

Demographic Change and the Living Arrangements of the Elderly: The Case of Brazil*

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Abstract:

A recent report by the United Nations on the living arrangements of the elderly around the world found that there is a global trend towards independent living arrangements, while coresidence with kin is on the decline. We use the case of Brazil to investigate how socioeconomic changes, on the one hand, and a decline in family sizes, on the other, may have independently influenced the prevalence of coresidence of elderly women with their adult children in that country from 1970 to 2009. We find that, despite the prevalence of processes which have been generally associated with a decline in intergenerational coresidence in the developing world, such as urbanization and expansion of old-age social security, levels of coresidence of elderly women with their offspring remained remarkably stable in Brazil until around 2000. In contrast with that, we find that the fast decline in fertility levels that started in the 1970s are projected to bring a decline in the levels of intergenerational coresidence in Brazil in the next twenty years that will happen at an unprecedented pace.

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1. Introduction

A 2005 report by the United Nations on the living arrangements of the elderly around the world found that there is a global trend towards independent living arrangements among old-aged persons, while intergenerational living arrangements are on the decline. With the exception of Africa, old-aged individuals in most developing and developed countries are becoming more likely to live alone or with their spouse only, and less likely to coreside with other kin, such as their adult children (United Nations 2005).

Although previous studies have provided a vast array of different and sometimes conflicting explanations for this trend, it is useful to categorize the proposed theories into two basic types. The first type of theories are those that focus on indentifying large historical changes that may have changed the costs and benefits associated with intergenerational coresidence as it is perceived by elderly individuals and their adult children. For instance, it has been proposed that some historical trends observed during the last century such as increases in the income of the elderly and of their adult children, higher social and geographic mobility, increasing urbanization, and increasing individualism may have made independent forms of living arrangements more desirable and more feasible (Ruggles 2007).

A second type of explanations, on the other hand, is related to the decline in family sizes brought about by the Demographic Transition and to how this decline in the pool of available kin affects the possibility of intergenerational coresidence for the elderly¹. From the perspective of the elderly individual, fewer adult children mean a smaller pool of offspring to coreside with. Therefore, *ceteris paribus*, smaller family sizes might reduce the probability that an old-aged

¹ In this article we use the term “family size” to refer to the number living children an elderly person has at a given point in time.

individual will coreside with an offspring². In this context, even if the propensity of elderly individuals to coreside with their offspring is not changing over time, the percentage of old-aged individuals in intergenerational households might decline over time. We use the terms “behavioral” and “compositional” as a shorthand to refer to the first and second types of explanations, respectively.

An important difficulty in understanding the forces shaping the trends worldwide in the living arrangements of the elderly over the past century arise from the fact that most countries were experiencing, at the same time, the sociohistorical changes generally associated with the propensity to coreside in intergenerational households and the demographic changes in family size (United Nations 2005). Although most previous studies have acknowledged to some extent that both types of forces have contributed to reduce the proportion of elderly individuals in intergenerational households, considerably less is known on the degree of relative importance of these two components over time.

This article contributes to the literature by investigating the role of those two separate components on the living arrangements of elderly women in Brazil from 1970 to 2009. Using census and nationally representative survey data we find that despite the large socioeconomic changes that took place in Brazil between 1970 and 2000 – such as fast urbanization and significant expansion of old-age social security – the proportion of elderly women coresiding with their children remained remarkably stable during this period. At least for this period in Brazil, many of the modernizing forces generally associated in the literature with behavioral changes did not lead to declines in levels of intergenerational coresidence. Our results also show

² Smaller family sizes mean that the elderly parent may have less children willing to coreside with him/her. But smaller family sizes also mean that, *ceteris paribus*, it is less likely that one of the elderly parent’s children may need to coreside with him/her.

that, despite large declines in period fertility between 1970 and 2000, the average number of offspring of elderly women was fairly stable during this period. This should be no surprise when taken into account that the family size of elderly women in a given year is a function of fertility levels prevailing in 40 or more years before that year. For instance, the women who were 70 years old in the year 2000 were living their 20s during the 1950s, when fertility levels had not yet started to decline in Brazil.

