ACCESS TO EARLY CHILDHOOD EDUCATION AND TIME ALLOCATION OF MOTHERS

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ABSTRACT

The present study aims to evaluate the impact of early childhood education on mothers' time allocation between paid and unpaid domestic work. There is a simultaneity caused by the mother's joint decision making, between taking her child to early childhood education and how to allocate her time between the various activities, which brings endogeneity to the model, in addition to the fact that mothers who take their children to early childhood education are very different from those they don't take. We use database from PNAD for the years 2011 to 2015, and a sample of mothers aged 16 to 40 years. After controlling for observed and unobserved factors, by instrumental variables, we find the frequency of child attendance increases the proportion of total hours spent on paid work by 2.01 p.p. and reduces the domestic work participation by 0.66 p.p.. Thus, early childhood education may not be reducing the mother's dual journey. As work at home goes beyond childcare, the result may be suggesting that she remains responsible for all the management and execution of household chores, even increasing the share of hours for the labor market.

Keywords: Early childhood education; Mother time allocation; LATE.

RESUMO

O presente estudo procurou avaliar o impacto da frequência à educação infantil na alocação de tempos das mães entre o trabalho remunerado e o doméstico não remunerado, e não apenas sobre a oferta de trabalho formal da mãe. Existe uma simultaneidade causada pela tomada de decisão conjunta da mãe, entre levar o filho à educação infantil e como alocar o seu tempo entre as diversas atividades, que traz endogeneidade ao modelo, além de que as mães que levam os filhos a educação infantil são muito diferentes daquelas que não levam. Foram usados dados da PNAD, para os anos de 2011 a 2015, e uma amostra de mães de 16 a 40 anos. Após controlar por fatores observados e não observados, os resultados encontrados sugerem que a frequência do filho à educação infantil aumenta a proporção de horas totais gastas em trabalho remunerado em 2,01 p.p. e reduz a participação em 0,66 p.p. das horas de trabalho doméstico. Assim, a educação infantil pode não estar reduzindo a jornada dupla da mãe. Como o trabalho dentro de casa vai além dos cuidados dos filhos, o resultado pode estar sugerindo que ela ainda continua responsável por todo o gerenciamento e execução dos afazeres domésticos, mesmo aumentando a participação das horas destinadas ao mercado de trabalho.

Palavras-chave: Educação Infantil; Alocação de tempo das mães; LATE.

JEL: J2, I29, J13, C01

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1. INTRODUCTION

The participation of women in the labor market has increased more and more, while they are still those who mostly perform household activities and take care of other family members (ARAÚJO; FONTOURA, 2016). Inequality in the total workload between men and women is an issue that has been analyzed, especially when referring to unpaid domestic work. Contextualizing the issue for Brazil, in 2017, in relation to the allocation of hours of paid and unpaid work, for people aged 14 or over, it is possible to notice this discrepancy. In paid work, men worked 39.9 hours a week against 35.1 hours for women. However, when considering only the average hours dedicated to the activities of caring for people and / or household chores, women worked 18.1 hours a week and men 10.3 hours. When these activities are broken down, the disparity between the sexes becomes even greater, the rate of care for people among women was 37% and among men 25.6%; and the rate for household chores was 91.7% among women against 76.4% among men (IBGE/PNAD, 2018).

In this scenario, it is noted that women are still responsible for most of the unpaid work. The overload of domestic work has detrimental impacts on them, such as the difficulty of entering the labor market and the restriction of professional opportunities. In turn, this difference in the division of domestic work can generate a power relationship between men and women, where women are only responsible for the house, which, according to Perales (2014), corroborates the difficulty of women to launch themselves professionally.

Especially to mothers, face the dilemma of how to allocate time between careers and childcare. Many policies and interventions exist to encourage the employment of women, helping to combine these two journeys, increasing maternal income and thereby increasing the bargaining power of women within the home (HEATH; JAYACHANDRAN, 2016). The mother can be assisted by a support network, whether the company is offering a shorter and more flexible journey, or child care in the service, or access to early childhood education for her children, in addition to the support of family members in child care.

Finding alternatives to relieve mothers' journey is a way to achieve women's economic empowerment[3]. Among them, we can highlight the access to early childhood education (daycare centers and preschool), the first stage of basic education, which integrates family and community action for children up to five years old. Its objective is the physical, psychological, intellectual and social development, stimulating and preparing the child (BRASIL, 2013). It is characterized as an alternative to those women who choose to reconcile careers and raising children, offering a safe option for the care of their children. This mechanism can make it possible to reallocate time for paid activities or to invest in human capital, which can contribute to the financial autonomy of these women. In this sense, this work sought to evaluate the potential effect of access to early childhood education on the allocation of time for mothers with children under six years of age.

Providing a place for the child to stay, the mother's time can be changed, being allocated to other activities, especially those younger. Narita and Diaz (2016) found that mothers who had children in their teens are less likely to complete high school and are less likely to participate in the labor market. As a result, the child's access to the kindergarten allows young mothers to dedicate more time to their professional career, as well as to continue their studies, increasing their educational stock.

The presence of children tends to be one of the main aspects that define the structure of mothers' domestic and paid work. The literature in the area indicates that, for women, the presence of children is associated with lower probabilities of participation in the labor market (MARON; MEULDERS, 2008); is related to a lower hourly wage (HERSCH; STRATTON, 2002; KORENMAN; LIAO; O'NEILL, 2005; WALDFOGEL, 1998); greater likelihood of doing part-time work (DAL ROSSO, 2012; GOUGH; NOONAN, 2013); it also increases the likelihood of being in precarious work (MONTALI, 2016); the presence of children up to five years of age tends to reduce both the chance of work and the number of

[3] Women's empowerment is a broad concept that encompasses the search for gender equality in several aspects such as, for example, leadership, political participation, health and security (UN WOMEN, 2019). However, in this work, this term is used considering economic empowerment, which is gender equality in economic aspects, such as income, which is directly related to the eradication of poverty and inclusive economic growth (DUFLO, 2012).

hours worked (QUEIROZ; ARAGÓN, 2015); and the presence of children is detrimental to the education of young mothers, less likely to finish high school and earn a higher salary (NARITA; DIAZ, 2016).

Many studies have analyzed the relationship between children's attendance to early childhood education promoted through policies and subsidies and how it can affect the time the mother dedicates in the paid labor market. In Brazil, Barros et al (2011) studied a political experience that randomly selected children for places in public day care centers and found that access to the day care increased employment rates and reduced maternal unemployment. Queiroz and Aragón (2015) and Costa (2007), also for Brazil, found positive and significant effects on access to daycare on the female insertion in the labor market.

In Germany, Bick (2016) found that the provision of child care increases the maternal labor force and Bauernschuster and Schlotter (2015) explored the expansion of public child care and the results showed that kindergarten increased labor market participation of young mothers whose youngest child is three to four years old. In Argentina, Berlinski and Galiani (2007) studied the impact of a preschool school attendance program offering maternal work. The results showed that the assistance allowance induced by an infrastructure program that expanded school attendance, increased mothers' employment. Schlosser (2005) verified the effects of childcare costs and the job supply of Arab mothers, based on the 1999 Preschool Law, which was a policy by the Israeli government, gradually implemented between cities to provide free preschool for all children 3 to 4 years. The result of the intervention was an increase both in the enrollment of children in preschool and in the mothers' job offer, occurring mainly in those with higher schooling.

