

The Influence of Household Tasks on Earnings in Brazil

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Abstract

The time spent on household chores is a factor that can affect salaries, with women being the main responsible for this activity, and they are also the ones who face the greatest problems in the job market due to this activity. This article analyzes how the time spent on household chores by the individual and the partner influences wages in the labor market and the wage difference between couples. Being the first analysis carried out in this sense for Brazil, the results suggest that women's housework significantly reduces their wages, while men's contributions to chores have a smaller effect on their own wages. Despite women's greater domestic workload, men's increased free time does not translate into higher wages. On the other hand, men's household chores positively impact women's wages. These patterns hold for both individual wages and the within-couple wage gap, suggesting that encouraging men's involvement in chores could help reduce income disparities.

Key-words: Domestic Chores; Wage; Wage gap; Time Allocation.

1 Introduction

Despite recent changes in the division of labor between men and women in the workforce and at home, heterosexual couples still exhibit a trend where women specialize in domestic duties (ARTIS; PAVALKO, 2003; KAN; SULLIVAN; GERSHUNY, 2011; BLAU; KAHN, 2017). The time division between paid and unpaid work among heterosexual couples carries various socioeconomic implications. These include disadvantages for female labor force participation and lower wages (BLAU; KAHN, 2017), which can affect financial independence, and the possibility of retirement, and can also have aggregate effects of underutilization of women's workforce.

Different theories explain the relationship between domestic chores and labor market results. According to Becker (1985), the negative impact of household chores on wages arises from the constraint on individual energy. Thus, the more energy expended on household chores, the less energy is available to invest in the labor market, reducing productivity and consequently lowering wages. Furthermore, dedicating more time to household chores leads to a decreased availability of time for participation in the labor market and training programs (BAXTER, 1992). Consequently, there is an increased demand for lower-skilled and more flexible employment opportunities, which tend to offer lower compensation.

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On the other hand, within the household dynamic, an increase in the partner's time allocation to household chores diminishes the individual's need to dedicate as much time to such tasks. This, in turn, bolsters the availability of energy to be directed towards the labor market (BONKE; GUPTA; SMITH, 2004). Moreover, it affords more time for engaging in work demanding higher professional availability, thereby fostering beneficial outcomes in terms of career advancement and income growth.

Besides this, the time allocation divided between the couple depends on factors such as human capital, which leads to the specialization of the member with less human capital or smaller wages in domestic tasks, while the member with greater human capital or higher wages specializes in the labor market (GRONAU, 1977). The specialization theory does not incorporate the gender perspective and overlooks the necessity of policies aimed at fostering a more equitable distribution of household labor as fundamental for achieving a fairer society (BLOM; COOKE, 2023).

In contrast to this model, gender theorists assert that the division of housework encompasses more than just rational time allocation. Among these factors are gender identities, roles, and status hierarchies (BERK, 2012; WEST; ZIMMERMAN, 1987; RIDGEWAY; CORRELL, 2004). This explains why women typically undertake more domestic responsibilities than men, even when they spend similar hours in the labor market. Moreover, women often bear the primary responsibility for the mental organization of household tasks, even when their partners contribute more hours, potentially detracting from their work productivity (DAMINGER, 2019).

According to the Organization for Economic Cooperation and Development (OECD), the unequal division of household chores within the household can be a factor that contributes to explaining the gender differences observed in labor market outcomes (FER-RANT; PESANDO; NOWACKA, 2014). Furthermore, Matteazzi and Scherer (2021) contend that women tend to face more substantial wage penalties for routine domestic work compared to their male counterparts.

Several studies have analyzed the negative relationship between household chores and wages (BAXTER, 1992; BONKE; GUPTA; SMITH, 2004; BRYAN; SEVILLA-SANZ, 2011; CARLSON; LYNCH, 2017; COOKE; HOOK, 2018; COVERMAN, 1983; HERSCH; STRATTON, 1997; HERSCH, 2009; KEITH; MALONE, 2005; MCALLISTER, 1990; MCLENNAN, 2000). Although, just a few of the take into account the effects of the partner's household time on the individual wage (JACOBSEN; RAYACK, 1996; STROH; BRETT, 1996; BRYAN; SEVILLA-SANZ, 2011; HERSCH; STRATTON, 1997; HERSCH, 2009; KEITH; MALONE, 2005; MATTEAZZI; SCHERER, 2021).

Hence, the objective of this study is to examine the impact of individual and partner household chores on individual wages in Brazil. Furthermore, the study aims to assess how the division of household tasks within a household influences the gender wage gap. Lastly, we inquire whether enhanced gender equality in domestic responsibilities correlates with greater parity in the labor market. Specifically, our analysis focuses on wage differentials between partners (the intra-couple wage gap), the significance of both partners' domestic commitments, and the repercussions of the intra-household allocation of household labor. A similar analysis is conducted by Matteazzi and Scherer (2021) for the United States, Germany, and Italy. However, there is currently no analysis in the Brazilian context, neither regarding couples' simultaneous decision-making related to the time each partner dedicates to household chores, and its effects on their individual wages.

To fulfill the stated objectives, this study employs various methodological ap-

proaches including Ordinary Least Squares (OLS), Instrumental Variables (IV), and Seemingly Unrelated Regression (SUR). The dataset utilized is the Continuous National Household Sample Survey (PNADC) spanning from 2016 to 2019.

2 Data

The data used in this study is the Continuous National Household Sample Survey (PNADC) conducted by the Brazilian Institute of Geography and Statistics (IBGE), from 2016 to 2019. The PNADC sample follows a rotating panel design, where households are interviewed for one month and then exit the sample for two consecutive months; this process is repeated five times. While the survey is not a time diary, it includes stylized inquiries regarding time allocation for household chores and caregiving responsibilities. Consequently, respondents are queried about the amount of time dedicated to household chores or caregiving activities in the past week. This question was posed solely during the last interview and is accessible only for the years 2016 to 2019, thereby justifying the selected time frame.