The period 2000-2009, on the other hand, presented a very different dynamic. The fast declines in fertility levels initiated in the 1960s started to reduce the number of adult children of the women entering old-age in the 2000s. More importantly, the data for women 40-60 years old in 2009, who have for the most part already completed their fertility histories, indicates that the family size of elderly women will likely decline at an unprecedented fast pace in Brazil over the next 20 years. Regarding the propensity of elderly individuals to coreside with their children net of the effect of family size, our results also show that during the 2000-2009 period there was an unprecedented decline in the propensity for intergenerational coresidence, especially for the elderly women who had five or more adult . This last result suggests that forces of the type emphasized by the behavioral theories might have been becoming particularly important in Brazil in the past decade.

The remainder of this paper is organized as follows. First we present formally how we conceptualized empirically the effects of the behavioral and compositional components affecting the living arrangement of the elderly. Next we present the results, followed by a discussion of the findings.

2. The Decomposition of Behavioral and Compositional forces

We use standard demographic decomposition to separate the effects of changes in family size on the living arrangements of the elderly from the effects of all other causes that should affect living arrangements apart from changes on the distribution of family sizes in the population (see Preston, Heuveline et al. 2001 for more details on this technique). If the proportion of elderly women coresiding with at least one of her offspring in year t is PC_t , then:

$$PC_t = \frac{R_t}{N_t} = \frac{\sum_{i=0}^k R_{i,t}}{N_t} \quad (1)$$

where R_t is the number of elderly women coresiding with at least one of her offspring in year t , N is the total number of elderly women in year t , R_i is the number of elderly women with i living children who are coresiding with an offspring, and k is the highest family size of elderly women in that population. PC_t can be further decomposed as:

$$PC_t = \frac{\sum_{i=0}^k \left(\frac{R_{i,t}}{N_{i,t}} \times N_{i,t} \right)}{N_t} = \sum_{i=0}^k \left(\frac{R_{i,t}}{N_{i,t}} \times \frac{N_{i,t}}{N_t} \right) = \sum_{i=0}^k (r_{i,t} \times c_{i,t}) \quad (2)$$

Equation 2 shows that the proportion of elderly women coresiding with at least one of her offspring in a given year can be expressed as a function of the relative distribution of the family sizes of women in that year (c_i), and the rates of coresidence among women of different family sizes (r_i). In terms of our categorization of theories that attempt to explain historical changes in the living arrangements of the elderly presented previously, those of the behavioral type emphasize changes on the r_i schedule over time, while those which emphasize changes in family size focus on changes on the c_i schedule.

For instance, Ruggles (2007) proposes that the log-term decline in intergenerational coresidence observed in the United States is mostly a result of increasing opportunities for young adults to form independent households separate from their elderly parents. This suggests that the propensity of elderly Americans to coreside with their offspring (r_i) should be declining over time for elderly individuals of all family sizes (i). The proposed change in opportunities may affect differently the elderly individuals who have different family sizes – for instance, those with large family sizes may experience larger relative declines in the propensity to coreside than those with smaller family sizes. However, at the end of the day the argument is inevitably one about changes in the r_i schedule.

The second class of theories, which we labeled above as compositional, emphasize changes in the c_i schedule. The demographic transition experienced by most countries is typically characterized by declines in mortality followed by declines in fertility. This pattern generally leads to a slight increase in average family sizes at first, followed by much larger declines in family size (Lam and Marteleto 2008).

