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Work and Family Conflict, Gender and Low Fertility in Brazil

Helena Cruz Castanheira

Hans-Peter Kohler

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ABSTRACT

This paper uses a multilevel logistic analysis to measure in what extent gender and work-family ratios, at the city level, are associated with the odds to have a child at the individual level in different parities, controlled by age and socio-economic characteristics. We analyze only married or cohabiting women from 15 to 49 years old. Work and family conflict variable affects negatively the predicted probabilities of a birth of first order, and positively the second, third and fourth in 2010 when Brazil had below replacement fertility. The variable used to measure gender relations had no effect in the predicted probabilities to have a birth.

1. INTRODUCTION

In the 2000s, the estimated TFR (total fertility rate) for Brazil declined from 2.38 children per women in 2000 to 1.90 in 2010 (Census Data - IBGE). This decline was already expected by demographers since below replacement fertility levels were detected in several areas in the beginning of 2000. The state of São Paulo, for instance, had a TFR of 1.88 children per women in 2002 (Yazaki 2003). Nine metropolitan regions and the Federal District had below replacement fertility by 2004 (Wong and Bonifácio 2008). When analyzing Brazilian fertility rates it is essential to consider the heterogeneity in Brazilian territory and the different process that may be driving those changes (Carvalho 1973, Carvalho and Wood 1994, Potter et al., 2010).

The most recent Census microdata (IBGE 2010) provide a unique opportunity to study some social factors behind the below replacement fertility considering the heterogeneity in the Brazilian territory. In this article we drive from the bibliography that relates fertility decisions with work and family relations and gender conflict (Folbre, 1983; Oppenheimer, 1994; Mason 1997; Mason and Oppenheimer, 1997; McDonald, 2000; Del Bocca 2002; Catalbiano 2009; Esping-Andersen 2009; Luci and Thévenon 2010; Rindfuss et al. 2007; Kravdal and Rindfuss 2008; Myrskylä, Kohler and Billari 2011; Thévenon 2011; Mills 2011; among others). Specifically, the goal is to test using a multilevel analysis, in what extent work and family conflict and gender relations at the city level are associated with the odds to have a child at the individual level in different parities, controlled by age and socio-economic characteristics.

There are evidences that Brazilian labor policies do not harmonize work and childrearing effectively (Sorj et al. 2007). The limited access to child care, especially low-cost and high quality child care, is an issue. In relation to gender, Brazil is in the 85th position of 134 countries in the Global Gender Gap Index in 2010 (Hausmann et al. 2010). The index considers economic participation and opportunity, educational attainment, health and survival and political empowerment. This is not a virtuous position for the 6th highest GDP in the world

in 2010 (in current US\$, International Monetary Fund 2012 and World Bank 2012). Therefore, we hypothesize that work and family conflict and gender relations might be related to the fertility levels observed in Brazil in 2010.

2. BACKGROUND

2.1 Basic Determinants of the First Fertility Decline in Brazil

Brazil is a highly heterogeneous country; it has the fifth largest territory in the world, diverse biomes across regions and substantial cultural diversity and socio-economic inequalities. Alongside this heterogeneity coexists different demographic regimes (Carvalho 1973, Carvalho and Wood 1994, among others). The fertility decline onset was in the South and Southeast in the 1960s. Around fifteen years later it started in the North and Northeast (Potter et al., 2010). The transition from high to below replacement fertility levels appears to be strongly related to changes in socio-economic circumstances (Potter et al. 2002). On the macro level the Federal Government had an important role in the decline, despite the absence of a targeted public policy to reduce fertility¹. In the last fifty years, public administration promoted changes in the economy (incentives to industrialization and technology development), in the infra-structure (sanitary reform and electrification), health system (access and coverage), improved medication accessibility and subsidies, and a solidification of the social security system.