The Italian government created a National Fund to develop public child care services in the municipalities, and Brilli et al (2016) found a positive and significant effect on this availability on the mother's work status. In France, Givord and Marbot (2015) found significant effects of the childcare subsidy paid on mothers' participation in the workforce. In the United States, in the 1960s, 70s and 80s, many states started with a subsidy for districts to offer early childhood education in public schools. Cascio (2009) studied how this subsidy affected maternal employment, and found that the employment of single mothers was sensitive to the subsidy, and of these only for those without children under 5 years old. In Norway, in 1972, the government introduced changes in public childcare policies, leaving the responsibility for childcare to municipalities, becoming a universally accessible service. In the following years, the reform became a substantial positive shock to the provision of child care, where the expansion was implemented at an intense pace, and Havnes and Mogstad (2011) found a strong correlation in child care with maternal employment. Finally, in Canada, the government implemented a childcare policy in the province of Quebec, and childcare subsidies, lowering the price of its services and offering full-time preschool free, in addition to expanding the offer of vacancies. Lefebvre and Marrigan (2008) found a large and statistically significant impact on the relationship between politics and the job supply of mothers with preschool children.

Considering the collective labor supply model, proposed by Cherchye, de Rock and Vermeulen (2012) , participation in education affects the time that parents spend taking care of their children, within unpaid domestic work. With this, adults reallocate their time, being able to spend with other activities in the home, or offering in the paid job market, or in leisure. Thus, access to a support network for the care of these children can be an important means of reducing disparities in terms of allocating mothers' time between different activities. In this sense, this study seeks to analyze how children's access to early childhood education affects the allocation of time for young Brazilian mothers, based on data from the National Household Sample Survey. It is assumed that children's access to early childhood education alters the mother's time allocation, allowing the mother to reduce the time allocated to unpaid domestic work and to increase the time devoted to paid work.

Given the contributions of the mentioned literature, in addition to the scarcity in Brazilian literature of studies on the effects of child care on how the mother allocates her time, this analysis differs from the others, in trying to understand how access to early childhood education can influence mothers' time allocation between different types of activities. A sample of young mothers will be used, since the cited literature shows that the presence of children decreases the probability of women being in formal paid employment and increases the proportion of women in the unpaid workforce. As a result, it is assumed that not only the hours of paid work can be changed due to access to the benefit, but also the

hours allocated to domestic work. Thus, it is proposed to evaluate the impact of attendance at early childhood education on the allocation of mothers' time between paid and unpaid domestic work, and not only on the mother's formal job offer.

As the decision to enroll the child in early childhood education and the decision on how to allocate her time are decisions that the mother makes jointly, there is an endogeneity caused by this simultaneity. In addition, mothers who take their children to early childhood education are very different from those who do not, that is, unobservable characteristics as well, such as concern for the care of children, influence the decision on how to allocate their time among the various activities. To work around this problem, a change in Brazilian legislation is used, Constitutional Amendment nº 59, 2009 and Law nº 12,796, 2013, which established a new age range for basic education in the country, which reduces the mandatory age for entering early childhood education. According to Meyer (1995) and Bauernschuster and Schlotter (2015), this type of change provides a quasi-experiment, that is, an exogenous variation that affects the mother's decision to enroll her child in early childhood education and at the same time does not directly affect how this mother allocates her time, except for this change in the age provided for in the Amendment and the Law.

To measure the effect of early childhood education on mother time allocation, we estimated a system of equations, with the dependent variables being the proportion of total hours used for each activity. Thereafter, we applied the instrumental variable method, which allowed observing the Local Average Treatment Effect (LATE), and the average effect of attending early childhood education was captured only for the subpopulation of mothers who were affected, changing their behavior, that is, mothers who started to enroll their children in school because of the change in the Amendment and the Law.

In addition to this introductory section, we present the Amendment and the Law, in addition to the provision of early childhood education in that period, in next section. Section 3 presents the methodology, followed by section 4, with the main results achieved and discussion. In the last section, we present the research findings.

2. CONSTITUTIONAL AMENDMENT Nº 59 AND THE PROVISION OF BRAZILIAN EARLY CHILDHOOD EDUCATION

In Brazil, Constitutional Amendment nº 59, of November 11, 2009, which changes the mandatory age of basic education, advancing the age at which the child enters school to four years, can be highlighted as a favorable measure to access early childhood education. The Amendment also guarantees the government's responsibility in the offer, ensuring free access for all. The 6th Article of the Amendment states that the measure should be implemented progressively, until 2016, under the terms of the National Education Plan, with the technical and financial support of the Union (BRASIL, 2009). With the publication of Law nº 12,796, of April 4, which alters the Law of Directives and Bases of National Education, the organization of basic education in preschool, elementary and high school was included, creating child education until then not mentioned (BRASIL, 2013).

With the Law taking effect on the date of its publication, that is, April 2013, parents should already seek a place for their children, subject to a fine or detention. Public managers would have until 2016 to adapt and welcome students. So, the Law did was to bring forward the deadline for complying with Amendment nº 59 for the enrollment of children.

As a way of verifying the evolution of access to early childhood education in this period, PNAD data on the total number of children from zero to five years old and the number of children enrolled in early childhood education (daycare and preschool) are used. In addition, INEP data on the number of establishments is presented for the year 2007, to analyze a period prior to the Amendment and for the years, 2009, 2011, 2013 and 2015. Table 1 shows the total number of children from zero to five years-old and the total number of children enrolled in early childhood education.

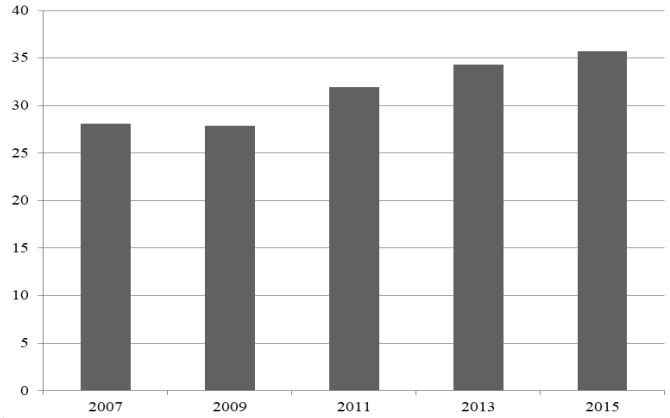
Table 1 - Total number of children and number of children enrolled in early childhood education, by stage of education, for Brazil, 2007, 2009, 2011, 2013 and 2015

Year	Number of children aged 0 to 5 years	Children enrolled		
		Total	Daycare	Preschool
2007	36,756	10,328	3,000	7,328
2009	34,615	9,654	3,898	5,756
2011	30,514	9,736	3,897	5,839
2013	29,430	10,085	5,137	4,948
2015	27,622	9,866	4,732	5,134

Source: Results of the research, based on PNAD data

The number of children in the age group analyzed in 2015 fell by 24.85 percentage points (p.p.) in relation to 2007, requiring an analysis by proportion of children, which is shown in Graph 1. There is an increase in the proportion of children enrolled in Early Childhood Education in relation to the total number of children in 2009, which was the year that the Amendment came into force, until 2015. For the offer, the number of establishments in Brazil for early childhood education was analyzed for the years analyzed (Table 2). In 2015, there was an increase of approximately 2.78% in the total number of establishments in relation to the number of 2007, where the number of daycare centers more than doubled (57.76%) and the number of preschool establishments decreased by 0.23 pp.