Two important points should be noted before continuing to the results. First, although we chose the contrasting labels “behavioral” and “compositional”, it should be clear that changes in the c_i schedule are also the product of changes in behavior. It is true, however, that the c_i schedule prevailing in a given year in a society represents mostly fertility behavior, as well as patterns of infant mortality, prevailing in that society three or more decades earlier. Therefore, our decomposition of the forces driving patterns of living arrangements into r_i and c_i and is an attempt to capture, on the one hand, changes in the prevailing costs and incentives associated with intergenerational coresidence and, on the other hand, changes in the distribution of family sizes.

Second, we do not suggest that all existing theories of changes in the living arrangements of the elderly fall exclusively on either the behavioral or compositional type. This division is rather an analytical tool than a categorization of the existing literature. We are also not alone in suggesting such type of categorization. For instance, Wolf's (1994) has suggested thinking about trends in the living arrangements of the elderly as a result of "behavioral propensities" in combination with "[the] composition of the population making those choices" (p. 186). Nonetheless, we emphasize this particular distinction between those two types of explanations because, although previous studies have acknowledge both types of explanations, much fewer studies have rigorously taken into account simultaneously long-term changes in those two components.

3. Results

We used in our analysis data from the 1970, 1980, 1991, and 2000 Brazilian censuses; and the 1992 to 2009 waves of the *Pesquisa Nacional por Amostra de Domicílio* (PNAD). The PNAD is a nationally representative cross-sectional survey administered annually by the Brazilian Census Bureau³. Over the period 1992-2009 the PNAD was not administered only in 1994 and in 2000. The survey contains information on several socioeconomic characteristics of all the persons living in each sampled household. Particularly important for this study is the fact that for every woman aged 15 years or old the censuses' and the PNADs' questionnaires included information on the number of children ever had, the number of those children still alive, and how many of those coresided with her.

³ During the period 1992-2003 the PNAD survey did not cover the rural area of the Northern region of Brazil. However, it is unlikely that this omission significantly influence the major trends reported here, since the population not covered represent less than 3% of the total population. Additionally, we were not able to identify any sudden shifts in the time trends of any of the variables in the PNAD time series right after 2004.

The data indicates that the percentage of women aged 60 years and over coresiding with at least one of her own children remained at or close to 50% during the period from 1970 to 2009 (Table 1). Overall, there was a slow decline in levels of intergenerational coresidence, with the exception of the 1980s when levels of intergenerational coresidence actually increased. The age group 60 and over averages the experience of many different cohorts of women, which may contribute to the stability of the coresidence levels over time. For this reason, we also include the trend for women aged 65-69 years old. However, the trend in coresidence level for women 65-69 closely resembles this same general trend over that period.

Table 1 – Percentage of women coresiding with at least one offspring, by year and age – 1970 to 2009

| Year | 60+ | | 65-69 | |
|-------------|------------|-----------|--------------|-----------|
| 1970 | 53 | (122,547) | 51 | (31,585) |
| 1980 | 50 | (193,256) | 49 | (53,925) |
| 1991 | 55 | (297,458) | 54 | (76,151) |
| 2000 | 52 | (464,171) | 52 | (112,682) |
| 2009 | 50 | (24,029) | 48 | (5,758) |

Source: 1970-2000 Censuses and 2009 PNAD. Note: Sample size in parenthesis.