We specifically targeted heterosexual couples wherein both partners were aged between 20 and 60 and were employed. This age bracket was selected to mitigate potential biases stemming from very young couples who might still be in education and thus not yet active in the job market. Similarly, couples aged over 60 are more likely to be retired and hence not contributing to the labor force. Individuals who reported not having a job but received a positive wage, those who were employed but did not receive a wage, and respondents who claimed to spend over 70 hours per week on domestic chores, over 60 hours in the labor market, or less than 5 hours in the labor market were excluded from the analysis. Finally, we excluded households with more than one family living together. The analyses are carried out for families with and without children to verify the robustness of the results.

Table 1 presents the descriptive statistics. It can be observed that the mean hourly wage é by about R\$16. The individual time spent on domestic chores is around 13 hours a week while the partner’s time spent in this activity is about 17 hours a week. Most of the sample has completed high school, is occupied at elementary occupations, and skilled agricultural workers, service, shop, and market sales workers the predominant sector is construction, wholesale and retail trade, and transportation. Finally, more than 88% live in urban areas and about 44% in the southeast.

Table 1 – Descriptive Statistics

Variable	Mean	SD	Min.	Max.
Hourly Wage	16.71329	24.94513	.0263127	70
Domestic Chores _i	13.42976	10.92327	0	4900
Domestic Chores _i ²	299.6759	494.4871	0	70
Domestic Chores _p	17.99487	13.54245	0	4900
Domestic Chores _p ²	507.2125	7325675	0	11
13 to 18	1.026111	.9980062	0	6
6 to 12	.4137598	.6380956	0	5
0 to 5	.3091463	.5471859	0	1
Black	.5229254	.499475	0	1
Incomplete Elementary	.239197	.4265939	0	1
Elementary	.0896533	.2856849	0	1
Incomplete High School	.0560399	.2299991	0	1
High School	.339226	.4734474	0	1

Incomplete Graduate	.0434378	.2038409	0	1
Graduate	.2133255	.4096563	0	1
Occupation ^a				
1	.2084058	.4061691	0	1
2	.0450355	.2073824	0	1
3	.1160445	.3202788	0	1
4	.0812165	.2731677	0	1
5	.0647192	.24603	0	1
6	.2082506	.4060577	0	1
7	.251991	.4341568	0	1
Sector ^b				
1	.0467942	.2111982	0	1
2	.2249983	.4175819	0	1
3	.3279192	.469456	0	1
4	.0453015	.2079648	0	1
5	.0282321	.1656356	0	1
6	.0807002	.2723746	0	1
7	.1846922	.3880483	0	1
8	.0610809	.2394789	0	1
Urban Area	.8871818	.3163709	0	1
Northeast	.223504	.4165939	0	1
Southeast	.4471264	.4971973	0	1
South	.1726706	.3779628	0	1
Mid-West	.087652	.2827886	0	1
Mills	.4867148	.2341807	.0583409	4.131356
2017	.2499832	.4330037	0	1
2018	.2517347	.4340103	0	1
2019	.2506508	.4333885	0	1

Notes: (a): Occupation: 1=Elementary occupations and skilled agricultural workers; 2=Managers; 3=Professionals; 4=Associate professionals; 5=Clerks; 6=Service, shop and market sales workers; 7=Craftworkers; Plant and machine operators. (b) Sector of the economic activity: 1=Arts, activities of extraterritorial bodies and other services; 2=Agriculture, mining, manufacturing, electricity, gas and water supply; 3=Construction, wholesale and retail trade, and transportation; 4=Accommodation and food services; 5=Information and communication, financial and insurance activities; 6=Real estate, professional and administrative services; 7=Public administration, education and human health services. 8=Domestic work.

Source: Survey results based on PNADC data, 2016-2019 (IBGE, 2020)

3 Methodology

3.1 Instrumental Variables

As individuals with higher productivity tend to specialize in the labor market and reduce time spent on housework, housework can be endogenous to the wage equation. In that case, domestic work is instrumentalized from the income of non-domestic work, partner characteristics such as age, education, and income, and the number and age cohort of resident children. To confirm the robustness of the instrumental variable estimates, a heteroscedasticity-based instrumental variable (LEWBEL, 2012) is also performed.

Let y_i denote the outcome variable of interest, the hourly wage of i individual for individual wages analysis, and the wage gap in the within couple wage gap analysis. The difference between the male and female wages gives the wage gap. Y_i denotes the interest variables (the hourly wage of i individual for individual wages analysis and the wage gap in

the within couple wage gap analysis), X_i denotes K_1 additional observed control variables (the individual partner's squared time spent on domestic chores, the partners time spent on domestic chores, the number of children aged between 13 and 18 years old, the number of children aged between 6 and 12 years old, the number of children aged between 0 and 5 years old, race, educational level, occupation, sector of the economic activity, region controls, and year controls), and Z_i denote the instrumental variable (obtained through the variables of non-work income, partner's age, partner's work income and total number of children), where these are all observed for observations $i = 1, \dots, N$. Also, let β and γ be unknown parameter vectors, let Φ and Π be matrices of unknown parameters, and let β' denote the transpose of β . Suppose that these variables are linearly related as

$$y_i = \beta' Y_i + \gamma' X_i + u_i \quad (1)$$

$$Y_i = \Phi X_i + \Pi Z_i + V_i \quad (2)$$

where u_i and V_i are error terms.

3.2 Seemingly Unrelated Regression

The intrahousehold decision of the couple's time allocation into household chores can be considered a collective decision. These decisions are made through interactions between the couple and produce responses that are Pareto efficient. Considering that the intrafamily decision is simultaneous, the estimation of Seemingly Unrelated Regression (SUR) is carried out to verify the impacts of the individual's and partner's time allocation in domestic chores over wages. The domestic chores variables used in the SUR model are obtained using the Two-Stage Least Squares (2SLS) to instrumentalize where domestic work is the dependent variable and income of non-domestic work, partner characteristics such as age, education, and income, and the number and age cohort of resident children are explanatory.

The SUR model, developed by Zellner (1962), considers that the decisions of one partner have effects on the decisions of the other, even if there is no information available that makes it possible to measure this relationship.

