WAGE DIFFERENTIAL BETWEEN MOTHERS AND NON-MOTHERS IN BRAZIL: A DECOMPOSITION STUDY FOR SELECTED AGE GROUPS

1. Introduction

This study aims to analyze the phenomenon of the motherhood penalty in the Brazilian labor market by decomposing the wage differential between mothers and non-mothers, considering different stages of the life course based on age groups. The literature on the motherhood penalty shows a consensus that mothers receive, on average, lower wages compared to non-mothers. Examples include Waldfogel (1997), Budig and England (2001), and Anderson et al. (2002) for the United States; Kühhirt and Ludwig (2012) for Germany; Livermore, Rodgers, and Siminski (2011) for Australia; Jia and Dong (2012) for China; Gamboa and Zuluaga (2013) for Colombia; Molina and Montuenga (2009) for Spain; and Gafni and Siniver (2015) for Israel.

Although there is no divergence in the literature regarding the existence of the motherhood penalty, several points still prompt discussion. For example, what are the factors that most contribute to the wage differential between mothers and non-mothers? Which mothers are more penalized – those of lower or higher socioeconomic status? How does the penalty tend to behave over the life course?

Regarding socioeconomic status (SES), some studies argue that women at the top of the income distribution live in households better equipped to outsource caregiving tasks, thereby reducing the conflict between work and family (Budig and Hodges, 2010). On the other hand, other studies suggest that greater resource availability may allow mothers with higher wages to reduce their labor supply. Additionally, they may be more susceptible to wage deterioration resulting from motherhood due to their higher level of human capital, leading to a greater wage difference between mothers and non-mothers compared to women with low SES (Anderson et al., 2002; England, 2016).

Concerning the motherhood penalty at different ages, studies show that greater experience in balancing motherhood and work, along with the growth and independence of children, can contribute to reducing the penalty at older ages (Neumeier, Sørensen, and Webber, 2018). However, discontinuity in mothers' work experience may hinder entry into higher-paying occupations or delay their occupational progression, causing an increasing disadvantage relative to non-mothers (Abendroth et al., 2014; Khan et al., 2014).

In order to address issues related to SES and the life course, we opted to estimate quantile decompositions in different age groups, as detailed in the following data and methods section.

2. Data and Methods

This work utilized microdata from the 2015 National Household Sample Survey (*Pesquisa Nacional por Amostra de Domicílios* – PNAD), conducted by the Brazilian Institute of Geography and Statistics (*Instituto Brasileiro de Geografia e Estatística* – IBGE). The period was chosen considering the most recent survey in which the fertility questionnaire was administered. The sample included women residing in urban areas, divided between mothers and non-mothers. Additionally, the sample was separated into two age groups: 25 to 34 years-old and 35 to 44 years-old. Decadal age groups were used to prevent the sample from becoming too small.

Regarding the empirical models, the Oaxaca-Blinder decomposition was employed for average hourly wages, and the quantile decomposition following Firpo, Fortin, and Lemieux's (2009, 2018) approach was used for the quantiles of hourly wages. Firpo, Fortin, and Lemieux (2009, 2018) developed a formulation using the Recentered Influence Function (RIF), which enables the estimation of decomposition detailed by covariates and is path independent – i.e., the order of predictors does not influence the model results. The authors also propose a strategy to measure model misspecification issues or when the RIF does not adequately approximate the quantiles, based on estimating a reweighting factor. For these reasons, Firpo, Fortin, and Lemieux's (2009, 2018) method was chosen for this study.

The variables used in the decomposition models for mean and quantiles were:

- Age: defined by the number of years lived by the woman.
- Age squared.
- Years of schooling: categorized as "no schooling," "primary education (incomplete or complete)," "secondary education (incomplete or complete)," and "higher education (incomplete or complete)."
- Marital status: assigned a value of 1 if a spouse is present in the household and 0 otherwise.
- Race/color: assigned a value of 1 if the woman is Black or Brown, and 0 if White.
- Number of weekly hours dedicated to household chores.
- Region of the country: defined by Brazil's five regions Southeast, South, Center-West, Northeast, or North.
- Occupation type: categorized as "employee with a formal contract," "employee without a formal contract," "military or statutory," "domestic worker with a formal contract," "domestic worker without a formal contract," "self-employed," or "employer."