Other macro factor that is frequently discussed in the literature is the role of mass communication expansion (Faria 1994; Martine 1996; Ferrara et al 2008; Westoff and Koffman 2011). Mass communication would have affected fertility through change in perception of social roles and the content favors nontraditional social norms (Martine 1996). The structural changes outlined occurred differently across regions. Urbanization was uneven in Brazilian territory and so was the

¹ The first family planning law was approved in 1996, more than thirty years after the onset of the fertility decline (Law number 9263) (Wong and Perpétuo 2006, page 260). It has legalized voluntary sterilization and allowed it to be done by the Public Health System. It also implements regulations to sterilization, for example, it forbids sterilization right after a delivery.

spread of mass education, industrialization, electricity and sewage. At the individual level, studies have also emphasized the role of education (Lam et al. 1993, Potter et al. 2002, Yazaki 2003), income (Berquó and Cavenaghi 2004) and religion (McKinnon et al. 2008).

Finally, Brazil was outlined by the literature, like other South American countries, as an atypical pattern of fertility in which low levels were attained with young age at marriage, young fertility schedules and high prevalence of stopping behavior. However, scholars have been reconsidering this notion. Rosero-Bixby et al. (2009), for instance, has shown an increase in fertility postponement and foregone fertility in South America. The postponement behavior is mainly attributable to recent expansion of secondary and college education in the continent. Nonetheless in some countries the effect of delaying fertility is higher than the shift in the education distribution of the population.

2.2 Work and Family Perceived Conflict and Gender Inequality

Four studies, so far, have explored the issue of below replacement fertility in Brazil (Yazaki 2003, Wong and Bonifácio 2008, Alves and Cavenaghi 2009, Goldani 2002). The first three papers are mostly descriptive, presenting fertility levels and how the proximate determinants of fertility have changed (specifically type of contraception and age at marriage). Yazaki (2003) focus in the state of São Paulo, and Wong and Bonifácio (2008) in metropolitan areas. Alves and Cavenaghi (2009) compare age specific fertility rates of Brazil with Portugal, Italy and France in the 2000s. Goldani (2002) is a qualitative compilation of Brazilian expert opinions presented to the UN about what will be the fertility level of Brazil in 30 years.

This paper will test the association of work-family conflict and gender symmetry with the odds of having a child in 2010, controlling for socio economic characteristics. Therefore, it is important to briefly explain the evidences from the literature and the general theoretical framework that justifies the use of those

variables. A growing body of research emphasizes the relation of gender with fertility (Folbre, 1983; Oppenheimer, 1994; Mason 1997; Mason and Oppenheimer, 1997; McDonald, 2000; Myrskylä, Kohler and Billari 2011; Esping-Andersen 2009). Gender equity is composed of two components of the gender system: an institutionalized inequality in the society and a within household inequality based on the division of labor between men and women (McDonald 2000; Mason 1997).

McDonald (2000) proposes that the transition from high to replacement fertility levels accompanies an increase in women's empowerment in the household with a decrease of patriarchal values. Sustained low fertility is driven by high levels of equity in individual-oriented institutions and moderate levels of gender equity within the family. Full gender equity is attained only when being male or female is not a determinant of who will generate income, do the caring and nurturing, and perform household maintenance (McDonald 2000, p. 436). Mills et al. (2006) has found a positive correlation of the total fertility rate of European countries with a gender-related development index. A cross-country comparison estimation among developed countries found that at similar Human Development levels, gender equality (measured by the Global Gender Gap from Hausmann et al. 2010) is important for higher fertility levels (Myrskylä et al. 2011).

Work and family conflict is related to the previous argument in the sense that higher gender inequality would produce more caring and labor work for the women, restricting their demand for children. The work-family conflict variable is a proxy indicating how institutional arrangements in the society (public, private and even the family) harmonize with labor supply of a mother with the youngest children from 1 to 5 years old. The hypothesis is that the decision to have children would be restricted to observable environment characteristics. The higher the perception of childrearing incompatibility with work in addition to higher educational and occupational aspirations, the more the fertility would be postponed.

3. MODEL AND DATA SPECIFICATIONS

In order to measure work and family conflict and gender disparities at the city level we have used the Brazilian Census Survey of 2010. It is the only national representative database that can be disaggregated at the city level. The total number of cities in the 2010 Census is 5,565. This analysis is restricted to married or cohabiting women in ages 15 to 49 in an attempt to capture intended fertility only. According to the 2006 Brazilian DHS, 93% of intended pregnancies in Brazil occurred among married or cohabiting women (Brazilian DHS 2006). In the 2010 Census, among the 292,318 individuals born between 2009.5 and 2010.5, 79.46% was born from married or cohabiting women in 2010.5 (232,318).