The SUR model can be represented as follows:

$$Y_j = X_j \beta_j + \varepsilon_j \quad j = 1, 2, \dots, k \quad (3)$$

where

$$\varepsilon_j = [\varepsilon_{j1}', \varepsilon_{j2}', \dots, \varepsilon_{jk}']$$

and

$$E[\varepsilon_j] = 0$$

with $E[\varepsilon_{jt} \varepsilon_{ls}'] = \sigma_{jl}$ if $t = s$, and 0, otherwise, in addition $E[\varepsilon_j \varepsilon_l'] = \sigma_{jl} I_T$.

Where Y_j is the individual j wages. It is assumed that, to estimate Y_j , a total of T observations are used, making it possible to estimate the parameters β_j of k equations,

using the set X_j of independent variables. Each equation has Z_k regressors for a total of $Z = \sum_{j=1}^k Z_j$. Furthermore, the assumption is also made that the data is well behaved¹ and that the errors (ε_j) are not correlated. In the present work, it is possible to specify two regressions ($k = 2$).

4 Results

In the selected sample, 40.51% of women were unemployed or out of the labor force while only 10.28% of men were in this situation. The Heckman (1979) correction is used to reduce the sample selection bias caused by the high level of female non-participation in the labor market and the mill's ratio was included among the explanatory variables².

4.1 Individual Wages

Time spent on domestic tasks may be endogenous to wages, as individuals with higher salaries often allocate more time to the labor market and can afford to outsource domestic tasks. The Wu-Hausman and Durbin-Wu-Hausman (HAUSMAN, 1978; WU, 1973) endogeneity indicated that, in the Brazilian context, domestic chores are endogenous for both men and women, supporting the application of the instrumental variables method. These results are presented in Table 2.

Table 2 – Endogeneity tests

	Wu-Hausman	Durbin-Wu-Hausman	P-Value
Women	1.54e+04	1.35e+04	0.00000
Men	608.06997	604.80090	604.80090

Source: Survey results based on PNADC data, 2016-2019 (IBGE, 2020).

The results in Table 3 illustrate the impacts of individual and partner household chores on the wages of men and women, derived from Ordinary Least Squares (OLS), Robust Method of Variables Instrumentals (HB IV)³. Since the couple's decision on time allocation for household chores can be a collective and simultaneous one, the results are also analyzed using the Seemingly Unrelated Regression (SUR) method.

Initially, an increase in time dedicated to household chores corresponds to a decrease in wages for both men and women. Moreover, this effect is more pronounced for women, with a potential reduction of up to R\$18.41 in hourly wages when employing the HB IV method. Conversely, for men, the reduction can reach up to R\$8.24. One potential explanation for the variance in results is that tasks typically deemed non-routine, such as minor repairs and gardening, which are more commonly performed by men, may not significantly impact the wages of either men or women (COOKE; HOOK, 2018; HERSCH, 2009). Furthermore, some studies indicate that routine tasks, such as house cleaning, primarily undertaken by women, exert a detrimental impact on employment. This adverse effect per additional hour is observed to be more pronounced for women compared to men (BRYAN; SEVILLA-SANZ, 2011; CARLSON; LYNCH, 2017; COOKE; HOOK, 2018; HERSCH, 2009;

¹ For more details on well-behaved data, see Greene (2003).

² The Heckman procedure details and the estimation results are presented in Appendix A.

³ The estimation of Instrumental Variables (IV) was also conducted and the results are similar to the ones obtained with the HB IV. These results are available under request to the corresponding author.

HERSCH; STRATTON, 1997; KILLEWALD; GARCÍA-MANGLANO, 2016; KÜHHIRT; LUDWIG, 2012; MATTEAZZI; SCHERER, 2021; POLLMANN-SCHULT, 2011). When we consider the possibility of the couple deciding about time allocation in domestic chores simultaneously, there is also a negative effect of domestic chores over individual wages. However, this effect has a higher negative impact on wages for men than for women.

In contrast, except when endogeneity is not controlled (OLS model) results for women, the findings suggest that a partner's engagement in household chores contributes to an increase in the individual's wage. This effect is more pronounced for women on the HB IV model, indicating that men increasing their time spent on domestic tasks contributes more to their partner's salary increase than the contribution from women increasing their time on such activities. This result is the opposite of what was obtained in [Matteazzi and Scherer \(2021\)](#) and can be attributed to women already bearing a significant burden with household chores, so any additional increase only marginally impacts their partners' earnings. However, the effect is higher for men when considering the simultaneous decision.

Even though, the results support the OECD's suggestion that unequal sharing of household chores may help explain gender disparities in labor market outcomes ([FERRANT; PESANDO; NOWACKA, 2014](#)). Hence, the results indicate that fostering men to take on more domestic responsibilities could be a viable strategy for narrowing the gender wage gap.

Regarding the age range of children in the household, it is noted that for children between 13 and 18 years old, there is an increase in women's hourly wages and a decrease in men's hourly wages. This outcome can be explained by the fact that teenagers in this age group can assist with household chores, allowing women to dedicate more time to the labor market. This increased availability may enable women to pursue full-time, formal employment, leading to higher wages.

The presence of children aged between 6 and 12 years reduces women's hourly wages according to the OLS model, but this effect is not significant in the HB IV model. For men, the results are not significant in the OLS model, but an increase in hourly wages is observed in the IV results. Concerning the presence of children aged between 0 and 5 years, there is a decrease in women's hourly wages and an increase in men's hourly wages. This finding suggests that when there are young children in the household, women tend to prioritize caregiving responsibilities over their careers, while men take on the role of the primary breadwinner.

As expected, being black reduces women's and men's wages. The higher the educational level, the higher the hourly wage for both men and women. However, the wage increase due to educational level is more pronounced for women than for men.

