The contribution of sociodemographic changes to the childlessness trend in Brazil

The high proportion of women finishing the reproductive period without children is an event observed and investigated in different developed countries. In Latin America, this phenomenon is almost not studied, although, in countries like Brazil, 13.5% of the cohort of women born between 1966-1970 are childless. This percentage represents an increase of almost 50% if compared to the 1942-1946 cohort, which presented a proportion of 9.03% of women without children at the end of the reproductive period.

Unlike the pioneer countries, the fertility transition in Brazil began in the second half of the 20th century and occurred in a faster way. The country as a whole achieved fertility below the replacement level in 2005, and ten years later, it had already a TFR of 1.7. The persistence of fertility decline to very low levels is associated with the recent start of its postponement (until 2000, the fertility age structure was still young in the country), and also with the increase of women who finish their reproductive life without children. If the postponement of fertility intensifies, permanent childlessness between different groups of women should also follow the same direction, considering the probable interaction between *tempo* and *quantum* effects.

The increase in the proportion of childless women in Brazil has been accompanied by the great expansion of schooling and by changes in the patterns of marriage and consensual union, that is, by variables that affect decisions on demand for children. Considering the association of these variables with the possibility of being childless and the changes in the composition of these variables over the last three decades, the aim of this study is to decompose the effect of these two components in the explanation of childlessness's increase in Brazil, from a multivariate research. At the end of the study, variations on voluntary and involuntary childlessness in the Brazilian context are discussed.

This work has Hayford (2013)[1] and Reher and Requena (2018)[2] as main references. In the first, the author (2013) shows that changes in marital status are still the most important factor for the proportional increase of childless women in the United States. Reher and Requena (2018) show that changes among cohorts reveal different patterns of behavior characterized by a reversal of the traditional association of childlessness with marital status and education.

This study uses Brazil's demographic censuses of the years 1991, 2000 and 2010, made available by the IPUMS - International Project[3]. The analysis is by birth cohort and is limited to women between the ages of 40 to 44 and 45 to 49 years, which fit the concept of permanent childlessness[4]. The choice of the variables in this work is based on the international literature about childless women and their availability in the databases used. As for the United States in Hayford (2013) and Spain in Reher and Requena (2017), *Race/Color*, *Union Status* and *Education* are used as controls. Considering that education is proxy for income, the latter was not included. *Religion*, *Region* and *Rural-Urban Division* were also included. Finally, it is worth mentioning that the dependent variable is a dichotomous measure of children's absence, that is, having or not a child.

In order to reach the proposed aim, this work uses decomposition based on logistic regression (FAIRLIE, 1999; POWERS, YOSHIOKA & YUN, 2011). The basic idea behind this technique is to decompose changes (at the population level) into the dependent categorical variable (having or not a child), between two cohorts in both macro-elements:

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[1] Published in *Demography*.

[2] Published in *European Journal of Population*.

[3] IPUMS collects census information from several countries, and harmonizes them so that all variables are compatible over time (and across countries). In this work, the data are from the sample, that is, from the extended questionnaire that is applied only to a part of the population.

[4] BILLARI *et al*. (2007).

a composition component (structure), and a rate component (reproductive behavior). These two are partitioned and present the effects in each of the categories of each of the variables used as controls. To run this decomposition, the *mvdcmp* package was used in Stata. Its advantage is the provision of the decomposition results in a detailed way, i.e. for both composition and rate components in each of the variables (POWERS, YOSHIOKA & YUN, 2011).

The decomposition was performed between the birth cohorts from 1942-1946 to 1966-1970, period in which the proportional increase in childless was almost 50%. Table 1, in the end, presents the results, specifying the individual contributions of the changes in each of the variable's categories, as well as the sum of them in both composition and rate components.

First, by analyzing components in aggregate form, that is, how much of the total change in childlessness is due to composition or rate effect, it is observed that both components contribute to the rising trend of childlessness, with a slight advantage for changes in reproductive behavior (56.2% of the total). It is also possible to see that almost 30% of the total change is attributable to the intercept. As Hayford (2013) discuss, this percentage can be thought of as a secular change experienced across the population. That is, almost a third of the increase in the proportion of women without children is a result of general changes, rather than a specific behavior of an individual segment of the population. It is possible to perceive, therefore, an important difference between what is found for Brazil and for the USA. In the analysis done by Hayford (2013), the largest portion of the change in childlessness is attributable to the intercept.

Investigating the results of each of the categories, it can be seen that the greater proportion of childlessness is mainly attributable to two changes: 1) composition of women with incomplete elementary (35% of the total); 2) reproductive behavior of women who lived at least once with a spouse (30% of the total). It can be said, therefore, that without these changes, the rising trend in childlessness would have been much smaller.

Rate effects in the incomplete elementary category also had a reasonable contribution to the rising trend of childlessness in Brazil - 12% of the total. Both effects, composition and rate account for 47% of the total variation in the dependent variable. When analyzing complete elementary school, on the other hand, it is seen that the changes occurred in this category would have caused a downward trend in the proportion of women without children if the other variations had not occurred. Compositional changes in the complete college category far outweigh the rate effects.

As for the marital situation, the effect of rate matters more than the composition's effect: 27.5% vs. 7.8% - which accounts for 35% of total changes in childlessness. This percentage is composed almost entirely of changes in the reproductive behavior of women who have ever lived with a partner. Variations in the composition of both categories of the variable did not contribute in a large extent to the increase of childlessness, and the changes in the reproductive behavior of those women never lived with a partner corroborate to a downward childlessness trend, as it happens for the complete elementary school category. That is, in the absence of other changes, the variations in the reproductive behavior of those women never united would have generated a trend of decline in childlessness. The results described in this paragraph suggest an increase in voluntary and decrease in involuntary childlessness.