Graph 1 - Proportion of children aged 0 to 5 years-old enrolled in Early Childhood Education, 2007, 2009, 2011, 2013 and 2015



Source: Results of the research, based on PNAD data

Table 2 - Number of establishments by stage of education, for Brazil, 2007, 2009, 2011, 2013 and 2015

Year	Daycare	Preschool	Total
2007	40,072	106,234	112,860
2009	43,030	106,563	114,158
2011	49,582	107,613	116,713
2013	56,870	108,470	117,726
2015	63,221	105,985	116,003

Source: Results of the research, based on INEP data.
Note: The total of early childhood education includes establishments with at least one enrollment in the daycare center or preschool.

3. METHODOLOGY

3.1. Empirical Model

To verify whether children's access to early childhood education alters mothers' time allocation in various activities, it is based on a system represented by a set of G linear structural equations, for the proportion of total hours spent on each activity:

$$Y_{igt} = \beta_1 educinf_{it} + \boldsymbol{X}_{it}\beta_2 + uf_i + d_t + \varepsilon_{it} \quad (1)$$

where $educinf$ is the variable that shows children's access to early childhood education. $\boldsymbol{X_{it}}$ is a matrix of observable variables $(x_{i1t}, x_{i2t}, \dots, x_{iGt})$; uf_i and d_t are the specific effects of states and years, respectively; and $\varepsilon_{it} = (\varepsilon_{i1t}, \varepsilon_{i2t}, \dots, \varepsilon_{iGt})$ is the vector with the error terms that contains the unobservable variables, not correlated with the observable variables, and the vector of variables of interest Y_{it} is made based on the mother's time constraint and contains three variables: proportion of total hours of the i-th woman, spent on paid work, unpaid domestic work, in addition to leisure and other activities and can be calculated as follows:

$$Y_{igt} = \frac{T_{igt}}{24} \quad (2)$$

Where $T_{igt} = \begin{cases} Hours/day\ spent\ on\ unpaid\ domestic\ work \\ Hours/day\ spent\ on\ paid\ work \\ Hours/day\ spent\ on\ leisure\ and\ other\ activities \end{cases}$

The equation for leisure and other activities (such as studying and sleeping) is removed to avoid the singularity of the variance matrix of the error terms, since the equations are linear combinations and add up to 1.

In the absence of an ideal experiment to isolate the effect that early childhood education has on women's time allocation, making this child's attendance at school exogenous (and therefore providing the causal effect), it is proposed to use a methodology with observational data to identify the effects of interest. The decision to take the child to school and how the woman allocates her time, more specifically, how she divides him between the activities considered, are decisions taken together. This simultaneity prevents observing the causal effect of this relationship through an Ordinary Least Squares (OLS) model. In addition, women who choose to take their children to school to attend early childhood education are in many ways different from women who do not. These differences can also influence how they allocate their time. Unobservable characteristics of women that affect their decisions are difficult to account for by control variables. However, the use of a change in legislation, related to the mandatory access to school provides an almost experimental scenario, which can be explored by an instrumental variable approach, to achieve the effects of access to early childhood education on the allocation of maternal time (BAUERNSCHUSTER; SCHLOTTER, 2015).

Following Bauernschuster and Schlotter (2015), one can consider Constitutional Amendment nº 59 of 2009 for the Brazilian case and then Law nº 12,796 in 2013, which changed the mandatory age of basic education, from four to seventeen years - before the child entered with six years. As enrollment becomes the duty of parents or guardians, women with children in this age group who did not take their children to school, may start to take. Therefore, the obligation foreseen by these changes since 2009, creates at the same time an exogenous variation to the unobservable factors that affect both children's access to early childhood education, as well as the allocation of mother's time. Thus, one can call Z the *dummy* variable that takes the value 1 if the child is of the mandatory age established by the Law, that is, more than four years old, and zero if less than four years old. As the effects of taking children to school are heterogeneous, the framework of the instrumental variable allows to recognize the Local Average Treatment Effect (LATE) (ANGRIST; PISCHKE, 2008).

The reduced form of the model, which shows the influence of the mandatory age cut by the Amendment/Law on access to early childhood education, can be seen in the following equation:

$$educinf_{it} = \mu + \delta Z_{it} + \varphi T_{it} + uf_i + d_t + \theta_{it} \quad (3)$$

where δ shows the relevance of the Z instrument and indicates the proportion of children entering early childhood education in accordance with the age provided for in the Law, T_i is a vector of covariates and θ is the error term (BAUERNSCHUSTER; SCHLOTTER, 2015). The estimated value $\widehat{educinf}_{it}$ of equation (3) is used in equation (1), to obtain the average effect of local treatment of attendance at early childhood education in the proportion of hours spent in each activity, domestic work and the paid.

The LATE represents the average effect of taking the child to school, considering only a specific subpopulation, for the population of women who have had their behavior altered, due to a change in the instrument (ANGRIST; PISCHKE, 2008), that is, the mothers who had to put their child in school because of the mandatory age change. Some assumptions are made, according to Angrist and Pischke (2008). The exclusion restriction says that there is only one single channel for the instrument's causal effects, that is, the mandatory age provided for by the Amendment only affects the mother's time allocation through the child's presence in early childhood education. Another assumption of the model is the independence of potential results, which implies that the Z instrument is as good as if it were randomly selected among mothers. Instrumental variables can be solved by the Two-Stage Least Squares method, so the third assumption made is that the first stage captures the effect of the instrument on the mother's decision to place the child in school or daycare. The monotonicity of potential treatments is also assumed, in which all people are affected in the same direction by the instrument, that is, there will be no women who will have the opposite behavior to that induced by the Law, that is, women who will not take their children in age to go to school. Then, the average effect can be measured by the difference in the mothers' potential results:

$$\beta_1 = \frac{E\{Y_i|Z_i = 1\} - E\{Y_i|Z_i = 0\}}{E\{educinf_i|Z_i = 1\} - E\{educinf_i|Z_i = 0\}} = E\{Y_{1i} - Y_{0i}|educinf_{1i} > educinf_{0i}\} \quad (4)$$

3.2. Database and Variables

To fulfill the research objective, microdata from the National Household Sample Survey (PNAD) were used, which are obtained by the Brazilian Institute of Geography and Statistics (IBGE), for the years 2011 to 2015. PNAD is a survey carried out annually for the entire national territory.

Information was collected from women mothers aged 16 to 40 years. The choice for the minimum age was made according to the age required to enroll the worker in Social Security, and the maximum chosen based on the study by Queiroz and Aragón (2015), which says that the average age of women is 40.6 years.

The choice of explanatory variables is based on the existing literature (BAUERNSCHUSTER; SCHLOTTER, 2015; BERGER; BLACK; OTHERS, 1992; QUEIROZ; ALBERTO; ARAGÓN, 2015). Variables were chosen that have individual characteristics of the woman, such as color, age, years of schooling, the total number of children, the total number of children between zero and five years, the woman's monthly salary and a marital status category, showing whether is married.