Table 3 – Effects of individuals' and their partners' housework hours on hourly wages

	Women			Men		
	OLS	HB IV	SUR	OLS	HB IV	SUR
Domestic Chores _i	-0.304*** (0.0224)	-18.41*** (0.941)	-3.633*** (0.343)	-0.208*** (0.0244)	-8.249*** (0.560)	-5.490*** (0.447)
Domestic Chores _i ²	0.00435*** (0.000383)	0.317*** (0.0164)	0.0308*** (0.0115)	0.00381*** (0.000641)	0.192*** (0.0133)	0.110*** (0.0154)
Domestic Chores _p	0.0345** (0.0170)	6.897*** (0.368)	6.537*** (0.343)	-0.237*** (0.0359)	2.510*** (0.199)	9.240*** (0.466)
Domestic Chores _p ²	4.38e-05 (0.000470)	-0.150*** (0.00841)	-0.136*** (0.0117)	0.00329*** (0.000536)	-0.0439*** (0.00347)	-0.156*** (0.0153)
13 to 18	0.983*** (0.148)	3.127*** (0.404)	0.743*** (0.0950)	0.341** (0.143)	-2.331*** (0.262)	1.794*** (0.124)
6 to 12	-1.456*** (0.247)	-0.799 (0.532)	-0.511*** (0.163)	0.161 (0.195)	3.503*** (0.348)	-3.298*** (0.208)
0 to 5	-7.827*** (0.505)	-7.537*** (0.742)	-3.563*** (0.309)	-0.658*** (0.223)	5.025*** (0.470)	-9.347*** (0.388)
Black	-1.768*** (0.149)	1.282*** (0.497)	-1.362*** (0.101)	-3.818*** (0.160)	-2.550*** (0.243)	-2.665*** (0.133)
Incomplete Elementary	9.299*** (0.669)	13.67*** (2.141)	3.745*** (0.511)	0.380** (0.179)	1.580** (0.665)	-5.862*** (0.507)
Elementary	16.70*** (1.029)	14.44*** (2.328)	9.180*** (0.540)	1.313*** (0.211)	5.514*** (0.767)	-3.123*** (0.529)
Incomplete High School	18.31*** (1.135)	14.57*** (2.444)	10.05*** (0.557)	1.522*** (0.245)	7.167*** (0.850)	-2.703*** (0.552)
High School	25.05*** (1.472)	17.64*** (2.487)	15.41*** (0.552)	2.562*** (0.207)	8.578*** (0.793)	1.440*** (0.511)
Incomplete Graduate	32.25*** (1.818)	18.12*** (2.845)	21.27*** (0.611)	6.027*** (0.471)	13.38*** (1.013)	6.488*** (0.589)
Graduate	49.92*** (2.298)	25.63*** (3.099)	37.79*** (0.640)	20.97*** (0.513)	24.94*** (0.924)	25.86*** (0.582)
Urban Area	1.727*** (0.128)	-4.292*** (0.678)	1.082*** (0.179)	1.770*** (0.107)	3.303*** (0.315)	2.022*** (0.244)
Northeast	1.168*** (0.241)	16.23*** (1.150)	0.183 (0.222)	-0.700*** (0.185)	-4.956*** (0.461)	-0.266 (0.292)
Southeast	9.589*** (0.503)	18.11*** (1.074)	6.372*** (0.228)	2.496*** (0.204)	3.056*** (0.377)	2.845*** (0.278)
South	10.85*** (0.621)	16.43*** (1.105)	6.950*** (0.259)	1.061*** (0.229)	4.683*** (0.465)	1.654*** (0.305)
Mid-West	9.218*** (0.439)	14.82*** (1.037)	6.677*** (0.262)	3.938*** (0.319)	1.085** (0.472)	3.996*** (0.332)
Mills	49.62*** (2.872)	33.23*** (2.821)	29.62*** (0.571)	- (-)	- (-)	- (-)
Constant	-37.27*** (9.887)	112.7*** (16.71)	-36.81*** (3.569)	19.17*** (1.561)	32.98*** (4.779)	-32.13*** (4.633)
Occupation Controls	Yes	Yes	Yes	Yes	Yes	Yes
Sector Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	106,568	106,568	103,375	105,097	105,097	103,375
R ²	0.342	.	0.349	0.255	.	0.336

Note: *Significant at 10%; **Significant at 5%; ***Significant at 1%. (-): not controlled for; (-): not available; OLS: ordinary least squares; HB IV: heteroskedasticity-based instrumental variable; SUR: Seemingly Unrelated Regression.

Source: Survey results based on PNADC data, 2016-2019 (IBGE, 2020).

4.2 Within-couple wage gap

The within-couple wage gap is calculated as the male wage minus the female wage. Table 4 presents the findings regarding the wage gap within couples. The results indicate that an increase in women's time spent on domestic tasks is associated with an increase in the wage gap, reaching up to R\$1.07 in hourly wages in HB IV estimates. Conversely, an increase in men's time spent on domestic tasks contributes to a reduction in the gap, amounting to R\$3.03 in hourly wages. Therefore, the results suggest that a more equitable distribution of household chores contributes to a fairer environment in the household.

Regarding age differences, a smaller wage gap is observed when men are older than women. Similarly, a smaller wage gap is seen with greater educational disparities in favor of men. Additionally, being black is a factor associated with a smaller wage gap. Conversely, a larger wage gap is found when the couple lives in an urban area.

Table 4 – Within-couple wage gap results

	OLS	HB IV
Domestic Chores _f	-0.00573*** (0.000254)	1.074*** (0.00534)
Domestic Chores _m	-0.0677*** (0.000341)	-3.036*** (0.00662)
Age Difference	-0.201*** (0.000445)	-0.188*** (0.000693)
Educational Difference	-0.315*** (0.000854)	-0.403*** (0.00119)
Black _f	-0.702*** (0.00633)	-1.330*** (0.00959)
Black _m	-0.982*** (0.00634)	0.473*** (0.00987)
Urban Area	0.986*** (0.0102)	3.116*** (0.0168)
Northeast	0.453*** (0.0120)	-2.996*** (0.0212)
Southeast	0.848*** (0.0115)	1.326*** (0.0185)
South	0.234*** (0.0128)	3.113*** (0.0195)
Mid-West	1.196*** (0.0136)	-0.641*** (0.0199)
Constant	1.139*** (0.229)	16.35*** (0.315)
Occupation Controls	Yes	Yes
Sector Controls	Yes	Yes
Year Controls	Yes	Yes
Observations	54,335,507	54,335,507
R ²	0.084	.