The statistical method is a two-level logit regression that controls for correlation among individuals within city. Consequently, the coefficients will not be biased due to the inclusion of city' variables. The model with two levels is preferred above a simple logit model with "average" variables at the city level. Institutional and Community features may have an important role in the process, but individuals' heterogeneity enhances the analysis (Smith 1989). The Stata command used to estimate the regressions is "xtlogit" with random intercept and fixed slopes.

The response of i th women in the k th city is

$$\ln(Y)_{ik} = \beta_{0,k} + \beta_1 X_{i,k} + \beta_2 Z_k + \alpha_i + \epsilon_{ik}$$

Y_{ik} is 1 if the woman had a birth in the previous year and 0 if she had no birth in the previous year. There are five dependent variables. The first one is applied to all women independent of parity. Since fertility motivation varies by birth order we estimate four other models considering parity progression. Therefore, we compared woman that had a birth in the previous year with parity p (1, 2, 3 or 4+) with women that had no birth in the previous year that was parity $p-1$ (0,1, 2 or 3).

The α_i random error accounts for the unobserved heterogeneity of individuals across cities. The likelihood-ratio test of rho [$\rho = (\text{var}(\alpha_i))/(\text{var}(\epsilon_{ik}) + \text{var}(\alpha_i))$] will

indicate the proportion of the error variance that is due to unobserved heterogeneity across cities and if a two-level model is applicable. In all models, rho was statistically significant and the bi-level model justified over the one level logistic model. Two models were estimated for each parity level. The first has individual characteristics and the second includes city-level variables. The individual characteristics are: race, education attainment, log of total household income per capita, age, and type of labor contract (formal or otherwise). The city-level variables are: female managers' ratio in relation to total managers, female employment rate, employment rate of mothers with youngest child 1 to 5 years, city-size, and log GDP per capita.

The female managers ratio is our proxy to measure gender equity in the municipality level and is given by the sum of total directors and managers in the municipality that are female by the total directors and managers in the municipality. Unfortunately it is not a comprehensive indicator of gender relations, however we found that it was the most plausible given the variables available in the Census database. The employment ratio of mothers with the youngest child from 1 to 5 years old is a proxy of work-family conflict of preschoolers' mothers. The hypothesis is that the higher the ratio of mothers ages 1 to 5 in the labor market, the better the work-family environment and the higher the odds to have a child.

Table 1 describes the number of observations per city size. The total database has 3,219,062 married or cohabiting mothers in ages 15 to 49. The total number of women that had birth in the previous year is 231,772 and the . In Table 1 we can observe that in 2010 the cities ranging from 10,000 to 99,999 individuals had the higher rates of women having at least one birth in 2010. There were more women in the transition from childless to motherhood (first birth) than in the other parities, a common characteristic of low fertility regimes.

Table 1: Married or Cohabiting Women Ages 15 to 49 in Brazil in 2010

City-Size	Any birth order		First birth		Second birth		Third birth		Fourth birth or higher	
	Obs	$E(Y_{ij}=1)$	Obs	$E(Y_{ij}=1)$	Obs	$E(Y_{ij}=1)$	Obs	$E(Y_{ij}=1)$	Obs	$E(Y_{ij}=1)$
Less than 10,000	625,182	0.069	95,574	0.179	145,006	0.094	185,263	0.036	112,679	0.049
10,000 - 24,999	731,771	0.076	116,833	0.181	166,048	0.102	200,457	0.043	130,636	0.066
25,000 - 99,999	704,688	0.075	123,835	0.170	168,987	0.097	195,369	0.041	118,712	0.064
100,000 - 499,999	744,583	0.069	148,822	0.150	197,839	0.083	216,034	0.034	113,272	0.046
500,000 or more	412,838	0.067	94,001	0.134	112,952	0.081	119,278	0.031	56,283	0.039
Total	3,219,062	0.072	579,065	0.163	790,832	0.092	916,401	0.037	531,582	0.055

Data Source: Brazilian Census 2010.