In addition to household characteristics, such as the spouse's salary, income from other means-excluding wages in the formal market-, the variable that characterizes the reference person, to assess bargaining power within the household, and whether the census zone is urban. The variables that report whether the woman's mother lives at home and whether there is a domestic worker will be included to show an alternative to child care, and thus have a possible impact on the woman's decision to take her child to attend early childhood education.

State and year *dummies* were included to control specific effects. Each state has its own special characteristics, as well as the years, being able to simultaneously influence the labor market as the supply of early childhood education and with that the intercept of the model may differ between the states / year, which can lead to a biased and inconsistent estimator. In other words, there are characteristics of the labor market, such as opportunity and discrimination, which can influence the supply of work inside and outside the home. Table 3 summarizes the descriptions of the main variables.

Table 3 – Descriptive statistics of variables

Variables	Description	Mean	SD	Minimum	Maximum
Hours of paid work	Proportion of hours spent in paid work	0,108	0,120	0	0,583
Housework hours	Proportion of hours spent on domestic work	0,168	0,108	0	0,583
Early childhood education	*Dummy* that identifies mothers with children between 0-5 years old who attend early childhood education	0,442	0,497	0	1
Color	Mother's color *dummy* (1- White; 0-otherwise)	0,428	0,495	0	1
Age	Age	33,11	20,90	0	120
Age²	Squared age	1533	1640	0	14400
Schooling	Schooling in years of study	6,579	4,856	0	15
Schooling²	Squared of schooling	66,86	68,80	0	225
Children total	Total number of children of the woman	2,814	2,026	0	24
Children 0 to 5	Total number of children of women between 0 and 5 years-old	0,264	0,562	0	6
Married	Marital status *dummy* (1-married; 0-otherwise)	0,5092	0,4999	0	1
Salary	Salary of mother with children aged 0-5 years	31,98	351,9	0	120000
Householder	Head *dummy* (1-woman is head of household; 0-otherwise)	0,437	0,496	0	1
Mother lives at home	Woman's mother lives at home	0,524	0,499	0	1
Spouse's salary	Spouse's salary *dummy*	0,376	0,484	0	1
Other income	*Dummy* for household income (excluding mother and spouse's salary)	0,889	0,314	0	1
Housekeeper	Maid *dummy*	0,00255	0,0504	0	1
Urban area	Census area *dummy*	0,854	0,353	0	1
Age cut-off	Law age cut-off (Instrumental variable)	0.674	0.468	0	1

Source Results of the research.

4. RESULTS AND DISCUSSION

4.1. Profile of the mothers analyzed

On the total number of mothers analyzed, 43.71% have children enrolled in early childhood education (treatment group) and 56.28% do not (control group). Table 4 shows the differences between groups in terms of time allocation. Mothers who have children enrolled in early childhood education spend about 15% of their total hours on domestic work, against 12% dedicated to paid work. For those whose children do not participate in early childhood education, 9% of the time is devoted to paid work and 17% to domestic work, on average, during the period analyzed. It is noticed that women who have a paid job use 2 percentage points (pp) of the total hours working at home, on average, which may be an indication that if the child attends early childhood education, the mother is able to work less within from home, since one of the household chores would be taking care of the child.

The decision to enroll their children in early childhood education may depend on observable variables, making groups of mothers different from each other. All the characteristics considered showed statistically significant differences (Table 4). It is noticed that mothers who enjoy the benefit have favorable characteristics, in terms of educational stock and salary. In addition, the proportion of beneficiary mothers is higher in urban areas.

Table 4 – Average of mothers' variables, by frequency of children attending early childhood education, 2011 to 2015

Variables	Has children who attend early childhood education	Has children who do not attend early childhood education	Mean Difference	Difference from standard deviation
Participation in paid work	0.1286	0.0916	0.0370***	0.0008
Participation of domestic work	0.1581	0.1748	-0.0166***	0.0007
Race (1=white)	0.4211	0.3895	0.0316***	0.0017
Age	19.2107	18.7195	0.4912***	0.0532
Schooling	5.1600	4.9368	0.2231***	0.0179
Children total	2.2481	2.179	0.0690***	0.0103
Children 0 to 5	1.3307	1.1977	0.1329***	0.0018
Married	0.7271	0.7347	-0.0075***	0.0020
Salary	234.6873	139.083	95.6042***	2.9295
Householder	0.3153	0.2785	0.0368***	0.0032
Mother lives at home	0.5372	0.5192	0.0180***	0.0018
Spouse's salary	0.3953	0.4155	-0.0201***	0.0017
Other income	0.7448	0.706	0.0388***	0.0015
Housekeeper	0.0040	0.002	0.0019***	0.0001
Urban area	0.8617	0.7981	0.0635***	0.0013

Note: Standard errors in parentheses. * p <.1, ** p <.05, *** p <.01.
Source: Research results.

The only variable that can influence the mother's simultaneous decision, with a negative difference between the groups, was the spouse's average salary, indicating that mothers without children enrolled in early childhood education live with a spouse who receives a higher salary, on average. By analyzing the differences in hours worked between mothers and fathers of children from zero to five years old, one can go deeper into the division of tasks within the household. Table 5 shows the hours of paid and domestic work performed by each one. It is noticed that fathers spend an average of 11.61% of their total hours in

paid work, whereas mothers, 10.77%. In domestic work, fathers dedicate 1.87% of their hours, while mothers devote 16.75%.

Table 5 - Participation of activities in the allocation of time for mothers and fathers with children aged 0-5 years-old, 2011 to 2015

	Variables	Mean	Standard deviation	Minimum	Maximum
Fathers	Paid work	0.1161	0.1349	0	0.5833
	Domestic work	0.0187	0.0396	0	0.5833
Mothers	Paid work	0.1077	0.12	0	0.5833
	Domestic work	0.1675	0.1078	0	0.5833

Source: Research results.

The total average of work, paid or domestic, is more than double for mothers than for fathers, showing the inequality in the total hours worked. This difference can be attributed to the hours of work inside the home, showing that even the approaching paid work hours, domestic work continues to be feminized, placing women as responsible for the care of the family and tasks (OFFER; SCHNEIDER, 2011; PERISTA, 2002; PINHEIRO; MEDEIROS, 2016).

Also notable is the number of hours per work for fathers and mothers for those who take their children to early childhood education and those who do not. The average hours are shown in Table 6. It is observed that the average hours that the father dedicates to paid work is 11.36% if the child attends early childhood education against 11.82% if the son does not attend, for the mother this value goes from 12.86% to 9.16%. In other words, this shows that for the father, the child goes to child education or not, little changes in the time devoted to paid work, whereas for the mother, there is a difference of 3.7 p.p..

Table 6 - Participation of activities in the allocation of time by mothers and fathers by children's attendance to Early Childhood Education, 2011 to 2015

Children attend early childhood education	Variables		Mean	Standard deviation	Minimum	Maximum
Yes	Paid work	Fathers	0.1136	0.1343	0	0.5833
		Mothers	0.1286	0.1209	0	0.5833
	Domestic work	Fathers	0.0186	0.0391	0	0.5833
		Mothers	0.1581	0.1041	0	0.5833
No	Paid work	Fathers	0.1182	0.1353	0	0.5833
		Mothers	0.0916	0.1168	0	0.5833
	Domestic work	Fathers	0.0188	0.0399	0	0.5833
		Mothers	0.1748	0.11	0	0.5833

Source: Research results.