Note: *Significant at 10%; **Significant at 5%; ***Significant at 1%; (·): not available; OLS: ordinary least squares; HB; IV: heteroskedasticity-based instrumental variable.

Source: Survey results based on PNADC data, 2016-2019 (IBGE, 2020)

4.3 Heterogeneity

4.3.1 Full-time employment

The first heterogeneity analysis is conducted only for people who work at least 40 hours a week. This test aims to determine if the effects persist when considering couples in full-time jobs, who consequently have limited flexibility to increase their time in the labor market, despite any increase in their partner’s time spent on domestic tasks.

4.3.1.1 Individual Wages

The Wu-Hausman and Durbin-Wu-Hausman (HAUSMAN, 1978; WU, 1973) endogeneity indicated that, in the Brazilian context, domestic chores are endogenous for both men and women working in a full-time job, once more supporting the application of the instrumental variables method. These results are presented in Table 5.

Table 5 – Endogeneity tests

	Wu-Hausman	Durbin-Wu-Hausman	P-Value
Women	1.49e+04	1.31e+04	0.00000
Men	768.78634	763.48475	0.00000

Source: Survey results based on PNADC data, 2016-2019 (IBGE, 2020).

The results in Table 6 illustrate the impacts of individual and partner household chores on the wages of men and women working in full-time jobs, derived from Ordinary Least Squares (OLS), Robust Method of Variables Instrumentals (HB IV). Since the couple’s decision on time allocation for household chores can be a collective and simultaneous one, the results are also analyzed using the Seemingly Unrelated Regression (SUR) method.

Initially, an increase in time dedicated to household chores corresponds to a decrease in wages for both men and women. Moreover, this effect is more pronounced for women, with a potential reduction of up to R\$18.47 in hourly wages when employing the HB IV method. A very similar result is obtained for the general model. Conversely, for men, the reduction can reach up to R\$5.84, smaller than for the general model. When we contemplate the scenario where both partners jointly decide on how to divide their time for domestic chores, we also observe a detrimental influence of these chores on individual earnings. Nevertheless, this impact tends to be more pronounced for men compared to women.

In contrast, except when endogeneity is not controlled (OLS model) on the results for men, the findings suggest that a partner’s engagement in household chores contributes to an increase in the individual’s wage. While on the HB IV model, the results indicate that men increasing their time spent on domestic tasks contributes more to their partner’s salary increase than the contribution from women increasing their time on such activities, the opposite occurs for the SUR model.

Regarding the age range of children in the household, it is noted that for children between 13 and 18 years old, there is an increase in women’s hourly wages and a decrease in men’s hourly wages. The presence of children aged between 6 and 12 years reduces women’s hourly wages while for men, the results indicate an increase in hourly wages in

the IV results. Concerning the presence of children aged between 0 and 5 years, there is a decrease in women's hourly wages.

Table 6 – Effects of individuals' and their partners' housework hours on hourly wages

	Women			Men		
	OLS	HB IV	SUR	OLS	HB IV	SUR
Domestic Chores _i	-0.332*** (0.0277)	-18.47*** (1.170)	-2.635*** (0.415)	-0.232*** (0.0268)	-5.847*** (0.471)	-6.101*** (0.563)
Domestic Chores _i ²	0.00435*** (0.000518)	0.340*** (0.0220)	0.00804 (0.0139)	0.00417*** (0.000706)	0.138*** (0.0114)	-0.172*** (0.0190)
Domestic Chores _p	0.0942*** (0.0204)	7.987*** (0.523)	5.780*** (0.418)	-0.198*** (0.0398)	1.728*** (0.167)	9.620*** (0.579)
Domestic Chores _p ²	-0.000676 (0.000520)	-0.181*** (0.0124)	-0.108*** (0.0143)	0.00277*** (0.000573)	-0.0304*** (0.00292)	0.138*** (0.0194)
13 to 18	1.042*** (0.192)	3.174*** (0.471)	1.194*** (0.112)	0.407*** (0.156)	-1.411*** (0.216)	2.192*** (0.152)
6 to 12	-1.500*** (0.303)	-1.298** (0.618)	-1.351*** (0.192)	0.0602 (0.210)	2.340*** (0.285)	-3.809*** (0.255)
0 to 5	-7.833*** (0.658)	-7.665*** (0.903)	-5.600*** (0.362)	-0.728*** (0.217)	3.365*** (0.389)	-10.35*** (0.473)
Black	-1.719*** (0.178)	0.723 (0.560)	-1.385*** (0.116)	-3.715*** (0.155)	-2.770*** (0.197)	-2.958*** (0.158)
Incomplete Elementary	8.805*** (0.874)	10.23*** (2.828)	2.763*** (0.661)	0.287 (0.177)	1.407** (0.583)	-6.239*** (0.688)
Elementary	15.87*** (1.349)	12.19*** (3.030)	8.307*** (0.689)	1.197*** (0.202)	4.384*** (0.668)	-3.288*** (0.705)
Incomplete High School	17.61*** (1.496)	11.68*** (3.161)	9.641*** (0.707)	1.322*** (0.218)	5.463*** (0.731)	-3.234*** (0.731)
High School	24.20*** (1.952)	14.36*** (3.233)	15.46*** (0.700)	2.360*** (0.201)	6.792*** (0.698)	1.890*** (0.684)
Incomplete Graduate	31.16*** (2.402)	15.04*** (3.640)	22.18*** (0.762)	5.854*** (0.468)	10.88*** (0.866)	8.642*** (0.760)
Graduate	48.47*** (3.060)	23.53*** (3.941)	41.92*** (0.794)	20.56*** (0.522)	22.54*** (0.817)	31.64*** (0.746)
Urban Area	1.870*** (0.131)	-1.852** (0.755)	0.757*** (0.235)	1.633*** (0.106)	2.716*** (0.245)	1.654*** (0.314)
Northeast	1.143*** (0.303)	14.32*** (1.322)	0.132 (0.288)	-0.943*** (0.204)	-4.103*** (0.395)	-1.220*** (0.391)
Southeast	9.487*** (0.656)	17.53*** (1.292)	6.439*** (0.286)	2.643*** (0.220)	2.827*** (0.316)	2.125*** (0.365)
South	10.24*** (0.814)	16.37*** (1.353)	6.658*** (0.319)	0.757*** (0.234)	3.296*** (0.388)	0.341 (0.393)
Mid-West	8.890*** (0.566)	14.97*** (1.250)	6.059*** (0.325)	3.364*** (0.258)	1.719*** (0.395)	3.129*** (0.426)
Mills	49.66*** (3.894)	33.00*** (3.595)	30.39*** (0.670)	- -	- -	- -
Constant	-44.63*** (4.881)	107.8*** (15.87)	-46.86*** (4.004)	18.08*** (2.043)	29.15*** (3.495)	-34.54*** (5.519)
Occupation Controls	Yes	Yes	Yes	Yes	Yes	Yes
Sector Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	71,146	71,146	62,610	158,473	89,958	62,610
R ²	0.385	.	0.368	0.268	.	0.310