3. Results

The decomposition models' results demonstrated the significant importance of the attributes of mothers and non-mothers in explaining the wage differential between these two groups, regardless of the age group. The greater importance of the composition effect was observed both for average hourly wages (Table 1) and for the quantiles of the wage distribution (Figures 1 and 2). Regarding the quantile decompositions, it was found that the motherhood penalty is higher at the top of the distribution, aligning with previous studies on the topic. The vulnerability faced by mothers and non-mothers in the lower portion of the distribution makes the two groups more homogeneous in terms of their attributes, reducing the impact of motherhood on earnings.

Regarding the age perspective, a slight reduction in the wage differential between mothers and non-mothers was observed in the older age group compared to the younger one. However, this result cannot be attributed to an improvement in mothers' characteristics, as the composition effect was more significant in the 35 to 44 age group. This was evident in the models estimated for average earnings with and without the reweighting procedure, as well as in the reweighted models for the quantiles of the wage distribution.

The attributes that contributed most to widening the wage differential between mothers and non-mothers were schooling, hours dedicated to household chores, and occupation types, in both age ranges analyzed. The quantile decompositions showed that schooling differentials increase up to approximately the 0.7 quantile, then diminish beyond that point. Differentials related to hours

dedicated to chores became progressively larger higher up the wage distribution. This result is particularly interesting because wealthier women have the financial means to outsource household chores, yet still suffer a greater penalty related to this variable. Conversely, differentials related to occupation type were significant only up to the 0.35 quantile, due to the large proportion of mothers engaged in self-employment and domestic service without a formal contract.

On the other hand, the variables of age and the presence of a spouse in the household mitigated the wage differential between mothers and non-mothers. Concerning the age variable, this effect was relevant only among younger women. The importance of having a spouse highlights the vulnerability faced by mothers in single-parent households, as they generally have an inelastic labor supply, making them more willing to accept lower wages. Therefore, the results indicate that such women would have higher wages if they had a spouse present in the household.

Table 1. Decomposition of the Average Hourly Wages of Mothers and Non-Mothers Aged Between 25 and 34 Years-Old and Between 35 and 44 Years-Old, With and Without Reweighting – Brazil, 2015

Model type	Differential effect	25 to 34 y/o		35 to 44 y/o	
		Coefficient	%	Coefficient	%
Without reweighting	Composition	-0.238***	77.9	-0.219***	78.5
		(0.0142)		(0.0184)	
	Wage structure	-0.0676***	22.1	-0.0600***	21.5
		(0.0159)		(0.0209)	
	Total difference	-0.306***	100	-0.279***	100
		(0.0142)		(0.0203)	
With reweighting	Composition	-0.267***	87.5	-0.348***	124.9
		(0.0398)		(0.0486)	
	Wage structure	-0.0382	12.5	0.0694	-24.9
		(0.0407)		(0.0491)	
	Total difference	-0.306***	100	-0.279***	100
		(0.0142)		(0.0203)	

Source: Microdata from PNAD 2015 (IBGE).

Note: Significance level: *** $p \le 0.01$, ** $p \le 0.05$, * $p \le 0.1$.

Figure 1. Decomposition of the Quantiles of Hourly Wages of Mothers and Non-Mothers Aged Between 25 and 34 Years-Old and Between 35 and 44 Years-Old – Brazil, 2015



Source: Microdata from PNAD 2015 (IBGE).

Figure 2. Composition Effect Detailed by Variables in the Decomposition of the Quantiles of Hourly Wages of Mothers and Non-Mothers Aged Between 25 and 34 Years-Old and Between 35 and 44 Years-Old – Brazil, 2015



Source: Microdata from PNAD 2015 (IBGE).

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