Analyzing the categories in aggregate form in each of the variables, the increase in the proportion of women without children can be attributed, mainly to the changes in the variable of Education. Although the rate effects in the union status variable are of great relevance, variations in composition are smaller. Therefore, overall, compared to variations in this variable as a whole, educational changes contribute more to the increase in childlessness. Conversely, Hayford (2013) and Reher and Requena (2018) find that

variations in the composition of single women have impacted more than changes in education. Also different from the Brazilian context in which compositional variations in incomplete elementary school have a greater impact, the North American and Spanish (REHER, REQUENA, 2017) contexts show that the increase in childlessness can be more attributed to variations in the composition of women with a university degree.

As can be seen, both compositional and behavioral changes in the variables of education and union status are the most important factors for the rising proportion of childless women in Brazil. However, in addition to these and to the already mentioned contribution of the intercept, changes among the cohorts in the other variables also explain the increasing proportion of childlessness. Regarding the Brazilian regions, it is seen that both effects of composition and rate would cause a downward trend in childlessness if the other variables did not change. The total contribution of the variable religion is similar to that of the Brazilian Regions. That is, the sum of the changes in the variable would contribute to the production of a decreasing trend of childlessness if other variations did not occur. Changes in the rural-urban division variable are basically composed of changes in the reproductive behavior of women living in the urban area. Finally, the changes in the race/color variable are those with the smallest contribution to the rising trend in childlessness among the birth cohorts analyzed.

From these findings, it is possible to discuss a hypothesis that the patterns found for developed countries (the USA and Spain) differ from those found for developing countries, like Brazil. While in Hayford (2013) and Reher and Requena (2017), changes in marital status were the ones that contributed the most to the increase in childlessness, the Brazilian context shows that its rising trend is mostly attributable to variations in education, although changes in the reproductive behavior between the women already united contribute to a great extent. This discussion can be seen as a suggestion of a future research agenda.

Finally, and of great importance, variations in the reproductive behavior along the cohorts, of both women that lived and never lived with a partner, allow to infer that in Brazil, involuntary childlessness has diminished, at the same time that it voluntary childlessness has increased. In this way, besides analyzing the increase in permanent childlessness among cohorts in Brazil, this work sought to differentiate this phenomenon according to its spontaneity.

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Table 1 - Multivariate non-linear decomposition among birth cohorts from 1942-1946 to 1966-1970 of brazilian women without children who reported having 40 to 49 years in the 1991, 2000 and 2010 Censuses

	Composition Effects		Rate Effects		Total Effects	
	Absolute	Percentage	Absolute	Percentage	Absolute	Percentage
Total Change	0,019419000	43,819000000	0,024897000	56,181000000	0,044316000	100,000000000
Intercept			0,013163000	29,702000000	0,013163000	29,702000000
Race/Color						
Parda (brown)	-0,000317540	-0,716530000	0,000099739	0,225060000	-0,000217801	-0,491470000
White	0,000072471	0,163530000	0,000816470	1,842400000	0,000888941	2,005930000
Black	0,000037471	0,084553000	0,000010110	0,022814000	0,000047581	0,107367000
Other Races	0,000048775	0,110060000	-0,000016167	-0,036480000	0,000032608	0,073580000
Total Race/Color	-0,000158823	-0,358387000	0,000910152	2,053794000	0,000751329	1,695407000
Union Status						
Lived at least once with a partner	0,001739400	3,924800000	0,013334000	30,088000000	0,015073400	34,012800000
Never lived with a partner	0,001725300	3,893200000	-0,001157800	-2,612600000	0,000567500	1,280600000
Total Union Status	0,003464700	7,818000000	0,012176200	27,475400000	0,015640900	35,293400000
Education						
Elementary Incomplete	0,015647000	35,306000000	0,005330400	12,028000000	0,020977400	47,334000000
Elementary Complete	-0,005982900	-13,500000000	-0,000328560	-0,741400000	-0,006311460	-14,241400000
Medium Complete	0,001282600	2,894100000	-0,000524870	-1,184400000	0,000757730	1,709700000
College Complete	0,005570600	12,570000000	0,000124170	0,280200000	0,005694770	12,850200000
Total Education	0,016517300	37,270100000	0,004601140	10,382400000	0,021118440	47,652500000
Religião						
With Religion	0,000306480	0,691570000	-0,005102600	-11,514000000	-0,004796120	-10,822430000
No Religion	0,000305610	0,689600000	0,000130070	0,293500000	0,000435680	0,983100000
Total Religion	0,000612090	1,381170000	-0,004972530	-11,220500000	-0,004360440	-9,839330000
Region						
North	-0,000298490	-0,673540000	0,000938750	2,118300000	0,000640260	1,444760000
Mid-west	-0,000116590	-0,263070000	-0,000141760	-0,319870000	-0,000258350	-0,582940000
South	0,000093471	0,210920000	-0,001265600	-2,855700000	-0,001172129	-2,644780000
Northeast	0,000003707	0,008365000	-0,001680600	-3,792300000	-0,001676893	-3,783935000
Southeast	-0,000555890	-1,254400000	-0,001173500	-2,647900000	-0,001729390	-3,902300000
Total Region	-0,000873792	-1,971725000	-0,003322710	-7,497470000	-0,004196502	-9,469195000
Rural-Urban Divide						
Rural	-0,000073741	-0,166400000	-0,000868640	-1,960100000	-0,000942381	-2,126500000
Urban	-0,000073673	-0,166240000	0,003210800	7,245100000	0,003137127	7,078860000
Total Rural-Urban Divide	-0,000147414	-0,332640000	0,002342160	5,285000000	0,002194746	4,952360000

Source: Author's elaboration based on the Censuses of 1991, 2000 and 2010.