Note: The models that control for birth order compares woman that had a birth in the previous year ($Y_{ij}=1$) with parity p (1, 2, 3 or 4+) with women that had no birth in the previous year ($Y_{ij} = 0$) that was parity $p-1$ (0,1, 2 or 3).

4. RESULTS

Table 2 summarizes the results. We can observe that the inclusion of city-level variables is justified since it reduces the intercept variance and decreases rho. The gender ratio (female managers' ratio) was not statistically significant in any birth order. The work-family conflict variable (employment ratio of mothers with youngest child in ages 1 to 5) was positive to all birth orders. However, for the first order the interaction with the overall female employment ratio was negative and statistically significant. Consequently, the overall effect of work-family conflict variable was negative.

Graph 1 displays the predicted probability of a birth in each parity level by levels of work-family conflict variable. It can be observe that the negative effect in first birth is not very pronounced. However, the positive effect in further birth orders is expressive. The female employment ratio was negative in all parities, as expected. The city GDP per capita was significant only to the first and fourth parity. Level-1 variables had the expected behavior. Although it is interesting to notice the higher odds of high school or college completed women to have first order births than women with less than primary completed.

Table 2: Odds Ratio predicting a birth in Brazil for married or cohabiting women from 15 to 49 years old in 2010 by birth order

	First Child		Second Child		Third Child		Fourth Child		Any Birth Order	
	Model 1 (a)	Model 1 (b)	Model 2 (a)	Model 2 (b)	Model 3 (a)	Model 3 (b)	Model 4 (a)	Model 4 (b)	Model 5 (a)	Model 5 (b)
Intercept	0.312 ***	0.248 ***	0.207 ***	0.233 ***	0.047 ***	0.047 ***	0.097 ***	0.246 ***	0.085 ***	0.086 ***
Level-1 Variables										
Black or Brown	1.057 ***	1.045 ***	1.075 ***	1.052 ***	1.074 ***	1.072 ***	1.272 ***	1.244 ***	1.017 ***	1.012 *
Educ Attainment (ref. Less than Primary)										
Primary Completed	1.019 †	1.021 †	0.863 ***	0.865 ***	0.896 ***	0.893 ***	0.636 ***	0.637 ***	0.993 †	0.993 †
High School or College Completed	1.049 ***	1.050 ***	0.849 ***	0.845 ***	0.831 ***	0.826 ***	0.436 ***	0.434 ***	1.175 ***	1.172 ***
Not Declared	0.618 ***	0.619 ***	0.519 ***	0.516 ***	0.620 ***	0.614 ***	0.297 ***	0.295 ***	0.654 ***	0.652 ***
Log HH Income per capita	0.942 ***	0.943 ***	0.931 ***	0.933 ***	0.919 ***	0.919 ***	0.868 ***	0.872 ***	0.938 ***	0.939 ***
Formal	0.642 ***	0.649 ***	0.700 ***	0.706 ***	0.732 ***	0.728 ***	0.562 ***	0.570 ***	0.740 ***	0.740 ***
Level-2 Variables										
Female Employment Ratio		3.860 ***		0.420 ***		0.209 ***		0.082 ***		0.767 *
Mothers y1-5 Employment Ratio		3.359 ***		2.413 ***		2.513 ***		3.022 **		2.188 ***
Female x Mothers y1-5 Employment Ratio		0.089 ***		0.666 †		1.729 †		2.641 *		0.614 ***
Female Managers Ratio		1.009 †		1.057 †		1.090 †		1.090 †		1.059 *
Log GDP per capita		0.957 ***		0.994 †		1.011 †		0.931 ***		0.980 ***
Intercept Variance	0.167	0.156	0.167	0.164	0.216	0.203	0.476	0.456	0.133	0.124
rho	0.0084 ***	0.0073 ***	0.0086 ***	0.0081 ***	0.0140 ***	0.0123 ***	0.0643 ***	0.0593 ***	0.0053 ***	0.0047 ***
Wald Chi2	17839 ***	18056 ***	14598 ***	14786 ***	22883 ***	23021 ***	18224 ***	18532 ***	115107 ***	115388 ***
Number of obs	579065	579065	790832	790832	916401	916401	531582	531582	3219062	3219062
Number of groups	5565	5565	5565	5565	5565	5565	5565	5565	5565	5565
Obs per group										
min	4	4	9	9	8	8	7	7	59	59
avg	104.1	104.1	142.1	142.1	164.7	164.7	95.5	95.5	578.4	578.4
max	20001	20001	21801	21801	22380	22380	10155	10155	79785	79785

Data Source: Brazilian Census 2010.