The average number of hours spent on domestic work for men is 1.86% if the child attends daycare or preschool and 1.88% if the child does not attend. This figure increases substantially for mothers, who spend 15.81% of their total hours if their child goes to school and 17.48% if their child is not. Again, little changes in the father's time, regardless of the child's attendance at school, for the mother there is an increase of approximately 2 p.p..

It is noteworthy that the parents hardly change the allocation of their time between paid and unpaid work, regardless of whether the child goes to school or not, since the mother changes her time allocation, decreasing her job offer in the paid market and increasing your dedication to work at home.

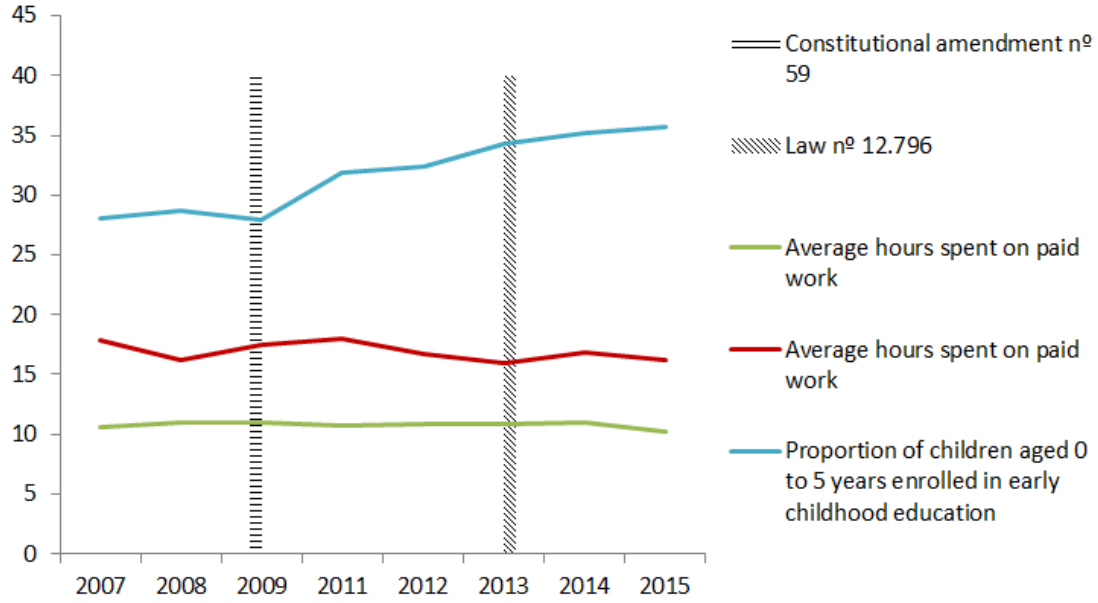
Although housework includes several tasks in addition to childcare, such as cleaning, laundry and meals, the data in Tables 5 and 6 provide a good indication that children can be a strong source of inequality in work between the sexes, both paid and unpaid. Motherhood for women involves more commitment than paternity, making women dedicate more physical effort in managing the home, with multitasking and responsibilities (CRAIG, 2006).

4.2. Effect of early childhood education on mothers' time allocation

As mentioned, the child education variable is endogenous, since the mother makes the decision on how to allocate her time and enrolls the child in school jointly. Therefore, the model may be contaminated by this simultaneity and by the fact that unobservable characteristics of these women influence both choices, such as concern for their children, motivation, past experiences, among other factors. For this reason, it was decided to make use of the age cut that makes access to early childhood education, defined by the 2009 Constitutional Amendment, mandatory as an instrumental variable. With this, we have an exogenous instrument, that is, the cut defined in the Amendment only affects how the mother will allocate her time through the child's attendance to early childhood education, since it is a decision external to them.

Graph 2 shows the evolution of the proportion of children aged zero to five enrolled in early childhood education, before and after the Amendment and the Law. It is noticed that this proportion is almost unchanged in 2007/2009 and grows after this period, indicating an increase in the number of enrollments, after intervention. It is also possible to observe changes in the proportion of hours worked inside and outside the home. However, these must be investigated, controlling for other temporal effects.

Graph 2 – Proportion of children aged 0 to 5 years enrolled in Early Childhood Education, Proportion of hours spent in paid and domestic work, 2007 to 2015



Source: Research results.

The *status* of the treatment is shown in Table 7. The columns show the instrument used (mandatory age foreseen by the Amendment / Law). In the lines, there is participation in early childhood education. In each quadrant, there is the number of women in the interest group.

In the first quadrant, there is the case where the two variables assume a value of 0, that is, there are the *compliers* and *never takers* groups, where it is not possible to know whether the child does not participate in early childhood education due to age or if mother would never enroll her. In the second quadrant, there is the instrument assuming 1 and the endogenous variable assuming 0, identifying only the group of *never-takers*, where it is possible to see that the child is aged, but has not been enrolled.

In the third quadrant, there is the group of *Always-takers* since the child is not of compulsory age, but is enrolled, that is, mothers always take their child to daycare or preschool, regardless of the

Amendment / Law. Finally, in the last quadrant there are the two variables assuming a value of 1, indicating that the child is aged and the mother enrolls her in early childhood education, but it is not possible to distinguish those mothers who would always take their children (*Always-takers*) from those whose behavior was altered by the Amendment / Law (*compliers*).

Table 7 - Number of mothers, by treatment status

		Z = Children aged 4 and 5	
		0	1
X = Early Childhood Education	0	63,368 (complier/never-taker)	114,007 (never-taker)
	1	21,708 (always-taker)	118,893 (complier/always-taker)

Source: Research results, based on PNAD data (2011-2015)

A good instrument is that correlated with the variable considered endogenous, but not correlated with the unobservable factors that contribute to the variable of interest, that is, the mandatory age caused by the Amendment / Law is correlated with the child's attendance at early childhood education, but it is not correlated with those unobservable factors that affect the mother's decision on how to allocate her time. Table 8 presents the results of the first stage of the instrumental variable estimates and shows the relationship between the instrument and access to early childhood education.

When estimating the effect of cutting the mandatory age with the frequency of child education by the child, a positive and significant coefficient is obtained and, as other observable factors of the mother are added that may also influence the, the coefficient remains significant and gains robustness, indicating that it is an adequate instrument.

Table 8 – First stage coefficients

Variables	Child Education			
	I	II	III	IV
Cut-off Age	0.263***	0.311***	0.321***	0.324***
	(0.00328)	(0.00366)	(0.00387)	(0.00388)
Constant	0.273***	-0.0785***	-0.187***	-0.344***
	(0.00304)	(0.0203)	(0.0315)	(0.0349)
Controls (characteristics)				
Mother	No	Yes	Yes	Yes
Household	No	No	Yes	Yes
Year	No	No	No	Yes
State	No	No	No	Yes
R^2	0.055	0.124	0.134	0.150
Prob>F	0	0	0	0

Note: Standard errors in parentheses. * p <.1, ** p <.05, *** p <.01. Standard errors clustered by psu and weighted by sample weight

Source: Research results.