Note: *Significant at 10%; **Significant at 5%; ***Significant at 1%. (-): not controlled for; (·): not available; OLS: ordinary least squares; HB IV: heteroskedasticity-based instrumental variable; SUR: Seemingly Unrelated Regression.

Source: Survey results based on PNADC data, 2016-2019 (IBGE, 2020).

4.3.1.2 Within-couple wage gap

The within-couple wage gap is calculated as the male wage minus the female wage. Table 7 presents the findings regarding the wage gap within couples where both are full-time employed. The results indicate that an increase in women’s time spent on domestic tasks is associated with an increase in the wage gap, reaching up to R\$3.37 in hourly wages in HB IV estimates. This result is almost three times higher than the general model. Conversely, an increase in men’s time spent on domestic tasks contributes to a reduction in the gap, amounting to R\$4.95 in hourly wages. This result is also higher than the general model. Therefore, the results suggest that a more equitable distribution of household chores contributes to a fairer environment in the household, especially if the couple has a full-time job.

In terms of age disparities, a narrower wage gap is noticed when men are older than women. Similarly, a diminished wage gap is evident when there are greater educational differences in favor of men. Furthermore, being black is linked to a narrower wage gap. Conversely, a wider wage gap is identified when the couple resides in an urban area.

Table 7 – Within-couple wage gap results

	OLS	HB IV
Domestic Chores _f	0.0550*** (0.000308)	3.370*** (0.00679)
Domestic Chores _m	-0.107*** (0.000386)	-4.953*** (0.00896)
Age Difference	-0.188*** (0.000485)	-0.169*** (0.00125)
Educational Difference	-0.336*** (0.000949)	-0.486*** (0.00242)
Black _f	-0.647*** (0.00688)	-1.763*** (0.0174)
Black _m	-1.093*** (0.00686)	0.791*** (0.0176)
Urban Area	0.406*** (0.0119)	3.040*** (0.0300)
Northeast	-0.168*** (0.0143)	-7.738*** (0.0376)
Southeast	0.583*** (0.0135)	-2.603*** (0.0338)
South	-0.114*** (0.0146)	2.060*** (0.0354)
Mid-West	1.181*** (0.0156)	-2.152*** (0.0375)
Constant	2.531*** (0.234)	1.605*** (0.515)
Occupation Controls	Yes	Yes
Sector Controls	Yes	Yes
Year Controls	Yes	Yes
Observations	34,286,800	34,286,800
R ²	0.090	.

Note: *Significant at 10%; **Significant at 5%; ***Significant at 1%; (-): not available; OLS: ordinary least squares; HB; IV: heteroskedasticity-based instrumental variable.

Source: Survey results based on PNADC data, 2016-2019 (IBGE, 2020)

4.3.2 Childless

Many times, the time spent caring for children is not considered a household chore by parents. Since the PNADC data does not have a specific question about time spent on this type of activity, it may lead to an underreporting of the total time spent on housework. To check the robustness of the results, we consider a subsample of childless couples.

4.3.2.1 Individual Wages

Even without children, time spent on domestic tasks may still be endogenous to wages, as individuals with higher salaries often allocate more time to the labor market and can afford to outsource domestic tasks. The Wu-Hausman and Durbin-Wu-Hausman (HAUSMAN, 1978; WU, 1973) endogeneity indicated that, in the Brazilian context, domestic chores are endogenous even for childless men and women, supporting the application of the instrumental variables method. These results are presented in Table 8.

Table 8 – Endogeneity tests

	Wu-Hausman	Durbin-Wu-Hausman	P-Value
Single Women	4.73e+03	4.19e+03	0.00000
Single Men	668.07933	656.49133	0.00000

Source: Survey results based on PNADC data, 2016-2019 (IBGE, 2020).

The results presented in Table 9 demonstrate the effects of individual and partner household chores on the wages of childless men and women, estimated using Ordinary Least Squares (OLS), Robust Method of Variables Instrumentals (HB IV). Since the couple's decision on time allocation for household chores can be a collective and simultaneous one, the results are also analyzed using the Seemingly Unrelated Regression (SUR) method.

The findings for the childless sample are quite similar to those of the general sample. An increase in the time spent on domestic chores contributes to a decrease of up to R\$19.91 in women's hourly wages (compared to R\$19 in the general model). For men, this reduction can reach up to R\$14.06 in hourly wages, whereas it was only up to R\$7 in the general model. This result reinforces the idea that the man is the family provider when there are children. Another issue raised by this result is that families with children may not be able to replace certain domestic tasks from women to men, such as breastfeeding.

In contrast, except for when the endogeneity is not controlled, the findings indicate that a partner's involvement in household chores leads to an increase in the individual's wage. This effect is more pronounced for women, suggesting that men increasing their time spent on domestic tasks contributes more to their partner's salary increase than the contribution from women increasing their time in such activities. Furthermore, the results for childless women are close to the general sample, while for men the increase in the partner's time spent on domestic chores results in an increase of close to R\$4.11 in hourly wage compared to R\$2.51 in the general sample.