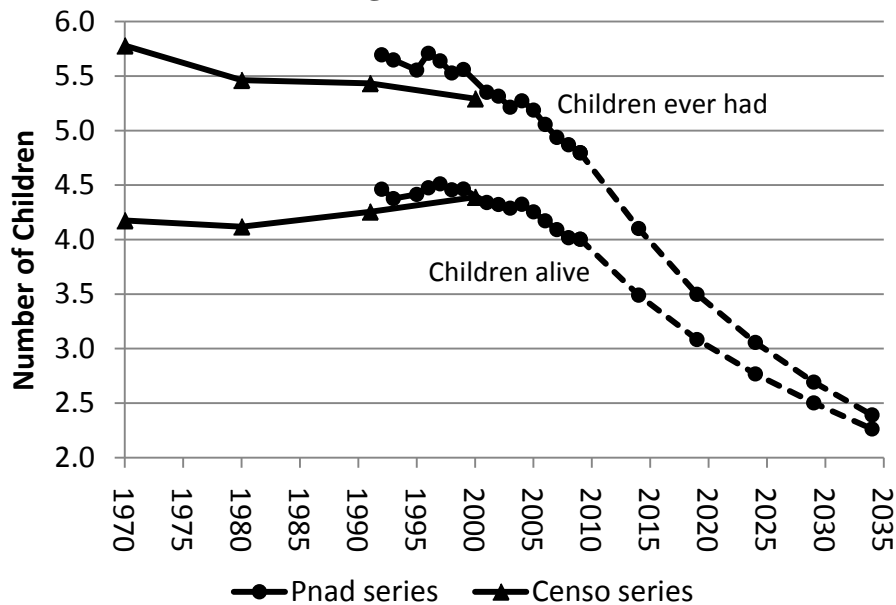
As discussed in the previous section, the percentage of women coresiding with offspring in year t (PC_t) can be described as a function of the relative distribution of women by number of living offspring in that year ($c_{i,t}$) and the propensity of coresidence by family sizes ($r_{i,t}$). Next we describe the trends in the $c_{i,t}$ and $r_{i,t}$ schedules over the 1970-2009 period, and discuss what those trends may suggest for changes in the patterns of intergenerational coresidence in Brazil in the following 25 years, up to year 2034.

3.1 Trends in the c_i schedule

Figure 1 illustrates the trends in the average number of surviving children of women aged 65-69 during the period from 1970 to 2009. In other words, it shows the series of $\sum c_{i,t}$, for

t=1970,..., 2009. In order to show the effect of fertility decline on the number of surviving children the graph also includes the average number of children ever had by those same women. Finally, the graph includes a forecast of those two trends up to year 2034 (dotted lines). This forecast was based on the information on parity and surviving number of children of women aged 40-64 in 2009. For instance, the average number of children ever had and the surviving number of children of women 60-64 in 2009 is used as a forecast for what those numbers should be for the women who will be aged 65-69 in 2014.

Figure 1 –Number of children ever had and current number of surviving children, women aged 65-69: Brazil, 1970 to 2034.



This simple forecast may differ from the observed number for two reasons. First, some of the children of this cohort of women are likely to die between 2009 and 2014, which brings the average number of surviving children lower than forecasted. Second, if women with higher parity and higher number of surviving children are more likely to die than women with lower parity and lower number of surviving children, the average parity and family size observed in 2014 should be lower than our forecast for that year. In sum, there is reason to believe that the

forecast for the period 2014-2034 in Figure 1 is likely to overestimate what will become the observed trend⁴. Nevertheless, this only reinforces that declines in the number of children available to elderly women in Brazil is likely to decline at an unprecedented in the next two decades.

The pattern in Figure 1 illustrates that over the period from 1970 to 2000 the number of surviving children was increasing slightly, which indicates that decreases in mortality were offsetting any declines in fertility. From around 2000 on, however, the declines in fertility dominate the trend to smaller family sizes. Although women 65-69 had on average between 4 and 4.5 surviving children during the whole period between 1970 to 2000, this number should decline to 3.5 by 2014, to 3 by 2024, and it should be well below 2.5 children per women by 2034.