Note: Additional controls for age (dummies for each age from 15 to 49 with the median age in each model as the reference age) and city size.

† $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$

Graph 1: Predicted probabilities of a birth in Brazil 2010

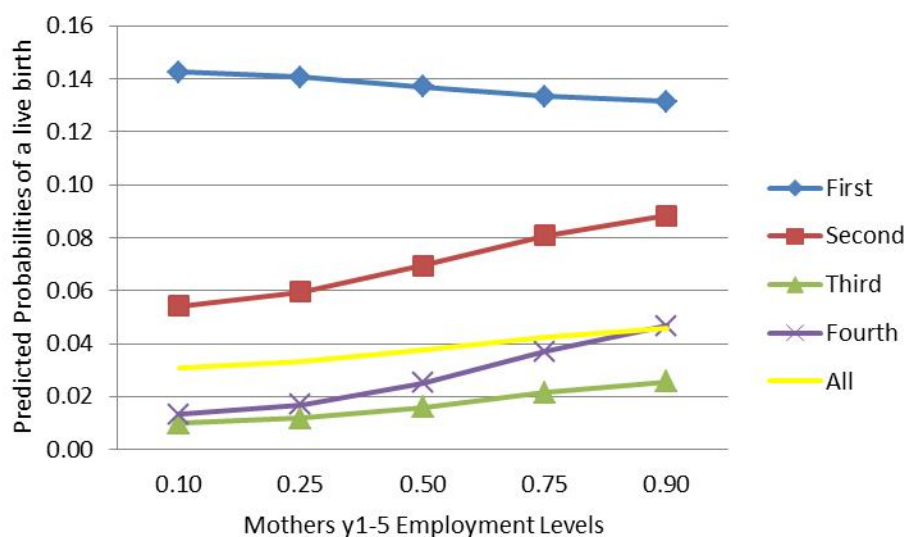


Table 3: Predicted Probabilities of a Birth by Employment Levels of mothers with the youngest child in preschool ages (1 to 5 years old) in Brazil 2010

Levels of Mothers' Employment Ratio	First	Second	Third	Fourth	Any Birth Order
0.10	0.143	0.054	0.010	0.013	0.031
0.25	0.140	0.059	0.012	0.017	0.033
0.50	0.137	0.069	0.016	0.025	0.038
0.75	0.133	0.081	0.021	0.037	0.043
0.90	0.131	0.088	0.026	0.047	0.046

Data Source: Brazilian Census 2010.

5. DISCUSSION

This paper is the first attempt to access how city-level variables are associated with fertility in Brazil in different birth orders. We have noticed that perceived work-family conflict do have an effect on fertility, especially to second, third and fourth birth orders. In this context, we highlight the importance of separating the analysis by parities. If we had used only Model 5 we wouldn't be able to observe how the variables have different effects in each birth order.

Further research is needed in the relation of gender and fertility levels, possibly by introducing a variable that could connect gender relation in the workforce and inside the household with time-use data, for example. Only with a measure that conciliates the two spheres we could be able to test McDonald (2000) hypothesis. The variable used in this article is related essentially to gender relations in the work-force and did not have any effect on fertility.

Finally, further research is needed to a better understanding of the mechanisms in which perceived work and childbearing or childrearing conflict affects fertility in the context of Brazilian cities. Specifically, analyzing childcare accessibility, price and quality variability among cities could be enlightening (Brewster and Rindfuss 2000; Connelly 1992; Mason and Kulhthau 1992; Baum 2002; Del Boca 2002). In addition, studying the variation in norms and attitudes about childrearing (Rindfuss and Brewster 1996), length of paid parental leaves (Duvander et al. 2010), withdrawal and return restrictions of the labor market (Desai and Waite 1991) or workplace flexibility (Schott 2011) could also help to further understand the causes of the present low fertility in Brazil and it's variations across cities.

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