Regarding the influence of early childhood education on mothers' time allocation[4], Tables 9 and 10 show the results of OLS regressions, for participation in the total hours spent on paid and domestic

[4] We present the results of all coefficients in Table A1 (Appendix).

work, respectively. As for the participation of paid work, there is a significant and positive effect, corroborating the hypothesis that, with the child attending early childhood education, some hours of mother's day are released and she will offer more labor in the paid market. When adding controls, the coefficient changes only with the increase in the characteristics of the mothers, showing that these characteristics are more important, while the other variables do little to change the relationship of attendance to early childhood education with the participation of this activity. So, by controlling those observable variables that can contaminate the effect of education on the proportion of hours, it is clear that the participation of early childhood education contributes to an increase in participation in the labor market by 2.64 p.p., on average. As for domestic work, column (8) of Table 10 shows the effect of early childhood education, controlled by the observable characteristics. It is noticed that children's access to early childhood education reduces by 1.61 p.p. the participation of work at home in the mother's total hours, on average.

Table 9 - Estimated coefficients by OLS for the proportion of hours spent on paid work, 2011 to 2015

	Proportion of hours spent in paid work			
Variables	1	2	3	4
Early Childhood Education	0.0373***	0.0259***	0.0260***	0.0264***
	(0.0011)	(0.00122)	(0.00129)	(0.00129)
Constant	0.0923***	-0.0960***	-0.0912***	-0.0763***
	(0.0005)	(0.00984)	(0.0109)	(0.0104)
Controls (characteristics)				
Mother	No	Yes	Yes	Yes
Household	No	No	Yes	Yes
Year	No	No	No	Yes
State	No	No	No	Yes
R^2	0.0238	0.2070	0.2092	0.2218
Prob>F	0.0000	0.0000	0.0000	0.0000

Source: Research results
Note: Standard errors in parentheses. * p <.1, ** p <.05, *** p <.01. Standard errors clustered by psu.

Table 10 - Estimated coefficients by OLS for the proportion of hours spent on domestic work, 2011 to 2015

	Proportion of hours spent on domestic work			
Variables	5	6	7	8
Early Childhood Education	-0.0176***	-0.0145***	-0.0148***	-0.0161***
	(0.0008)	(0.000852)	(0.000854)	(0.000861)
Constant	0.176***	0.0706***	0.0995***	0.0903***
	(0.0005)	(0.0136)	(0.0136)	(0.0148)
Controls (characteristics)				
Mother	No	Yes	Yes	Yes
Household	No	No	Yes	Yes
Year	No	No	No	Yes
State	No	No	No	Yes
R^2	0.0066	0.0828	0.0835	0.0978
Prob>F	0.0000	0.0000	0.0000	0.0000

Source: Research results.
Note: * p <.1, ** p <.05, *** p <.01. Standard errors in parentheses and clustered by psu.

As seen in Table 4, the groups are different in terms of observable variables that can influence the decision to enroll children in early childhood education and time allocation. However, unobservable characteristics can also influence these decisions. In this sense, the results in Table 11 show the estimates by instrumental variable (LATE). In addition, for comparison purposes, the effects after matching with propensity score are presented, with the aim of making the groups comparable in terms of observable variables (PSM).

Table 11 - Coefficients estimated by instrumental variable (LATE) and by PSM, for the proportion of hours spent in paid and domestic work, 2011 to 2015

Variables	Paid work		Domestic work	
	PSM	LATE	PSM	LATE
Early Childhood Education	0.021***	0.020***	-0.014***	-0.007*
	(0.001)	(0,004)	(0.001)	(0,003)
Controls (characteristics)				
Mother	Yes	Yes	Yes	Yes
Household	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes
State	Yes	Yes	Yes	Yes
R^2	0.203	0.221	0.106	0.0960
Prob>F	0.0000	0.0000	0.0000	0.0000

Note: * p <.1, ** p <.05, *** p <.01. Standard errors in parentheses and clustered by psu. PSM estimates consider the kernel weight. Estimates by LATE consider the sample weight.
Source: Research results.

Note that the results by PSM are like those of OLS. In comparison to LATE estimates, it can be said that, by ignoring the effect of factors not observed, the bias is positive (in absolute terms). This shows that such factors, such as concern for children, increase the chances of enrolling them in early childhood education, overestimating their effect on the allocation of time (increases the time in paid work and reduces domestic work). Another factor may be the mother's willingness to be with her child influences both the child's going to school and how the mother will allocate her time. This factor may not be associated with any observed variable and may be contaminating the portion of time devoted to domestic work, justifying the difference in results between the methods that control by observables and LATE.

Since the MQO and PSM estimates do not control this, it overestimates the relationships of interest. The inclusion of control variables can minimize the bias for paid work (Tables 9), but not enough, since the estimates using the instrumental variable are lower (in absolute terms). As for the PSM estimates, it appears that the effect on paid work is close to that of LATE, for the participation of paid work, indicating that the balance of groups, in terms of observable variables, can also contribute to the balance of characteristics not observed (mothers with the same level of education may also have a similar level of concern, but differ in the decision to enroll or not the child in early childhood education). The same is not true for domestic work, whose coefficient is close to that found by OLS.

It is worth mentioning that, as seen in subsection 3.1, the effect of LATE is local, considering only the subpopulation of mothers who changed their behavior because of the Law. PSM, on the other hand, allows extrapolation, as it controls by observable characteristics, although it has low internal validity. In short, there is a similarity of the results obtained by the three methods, with that, it can be said that the relationship between early childhood education and the proportion of hours of paid work is positive, that is, the child's attendance to early childhood education increases the number of hours per day that women spend in the paid labor market, approximately 2 p.p..

Analyzing the estimates found by the estimation with instrumental variable, it appears that the effect of the frequency of early childhood education on the participation of paid work, indicating an increase of 2.01 p.p. in the proportion of hours devoted to this activity. This result corroborates the

national and international literature on the subject. Studies have shown that child access to childcare or childcare allowances increases female employment (BAUERNSCHUSTER; SCHLOTTER, 2015; BERGER; BLACK; OTHERS, 1992; BICK, 2016; GELBACH, 2002; GIVORD; MARBOT, 2015; HEATH; JAYACHANDRAN, 2016; TEKIN, 2005). For Brazil, Barbosa and Costa (2017) found a positive and significant effect of the provision of daycare centers on the likelihood of mothers being inserted in the labor market. In addition, Barros et al (2011) verified access to free daycare centers on the maternal labor market, and found that mothers became more likely to enter the labor market. As for domestic work, the coefficients were significant and with the expected sign, indicating that the frequency of children in early childhood education, allows the mother to reduce the participation of time spent working at home by 0.66 p.p., on average.

Since there have been two changes in the legislature that determine the change in cut-off age, it is important to check whether the 2013 Law has brought about any change in the allocation of time for mothers, compared to the post-2009 amendment period. With the differences-in-differences approach, we compare the two periods (Table 12). To make the groups comparable in terms of factors that influence the decision to enroll children in early childhood education, the sample was balanced, using the propensity score.