As anticipated, higher levels of education correspond to higher hourly wages for both genders. Nevertheless, the wage boost linked to educational attainment is more significant for women than for men. The IV results suggest that the educational effects are stronger for childless couples, both for women and men. For instance, childless women with a graduate degree experience an hourly wage increase of approximately R\$22.13 compared

to non-educated childless women, whereas for the general sample, this increase is about R\$17.64.

Table 9 – Effects of childless individuals’ and their partners’ housework hours on hourly wages

	Women			Men		
	OLS	HB IV	SUR	OLS	HB IV	SUR
Domestic Chores _i	-0.357*** (0.0422)	-19.91*** (1.746)	-3.861*** (1.045)	-0.381*** (0.0660)	-14.06*** (1.484)	-8.282*** (1.325)
Domestic Chores _i ²	0.00549*** (0.000781)	0.390*** (0.0351)	0.0422 (0.0382)	0.00783*** (0.00190)	0.391*** (0.0439)	0.227*** (0.0493)
Domestic Chores _p	0.0128 (0.0318)	7.236*** (0.674)	24.66*** (1.152)	-0.261*** (0.0934)	4.113*** (0.484)	32.59*** (1.611)
Domestic Chores _p ²	-0.000198 (0.00110)	-0.167*** (0.0170)	-0.840*** (0.0434)	0.00451*** (0.00145)	-0.0828*** (0.0100)	-1.015*** (0.0584)
Black	-1.324*** (0.225)	1.509* (0.818)	-0.992*** (0.169)	-3.461*** (0.277)	-1.664*** (0.579)	-2.305*** (0.226)
Incomplete Elementary	7.668*** (0.659)	16.44*** (3.638)	5.905*** (0.793)	0.752*** (0.234)	0.129 (1.602)	-3.468*** (0.805)
Elementary	14.11*** (0.923)	20.86*** (3.975)	9.250*** (0.845)	1.956*** (0.304)	4.401** (1.751)	-2.092** (0.841)
Incomplete High School	16.03*** (1.047)	21.42*** (4.205)	9.674*** (0.892)	2.327*** (0.497)	8.126*** (2.020)	-1.622* (0.901)
High School	21.68*** (1.275)	22.13*** (4.144)	13.85*** (0.865)	3.303*** (0.303)	9.443*** (1.747)	2.148*** (0.808)
Incomplete Graduate	28.47*** (1.632)	21.55*** (4.696)	19.45*** (0.973)	6.971*** (0.980)	16.95*** (2.215)	8.580*** (0.934)
Graduate	42.29*** (1.924)	30.12*** (4.955)	35.55*** (1.015)	19.89*** (0.946)	25.01*** (2.007)	28.23*** (0.934)
Urban Area	1.203*** (0.268)	-4.048*** (1.172)	0.805*** (0.310)	1.551*** (0.198)	3.057*** (0.781)	1.916*** (0.429)
Northeast	0.724* (0.385)	13.11*** (1.825)	-0.146 (0.386)	-1.013*** (0.337)	-7.418*** (1.110)	-0.415 (0.515)
Southeast	7.361*** (0.481)	13.98*** (1.656)	5.439*** (0.398)	1.830*** (0.379)	2.090** (0.915)	2.038*** (0.488)
South	8.464*** (0.544)	13.30*** (1.740)	6.336*** (0.450)	0.661 (0.422)	5.744*** (1.148)	1.562*** (0.532)
Mid-West	7.601*** (0.457)	13.73*** (1.675)	6.149*** (0.450)	3.486*** (0.442)	0.214 (1.048)	4.093*** (0.573)
Mills	40.88*** (2.323)	33.77*** (4.419)	27.84*** (1.063)	- -	- -	- -
Constant	-6.611 (23.62)	113.9*** (25.80)	-130.5*** (9.449)	19.10*** (2.257)	44.92*** (12.88)	-171.7*** (11.63)
Occupation Controls	Yes	Yes	Yes	Yes	Yes	Yes
Sector Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	36,216	36,216	35,238	60,264	35,809	35,238
R ²	0.327	.	0.343	0.191	.	0.323

Note: *Significant at 10%; **Significant at 5%; ***Significant at 1%. (-): not controlled for; (-): not available; OLS: ordinary least squares; HB IV: heteroskedasticity-based instrumental variable; SUR: Seemingly Unrelated Regression.

Source: Survey results based on PNADC data, 2016-2019 (IBGE, 2020).

4.3.2.2 Whitin-couple wage gap

Table 10 presents the findings regarding the wage gap within couples. The results indicate that an increase in women’s time spent on domestic tasks decreases the gap by

about R\$1.10. For your turn, an increase in men’s time spent on domestic tasks contributes to an even higher decrease in the gap, amounting to R\$11.06.

Regarding age differences, a smaller wage gap is observed when men are older than women. Similarly, a smaller wage gap is seen with greater educational disparities in favor of men. Additionally, if the woman is Black, there is a smaller wage gap. However, if the man is Black, there is a higher wage gap (except for when the endogeneity is not controlled for). Finally, a larger wage gap is found when the couple lives in an urban area.

Table 10 – Childless within-couple wage gap results

	OLS	HB IV
Domestic Chores _f	0.0205*** (0.000486)	-1.010*** (0.0244)
Domestic Chores _m	-0.0943*** (0.000646)	-11.06*** (0.0526)
Age Difference	-0.238*** (0.000742)	-0.188*** (0.00345)
Educational Difference	-0.352*** (0.00145)	-0.472*** (0.00663)
Black _f	-0.820*** (0.0108)	-1.134*** (0.0491)
Black _m	-0.853*** (0.0108)	4.888*** (0.0558)
Urban Area	1.359*** (0.0182)	1.109*** (0.0862)
Northeast	0.509*** (0.0216)	-2.440*** (0.106)
Southeast	0.540*** (0.0206)	7.332*** (0.112)
South	0.153*** (0.0227)	8.261*** (0.113)
Mid-West	1.396*** (0.0240)	-10.81*** (0.125)
Constant	-4.840*** (0.347)	142.3*** (1.886)
Occupation Controls	Yes	Yes
Sector Controls	Yes	Yes
Year Controls	Yes	Yes
Observations	18,794,836	18,794,836
R ²	0.083	-

Note: *Significant at 10%; **Significant at 5%; ***Significant at 1%; (·): not available; OLS: ordinary least squares; HB; IV: heteroskedasticity-based instrumental variable.