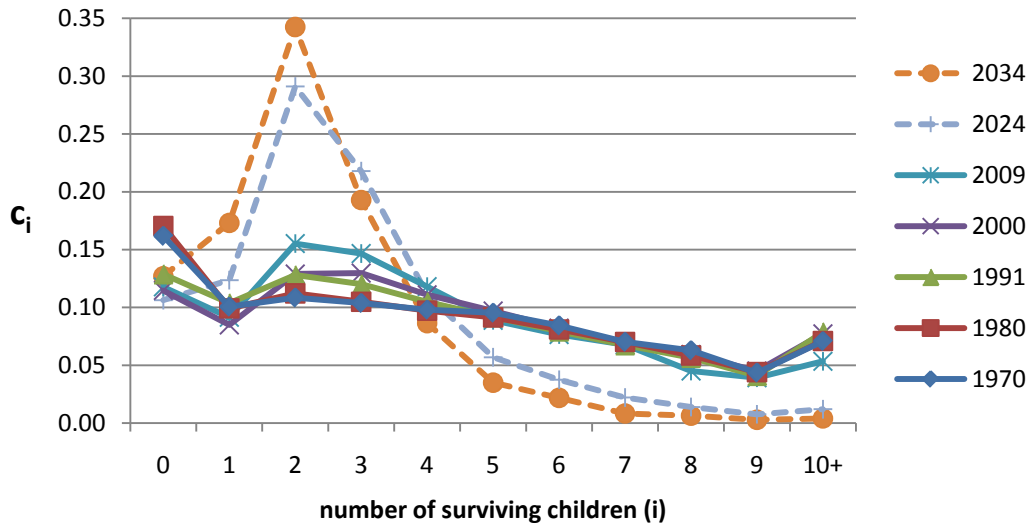
The large gap between children ever had and children alive observed in 1970 was still considerable in 2009, suggesting that the children of those cohorts of women experienced higher levels of infant mortality. However, the gap is projected to be close to zero in the cohorts of women who will be aged 65-69 in 2034. In 1970, by age 65-69 women had lost on average 1.6 children, this number was reduced to 0.8 in 2009, and should be close to 0.1 in 2034.

A closer look at the c_i schedules shows that elderly women with large family sizes are still very common in Brazil by 2009 (Figure 2). For instance, in 1970 about 43% of women aged 65-69 had five or more surviving children, the same percentage observed in 2000. In 2009 it declined to 37%. In the next two decades, on the other hand, there will be a and by 2034 less

⁴ A third reason is sampling variation. However, this should not drive the current forecast to systematically overestimate or underestimate what will become the observed values.

than 8% of the women aged 65-69 should have a pool of five or more children with whom they can coreside with.

Figure 2 – Relative distribution of women aged 65-69 by family size (i): Brazil, 1970 to 2034.



Note: Figures for years 2024 and 2034 forecasted as in Figure 1.

Additionally, as has been noted in previous studies, Figure 2 indicates that, differently from the pattern observed in many developed countries, fertility decline in Brazil was not accompanied by an increase in levels of childlessness. As a matter of fact, the proportion of women childless at age 65-69 in 2009 has in fact decrease when compared to the levels in 1970 and 1980.

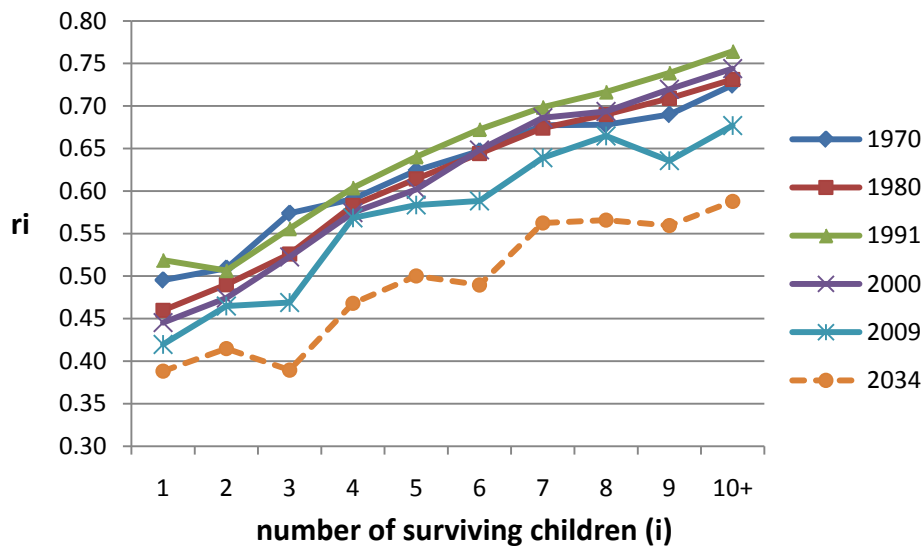
This pattern of relative stability of childlessness at relatively low levels in Brazil, even among those women who will reach old age in 2034, is a very important component driving the overall levels of intergenerational coresidence in the next decades. Since elderly women who have no children have by definition no chance of living in an intergenerational household ($r_0=0$), increases in c_0 tend to have large impact on coresidence levels. This seems to be the case in

