and ethnic disparities in paid and unpaid work in Bolivia, Ecuador, and Guatemala. Overall, the results suggest that ethnic disparities are more clearly reflected in wage differences on the labor market, while gender disparities can be found in both the labor market and the allocation of time to domestic activities within the household.

After decomposing labor earning differences, we found that in the three countries, indigenous workers are paid less than non-indigenous workers and that nearly half of the wage gap is explained by differences in human capital endowments. These results highlight the limited access to education and the concentration in rural areas of the indigenous population.

Gender disparities in the labor market are also important, but the wage gap is significantly reduced by the differences in endowments, suggesting a strong positive selection of women in the labor market.

Finally, in the case of two-earner couples, the results are consistent with the idea that differences on housework allocation of time are mainly due to gender identities.

From a policy perspective, the results emphasize the importance of education as a tool to reduce on the one side ethnic disparities due to the difference in endowments and on the other side gender disparities in the labor market and housework allocation.

Clearly, as any analysis based on a statistical residual, the results present some limitations since some unmeasured characteristics such as productivity could also explain the observed unequal allocation of time to domestic activities. Nevertheless, the results raise some interesting questions regarding the strength of stereotypes and social norms in the region. In all three countries, men's time allocation to unpaid housework activities is, to a large extent, invariant to changes in the level of wages. This suggest that policies directed to empower women through economic factors can only be effective if they are complemented with equalizing policies aiming to modify the perception of women's role in the society.

Endnotes

[1] The test procedures are detailed in Cameron and Trivedi (2009). Results are available from authors upon request.

[2] See the works of Buchinsky (1998), Albrecht et al. (2009), and Chzhen et al. (2012)

[3] The results of the detailed decomposition are shown in Additional file 1: Appendix. Tables S1, S2, S3, S4, S5 and S6.

[4] Complete estimations are available from the authors upon request.

Additional file

Additional file 1: Appendix. Table S1. Bolivia, RIF-OLS Regressions (Gender Wage Gap). **Table S2.** Bolivia, RIF- OLS Regressions. **Table S3.** Ecuador, RIF- OLS Regressions (Gender Wage Gap) (Ethnic Wage Gap). **Table S4.** Ecuador, RIF- OLS Regressions (Ethnic Wage Gap). **Table S5.** Guatemala, RIF- OLS Regressions (Gender Wage Gap). **Table S6.** Guatemala, RIF- OLS Regressions (Ethnic Wage Gap).

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