Source: Survey results based on PNADC data, 2016-2019 (IBGE, 2020)

5 Concluding Remarks

This article aims to analyze the influence of individual and partner household chores on wages and the gender wage gap. The results indicate that both individuals’ and partners’ housework play a role in explaining this gap. Specifically, women’s housework contributes significantly to a decrease in their own wages, while men do not benefit as much from their time spent on household chores. This may be explained by the fact that men

are predominantly employed in full-time jobs. Even though women take on the majority of domestic work, freeing up men's time, this extra time cannot be fully utilized in the labor market.

On the other hand, the time men spend on domestic chores reduces their wages, but to a lesser extent than for women. Additionally, male contributions to domestic activities have a positive impact on female wages. These findings hold true for both individual wages and the within-couple wage gap. Therefore, promoting men's involvement in domestic chores appears to be a way to reduce disparities in the labor market.

It also suggests that the gender-neutral economic model is not entirely consistent with the empirical results, as the penalty for domestic chores is higher for women. Another implication is that gender inequalities within the household are socially reproduced in the labor market, and a shift toward more equitable gender roles could help reduce gender income inequalities, as suggested by the OECD (FERRANT; PESANDO; NOWACKA, 2014).

One limitation of the study is that the data does not provide information about specific household tasks. This could be a crucial control factor, as the literature indicates that tasks predominantly performed by females, such as cleaning and caregiving, are penalized more than tasks predominantly performed by males, such as small repairs (HERSCH; STRATTON, 2002; NOONAN, 2001). Additionally, the format of the PNADC data does not allow for the control of fixed effects.

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Appendix A

Heckman

In the selected sample, 40.51% of women were unemployed or out of the labor force while only 10.28% of men were in this situation. The Heckman (1979) correction is used to

reduce the sample selection bias caused by the high level of female non-participation in the labor market. The Heckman (1979) selection equation estimates the probability of being employed. In the selection equation, the dependent variable assumes a value equal to one if the woman is employed and equal to zero if not. The dependent variable y_i^* represents labor market participation and is then regressed from:

$$y_i^* = \beta_i X_i + \mu_i \quad (4)$$

where X_i is a vector of explanatory variables, in which there is a latent probability that the woman is employed. The latent probability y_i is not observed. What is observed is the binary dependent variable y , such that:

$$y_i = 1 \text{ if } y_i^* > 0 \text{ and,} \quad (5)$$

$$y_i = 0 \text{ if } y_i^* \leq 0 \quad (6)$$

The equation yielded is calculated using:

$$w_i = \delta Z_i + \varepsilon_i \quad (7)$$

where w_i represents the wage, Z_i represents the vector of explanatory variables that determine the wage, δ_i corresponds to the parameter set, and ε_i is the error vector.

Assuming that:

$$\mu_i \sim N(0, \sigma), \quad (8)$$

$$\varepsilon_i \sim N(0, 1), \quad (9)$$

$$\text{corr}(\mu_i, \varepsilon_i) = \rho \quad (10)$$

So, if $\rho \neq 0$, the sample used in the earnings equation is random, and the use of standard regression techniques results in biased estimates. By estimating the parameters β_i and μ_i , it is possible to construct λ , which is called the inverse of Mills ratio, through:

$$\lambda = \frac{\phi\left(\frac{\beta X_i}{\sigma_\mu}\right)}{\Phi\left(\frac{\beta X_i}{\sigma_\mu}\right)} \quad (11)$$

so ϕ is the probability density function and Φ is the cumulative distribution function for the normal distribution. The inverse of the Mills ratio, λ , is included in the Ordinary Least Squares, and Instrumental Variables methods. Thus, consistent estimators are obtained for the population parameters and the problem of sample selectivity is corrected. From the results, one can then predict the expected values for the hourly wage that would be expected in the absence of selection bias.

Heckman Results

Table 11 – Heckman

Variables	LFP
Age _{<i>i</i>}	-0.00377*** (0.000773)
Age _{<i>p</i>}	-0.0106*** (0.000718)
13 to 18	0.0502*** (0.00755)
6 to 12	-0.130*** (0.0103)
0 to 5	-0.430*** (0.0107)
Incomplete Primary _{<i>i</i>}	0.181*** (0.0309)
Primary _{<i>i</i>}	0.370*** (0.0332)
Incomplete High School _{<i>i</i>}	0.387*** (0.0348)
High School _{<i>i</i>}	0.637*** (0.0319)
Incomplete Undergraduate _{<i>i</i>}	0.876*** (0.0385)
Undergraduate _{<i>i</i>}	1.403*** (0.0347)
Incomplete Primary _{<i>p</i>}	0.155*** (0.0244)
Primary _{<i>p</i>}	0.201*** (0.0275)
Incomplete High School _{<i>p</i>}	0.265*** (0.0298)
High School _{<i>p</i>}	0.213*** (0.0259)
Incomplete Undergraduate _{<i>p</i>}	0.221*** (0.0360)
Undergraduate _{<i>p</i>}	0.115*** (0.0302)
Black	0.0147 (0.00957)
Wage _{<i>p</i>}	-0.00298*** (0.000261)
Non-Work Income	-2.37e-05*** (6.59e-06)
Northeast	0.0726*** (0.0131)
Southeast	0.320*** (0.0137)
South	0.426*** (0.0149)
Midwest	0.276*** (0.0154)
Constant	0.124*** (0.0456)
Year Controls	Yes
Observations	195,404

Note: *Significant at 10%; **Significant at 5%; ***Significant at 1%. Observations represented with sample expansion.

Source: Survey results based on PNAD data, 2016-2019 (IBGE, 2020)