Brazil since, for instance, the distance between r_0 and r_1 tended to be relatively large historically. This is shown in more detail in the next section.

3.2 Trends in the r_i schedule

Following the behavior of the r_i schedule over time permits an analysis of the effects of behavioral changes on the propensity of elderly women to coreside with their children, net of the effect of changes in the availability of offspring. The data shows that, in spite of some fluctuation on the r_i schedule between 1970 and 2000, the 2000s seems to be a decade in which a more clear decline in the propensity to coreside took place (Figure 3).

Figure 3 – Rates of coresidence with offspring (r_i) by family size (i): women 65-69, Brazil 1970 to 2034.



Although the survey in 2009 already contains information that allow us to estimate how the c_i schedule is likely to behave in the following two decades, the same cannot be said about the r_i schedule. The shape of future r_i schedules is likely to be influenced to a large extent by socioeconomic conditions and cultural patterns prevailing over the next decades. Nevertheless, we included in Figure 3 an estimate of r_i for 2034 based on a linear extrapolation of the time

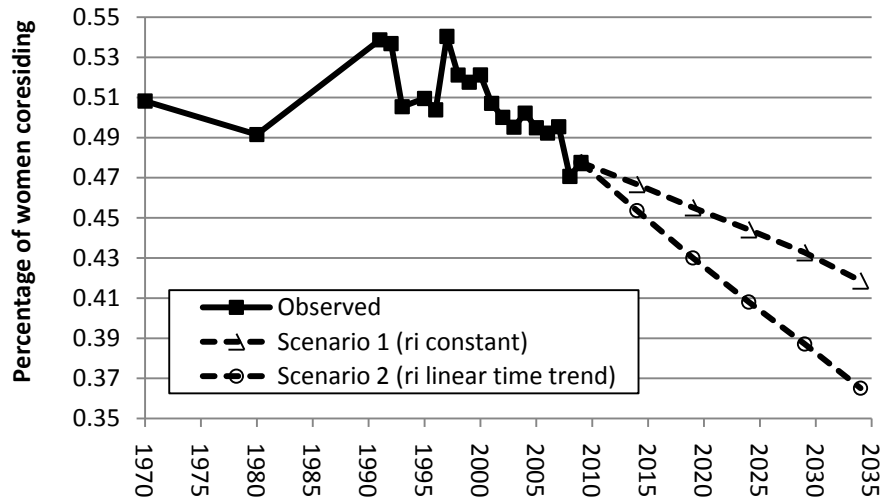
trend for each family size i (dotted line). In this exercise we limited the start of the time trend in 1991 and included not only the years shown in Figure 3, but also all the available PNAD waves from 1992 to 2009.

Although it is out of the scope of this paper to ascertain if this extrapolation is a good representation of the behavioral changes that might occur in the next two decades, it is a useful analytical tool. Since it represents the shape of the r_i schedule if r_i continues to change at the pace it did in the last two decades, in case the pace of decline slows down we know that the r_i schedule in 2034 is likely to fall somewhere between the curves for 2009 and 2034 in Figure 3. Conversely, if there is an increase in the pace of decline, the r_i schedule in 2034 should fall below what it is estimated to be in Figure 3.