Taking the year 2011 as the basis (two years after the Amendment), there are significant impacts on the allocation of time, being positive for the participation of work and negative for the domestic. However, the participation of this activity has not changed over the term and after the 2013 Law, being like the effect found in Table 11. For paid work, there was no significant change between the period after the Amendment and one year after the Law. For 2015, the effect of early childhood education is greater (0.9 p.p.), probably due to the changes imposed by the Law being stronger, in addition to formalizing the measures imposed by Amendment.

As seen in Table 11, we still have unobserved factors that overestimate this relationship, as the unobserved factors may not be fixed over time. In the Table 11, the effect is on the average of the years. As it is smaller, we consider the post law is also not significant. For work paid, the effect is more approximate, comparing all models. Thus, it can be said that the unobserved effects lost more influence than on domestic work. The positive and significant addition shows that some changes in early childhood education, brought by the law, also contributed to the mothers' work, in comparison to the effects already brought by the amendment.

Table 12 - Coefficients estimated by Difference-in-Difference and PSM, for comparison between the post-Amendment and post-Law periods, 2011 to 2015

Variables	Paid work	Domestic work
Early Childhood Education	0.024***	-0.015***
	(0.001)	(0.001)
Early Childhood Education x 2014	-0.0001	-0.001
	(0.002)	(0.002)
Early Childhood Education x 2015	0.009***	-0.001
	(0.002)	(0.002)
Controls		
(characteristics)		
Mother	Yes	Yes
Household	Yes	Yes
Year	Yes	Yes
State	Yes	Yes
R^2	0.214	0.09
Prob>F	0.0000	0.0000

Note: Standard errors in parentheses. * p <.1, ** p <.05, *** p <.01. Standard errors clustered by psu. Estimates consider the sample weight.
Source: Research results.

The fact is that childcare is just one of the activities performed at home, with many others, such as taking care of food preparation, cleaning the house and taking care of other members (PNAD, 2016). The results show that even having access to early childhood education and having at least four more hours free in the day, little changes in domestic service, since the reduction is small. Paid work, on the other hand, increases. In other words, the mother having a place for the child to stay, she offers more labor in the paid market, but at the same time almost nothing changes in the work she does at home, since it consists of several activities and not only for the care of children.

This evidence shows that mothers are overwhelmed, with a double daily shift, as this mechanism encourages insertion in the labor market, but it reduces little in domestic activities. According to Costa and Marra (2013), the allocation of time between different activities does not depend only on your will, as these women find themselves daily in an accumulation of roles, which leads to a lack of time incorporated into their routine.

The results obtained may be evidence that having children in early childhood education may not be contributing to the reduction of the mother's double shift, indicating that, even though she dedicates more hours to paid work, she is still responsible for household chores, whose participation in time of mothers little changes.

5. **CONCLUSIONS**

The general objective of the study was to verify the effect that the child's attendance at early childhood education has on the mother's time allocation, more precisely, as it modifies the way in which she allocates the hours between paid and unpaid domestic work. The literature sought to show the effect that childcare has on maternal work, whether subsidized or private, but focusing only on the effect on paid work. Thus, the present analysis differs from the others, in trying to understand how participation in unpaid work is also affected.

For the mother, the decision to allocate her time and the decision to take her child to daycare or preschool are taken together, so there is a simultaneity in the model that makes it impossible to estimate by OLS, bringing biased coefficients. As a result, changes in Brazilian legislation were used, which brought new guidelines for basic education, such as the change in the age range for mandatory access.

This obligation in the child's age presents an exogenous variation that allows us to approach by instrumental variable, creating a quasi-experimental scenario. Then, the LATE methodology is used, which allows to capture the local average treatment effect for the subpopulation of *compliers*, that is, for those mothers whose behavior has been altered by the Amendment/Law. The sample was composed of women mothers from 16 to 40 years old, with children from 0 to 5 years old and the data were extracted from PNAD, for the years 2011 to 2015. After controlling for observed and unobserved factors, the results found suggest that the child's attendance at early childhood education increases the proportion of total hours spent in paid work by 2.01 p.p., against the literature studies.

Regarding domestic work, the results suggest that if the child attends early childhood education, the mother reduces participation by 0.7 p.p. in the total of her total hours. These differences in effect on time attendance indicate that early childhood education may not be reducing the mother's double journey. As work at home goes beyond the care of children, the result may be suggesting that she is still responsible for all the management and execution of household chores, even increasing the participation of hours allocated to the labor market. When making a distinction between the post-amendment and post-law periods, it appears that the latter intervention was more important to paid work.

The present study was relevant when studying the working time of Brazilian mothers, and factors that can increase their insertion in the paid labor market. As domestic work and childcare is still a feminized job, with the predominance of women exercising it, studying alternatives so that the domestic journey is equal between men and women is necessary. On the other hand, verifying ways in which women can reconcile family and career, makes their empowerment happen. To this end, policies aimed at childcare, or more flexible and short hours, imply the decision to participate in the market paid by mothers.

Finally, as the average effect found is local, that is, only for those mothers who changed their behavior due to the mandatory nature of the Amendment / Law, then it is not possible to extrapolate the

result to the population. Another point is that the base used does not provide hours dedicated to study, and analyzing how attendance at early childhood education affects the distribution of hours spent in each activity, including schooling, can bring clearer information on how to help these mothers, including in the search by qualification.

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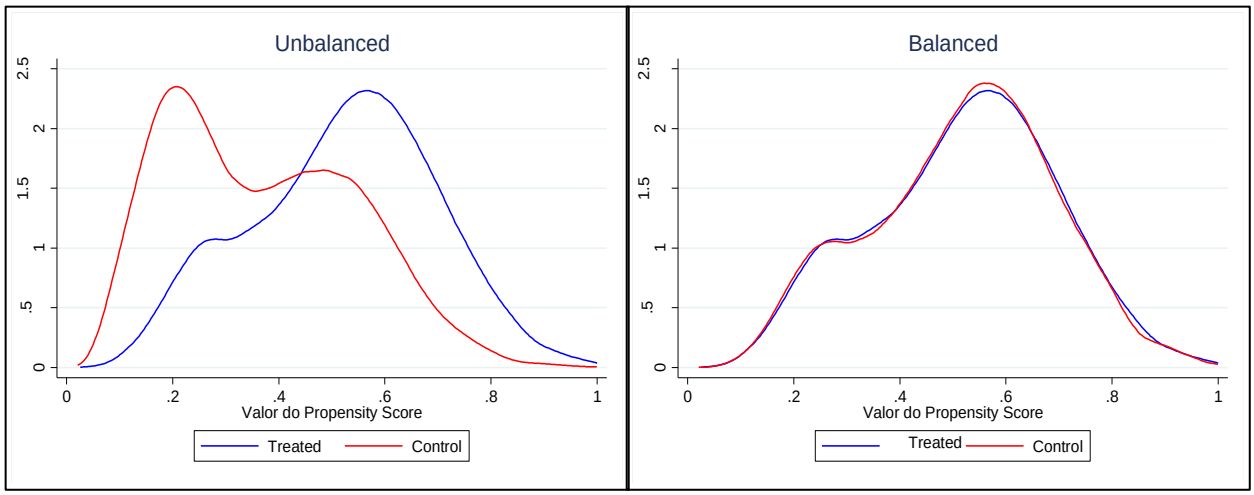
Appendix

Graph 1 – Propensity score density



Source: Research results.