In a similar fashion, we estimated r_i schedules for 2014, 2019 and 2024. We combined those $r_{i,t}$ schedules with the $c_{i,t}$ schedules for those same years (calculated according to the steps described in section 3.2) to estimate two counterfactual scenarios. Figure 4 summarizes those counterfactual results. In the first scenario there is no change in the propensity of 65-69 years old women to coreside with their offspring over the 2009 to 2034 period (i.e., if the r_i schedule remains constant at its 2009 level over the entire period). As a result, by 2034 around 42% of women 65-69 should be coresiding with their offspring. In this scenario the 6 percentage points decline from 48% in 2009 is entirely due to declines in the family size of elderly women.

In the second scenario we estimated what the pattern of intergenerational coresidence will look like if the r_i schedule continues changing according to the time trend observed during the 1990s and 2000s. In this case, by 2034 around 37% of women aged 65-69 will be coresiding with their offspring (Figure 4).

Figure 4 – Percentage of coresiding with offspring: women aged 65-69, Brazil 1970 to 2034.



4. Discussion

In this study we provide an overview of the long-term historical trends in the proportion of elderly women coresiding with their offspring in Brazil. The basic aim of this investigation was to evaluate if there were signs of changes in the propensity of elderly women to coreside with kin, while simultaneously taking into account the reductions in family size brought about by the Demographic Transition.

Our results showed that the proportion of elderly women coresiding with their offspring remained relatively stable between 1970 and 2000. This is an interesting finding, given that during this period Brazil underwent profound socioeconomic transformations that could potentially affect the costs and benefits faced by elderly women and their adult children when determining their living arrangements. For instance, while 56% of the population lived in rural areas in 1970, by 2000 it was 81%, and it continued to increase to 84% by 2010. Old-age social security also vastly expanded its coverage during the 1970s and 1980s (Oliveira, Beltrão et al. 1997). Additionally, a large flow of young adults migrated from the less economically developed

Northeast region to the faster growing São Paulo state in the South, likely increasing the geographical distance between adults and their elderly parents.

Despite those significant historical process that took place over the 1970-2000 period, our data shows that the propensity to coreside in intergenerational households remained relatively stable, suggesting that no significant behavioral change may have followed those structural transformations in the Brazilian society. For the period between 2000 and 2009, on the other hand, our analysis suggests that there were declines in the propensity of elderly women to coreside in intergenerational households, net of the effect of declines in the family size of women, which were also taking place during that decade.

Finally, the information on the family size of those women in their 40s and 50s in 2009 allowed us to provide some estimates of how changes in family size will likely affect patterns of intergenerational coresidence in the following decades. We estimated that if the propensity to coreside with offspring stays constant at its 2009 level, the expected declines in the family size of elderly women alone is likely to reduce the proportion of 65-69 aged women coresiding with offspring from 48% in 2009 to 42% in 2034. However, if the propensity to coreside continues to decline in the 2010s and 2020s at the same pace it has declined in the 1990s and 2000s, only 37% of those women are expected to be coresiding with an offspring in 2034.

The current version of this paper is, to an extent, still exploratory. In the next versions of this article we intent to condense the results section, which is largely graphically descriptive. By presenting the analysis in a more condensed manner, we can more easily incorporate trend in intergenerational coresidence at other age ranges besides the 65-69. But more importantly, condensing the existing results section is important because we want to move the analysis from a

comparison of “coresiding with children” versus “no children in the household”, to an approach that can better capture the choices of living arrangements available to elderly women. Particularly, in the current version of the paper we are not taking into account the marital status of the elderly women. For instance, our data allows us to differentiate between living “alone”, “with spouse and no children”, “with spouse and children”, and “with children and no spouse”. But this has not been included in the analysis yet. Incorporating this additional information is one of your most important next steps. In addition to this, we also want to improve our discussion on how the empirical findings on this paper speak to the larger literature on the changes in intergenerational coresidence.

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