Table A1 - Estimated coefficients by OLS and LATE for the proportion of hours spent on paid work and domestic work, 2011 to 2015

Variáveis	OLS		LATE	
	Work paid	Domestic work	Work paid	Domestic work
Early childhood education	0.0264***	-0.0161***	0.0201***	-0.00661*
	(0.001)	(0.001)	(0.004)	(0.003)
Color (white=1)	-0.0012	-0.0018*	-0.00126	-0.00173*
	(0.001)	(0.0010)	(0.0012)	(0.0010)
Age	0.0117***	0.00236**	0.0121***	0.00171*
	(0.0007)	(0.0010)	(0.0008)	(0.0009)
Age²	-0.000176***	-2.93e-05*	-0.000183***	-1.98e-05
	(1.25e-05)	(1.73e-05)	(1.36e-05)	(1.57e-05)
Schooling	0.00518***	0.00355***	0.00519***	0.00354***
	(0.0010)	(0.0006)	(0.0010)	(0.0006)
Schooling²	-0.000136	-0.000317***	-0.000134	-0.000320***
	(8.72e-05)	(4.94e-05)	(8.78e-05)	(4.98e-05)
Children total	-0.00225***	0.00251***	-0.00233***	0.00263***
	(0.0003)	(0.0004)	(0.0003)	(0.0004)
Children 0 to 5	-0.0228***	0.0207***	-0.0215***	0.0188***
	(0.00105)	(0.000883)	(0.00121)	(0.00102)
Married	-0.0268***	0.0191***	-0.0272***	0.0198***
	(0.00277)	(0.00178)	(0.00280)	(0.00172)
Salary	2.50e-05***	-1.23e-05***	2.52e-05***	-1.25e-05***
	(4.37e-06)	(2.01e-06)	(4.32e-06)	(2.04e-06)
Householder	0.000973	-0.00204*	0.00105	-0.00216*
	(0.00126)	(0.00115)	(0.00125)	(0.00116)
Mother lives at home	0.00168	-0.0115***	0.00146	-0.0112***
	(0.00233)	(0.00279)	(0.00232)	(0.00274)
Spouse salary	-0.00820***	0.0106***	-0.00821***	0.0107***
	(0.00117)	(0.00133)	(0.00116)	(0.00131)
Other income	0.0113***	-0.00649***	0.0114***	-0.00653***
	(0.00130)	(0.00133)	(0.00129)	(0.00133)
Housekeeper	-0.0102	-0.0497***	-0.0104	-0.0495***
	(0.016)	(0.0136)	(0.0157)	(0.0134)
Urban área	0.003***	-0.003**	0.004***	-0.00416***
	(0.001)	(0.001)	(0.001)	(0.001)
State (by initials) and year dummies				
AC	0.0005	-0.0011	0.0006	-0.0013
	(0.003)	(0.003)	(0.003)	(0.003)
AM	-0.0019	0.0010	-0.0020	0.0011
	(0.003)	(0.003)	(0.003)	(0.003)
RO	-0.0098**	0.0086**	-0.0093**	0.0079**
	(0.005)	(0.004)	(0.005)	(0.004)
PA	-0.0091***	0.0073***	-0.0082***	0.0062***
	(0.002)	(0.002)	(0.002)	(0.002)
AP	-0.0150***	0.0175***	-0.0150***	0.0175***
	(0.004)	(0.003)	(0.004)	(0.003)
TO	-0.0061	0.0045	-0.0055	0.0037
	(0.004)	(0.003)	(0.004)	(0.003)

Continue

MA	-0.0143***	0.0219***	-0.0125***	0.0196***
	(0.004)	(0.003)	(0.004)	(0.003)
PI	-0.0135***	0.0288***	-0.0117***	0.0266***
	(0.004)	(0.003)	(0.004)	(0.003)
CE	-0.0061**	0.0324***	-0.0044	0.0303***
	(0.003)	(0.003)	(0.003)	(0.003)
RN	-0.0171***	0.0392***	-0.0156***	0.0372***
	(0.003)	(0.003)	(0.003)	(0.003)
PB	-0.0113***	0.0408***	-0.0098***	0.0389***
	(0.004)	(0.002)	(0.004)	(0.002)
PE	-0.0100***	0.0363***	-0.0088***	0.0348***
	(0.003)	(0.003)	(0.003)	(0.003)
AL	-0.0217***	0.0453***	-0.0204***	0.0437***
	(0.003)	(0.003)	(0.002)	(0.004)
SE	-0.0037	0.0278***	-0.0024	0.0262***
	(0.003)	(0.003)	(0.003)	(0.003)
BA	-0.0079***	0.0200***	-0.0067***	0.0185***
	(0.002)	(0.002)	(0.002)	(0.002)
MG	0.0106***	0.0300***	0.0118***	0.0286***
	(0.003)	(0.002)	(0.003)	(0.002)
ES	0.0139***	0.0103***	0.0155***	0.0084***
	(0.003)	(0.003)	(0.003)	(0.003)
RJ	-0.0058*	0.0141***	-0.0046	0.0126***
	(0.003)	(0.002)	(0.003)	(0.002)
SP	0.0094***	0.0239***	0.0110***	0.0219***
	(0.003)	(0.003)	(0.003)	(0.003)
PR	0.0232***	0.0081***	0.0243***	0.0067**
	(0.003)	(0.003)	(0.003)	(0.003)
SC	0.0355***	0.0067*	0.0373***	0.0044
	(0.003)	(0.004)	(0.003)	(0.004)
RS	0.0289***	0.0186***	0.0299***	0.0173***
	(0.004)	(0.003)	(0.004)	(0.003)
MT	0.0163***	-0.0011	0.0172***	-0.0023
	(0.004)	(0.004)	(0.004)	(0.003)
GO	0.0075**	0.0060	0.0080**	0.0053
	(0.003)	(0.004)	(0.003)	(0.004)
MS	0.0129***	0.0033	0.0133***	0.0029
	(0.003)	(0.002)	(0.003)	(0.002)
DF	-0.0010	0.0326***	-0.0004	0.0319***
	(0.004)	(0.002)	(0.004)	(0.002)
2012	-0.0039***	-0.0117***	-0.0039***	-0.0117***
	(0.001)	(0.001)	(0.001)	(0.001)
2013	-0.0067***	-0.0182***	-0.0065***	-0.0184***
	(0.001)	(0.001)	(0.001)	(0.001)
2014	-0.0059***	-0.0106***	-0.0056***	-0.0109***
	(0.001)	(0.001)	(0.001)	(0.001)
2015	-0.0033*	-0.0202***	-0.0029*	-0.0206***
	(0.002)	(0.001)	(0.002)	(0.001)
Constant	-0.0763***	0.0903***	-0.0836***	0.101***
	(0.010)	(0.015)	(0.012)	(0.014)
Observations	74,377	74,377	74,377	74,377
R-squared	0.222	0.098	0.221	0.096

Note: * p <.1, ** p <.05, *** p <.01. Standard errors in parentheses and clustered by psu. Estimates consider the sample weight. Source: Research results.