

# The Impact of Demographic Change on Transfers in the form of Caregiving and on the Associated Well-being\*

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## **Abstract**

Caregiving is an important component of non-monetary transfers between and within generations. We propose a framework to evaluate the impact of demographic change on “who gives time to whom,” using matrices of time transfers by age and sex, and weighing time flows by self-reported indicators of well-being, for activities related to childcare and adult care. The empirical analysis based on the American Time Use Survey (ATUS 2011-2013) and the Panel Study of Income Dynamics (PSID) Disability and Use of Time Module (DUST 2013) reveals that people have more positive feelings and less negative moods when caring for children as opposed to caring for adults. Projections for the next several decades indicate that, although reductions in the care support ratio would be relatively small, population aging implies that an increased proportion of transfers would have more negative feelings associated to them, with potentially significant mental health consequences.

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# 1 Introduction

Intergenerational transfers of financial and unpaid resources are strongly affected by demographic change, which includes lower and later fertility as well as improved mortality and population aging. Changes in population age structure affect the fraction of the population in each stage of the life course (e.g. school attendance, childbearing, retirement, etc.). Thus population composition has relevant macro social and economic consequences [15].

The National Transfer Accounts (NTA) project has substantially improved our understanding of the generational economy. Members of the NTA network have generated the first estimates of economic flows across age, in a manner consistent with National Income and Products Accounts, for a large number of countries [21]. The NTA database has been used for a number of applications, including the evaluation of the macroeconomic consequences of population aging, the economic cost of childbearing and care for the elderly [15].

One of the main limitations of the NTA project is that unpaid productive activities are not fully taken into account yet. A large quantity of goods and services are produced by household members for their own consumption, without involving market transactions. Despite the economic and social importance of unpaid work, these productive activities are largely invisible to traditional national economic accounts. As a consequence, standard measures of intergenerational transfers typically ignore household production, and thus underestimate the overall value of goods and services produced over the life cycle, in particular, the economic contribution of women. The estimation of non-market productive activities has now become possible thanks to the increasing availability of time use surveys in a number of countries. Recently, there have been some efforts to evaluate the extent of household production, and to integrate it into national accounts [1, 7, 35, 36, 8].

A second important limitation of traditional approaches is that estimates of intergenerational transfers are based on profiles of consumption and production by age and sex, without an explicit and complete estimation of time flows between age/sex groups. Evaluating flows of resources between groups within a population is relevant because the dynamics of transfers are intimately connected to changes in family structures and in the age distribution of the population. Combining estimates of flows of resources with evaluations of the dynamics in the structure of the extended family would allow us to isolate behavioral changes from demographic constraints.

A third relevant limitation of current approaches is that there is no distinction in terms of well-being related to different activities that involve transfers of unpaid resources. Ten minutes spent doing childcare are typically considered equivalent to ten minutes spent doing chores. This assumption may be reasonable in a number of situations. However, in other circumstances, the level of well-being and the health outcomes associated to specific activities may vary substantially.

In this paper, we use data from the American Time Use Survey (ATUS, 2011-2013) and the Panel Study of Income Dynamics (PSID) to estimate flows of time transfers related to caregiving activities, by age and sex, that are weighted by the level of enjoyment and pain associated to the activities. We then use these matrices of time transfers to project the impact of demographic change in the US on overall time transfers and quality-adjusted care support ratios.

## 2 Background

Early models of intergenerational transfers initially focused only on quantifiable economic variables, such as earnings distribution (Loury 1981), capital accumulation and inheritance (Kotlikoff and Summers 1981; Gale and Scholz 1994), and risk transfers (Gordon and Varian 1988). Over time, modified models were introduced that incorporated time use as a measureable and exchangeable commodity (Lee and Lapkoff 1988), and also more finely divided the population into smaller age groups (Lee and Mason 2011). Time has not only been included in the analysis of budget constraints. Time spent on unpaid nonmarket household production activities such as cooking, cleaning and care has also been included in national accounts (Panel to Study the Design of Nonmarket Accounts 2004; Landefeld, Fraumeni, and Vojtech 2009). More specifically, within the family unit itself (Albertini and Kohli 2012) care is an important activity for which time is produced and consumed (Lee and Kramer 2002), and differs by age and gender (Sambt et al. 2015).

The nature of this intergenerational transfer of time and other resources plays not only an important role within the family unit, but is also tightly linked to the changes of demographic factors on a larger scale. For example, as the average lifespan increases, parents choose to have fewer children potentially because of the perceived increase in the expected years of obligations (and subsequently transfers) to the children, even while these obligations have actually been largely turned over to the public sector (Watkins, Menken, and Bongaarts 1987). Or, as more developed populations are experiencing higher female participation in the labor force, delayed marriage and childbirth, and also more births outside of wedlock, both parents increase their time production (Sayer, Bianchi, and Robinson 2004): mothers tend to cut down on their time spent on paid work and leisure, and fathers also produce more time devoted to childcare. Delayed childbearing in an aging population also means that both adult children and their elderly parents eventually require care for which time is increasingly provided by a worker from outside of the family unit (Bianchi 2011). The demands of caring for parents who live to an older age, in conjunction with caring for children, has also given rise to the so-called “sandwich generation” which mostly features parents in their 30s whose time production is consumed by both younger and older generations (Dukhovnov and Zagheni 2015). As the expectations of and actual transfers to older and younger generations increase, particularly with regards to women as producers of care time, the individual well-being in retirement may actually be affected if these intergenerational demands mean that the individual has to further decrease labor supply or decrease retirement savings (Wiemers and Bianchi 2015).

The notion that care is an activity where production and consumption is usually unidirectional, such as when parents or grandparents produce time that the children consume, or children produce time that the parents consume (Yannis and Kan 1999; Cardia and Ng 2003) suggests that caregivers often do so for motives that cannot be fully captured by means of quantifying exchange, or might be altruistic. The experiences of the caregiver during care giving such as emotions felt and general well-being, then, might be important factors that shape the nature and quality of time used in care activities.

A body of literature supports the importance of measuring the well-being of caretakers by looking at the quality of time engaged in care (Mohide et al. 1988), especially since caregivers in general seem to have lower levels of well-being than

non-caregivers (Verbakel 2014). In some cases, caregiving stressors lead to depression indirectly through their effect on hours of care provided and the resulting perceptions of an excess demand on time (Yates, Tennstedt, and Chang 1999; Savla et al. 2008). There is a line of literature that focuses on stressors associated with caring for elderly parents, especially when caring for the elderly with physical or mental disabilities, which is associated with higher levels of depression among the caregivers (Chappell and Reid 2002; Baumgarten et al. 1992). There is also a small pool of research that looks at the well-being of carers of children, where child care has been associated with significant levels of self-reported depression (Hamre and Pianta 2004), higher levels of exhaustion and frustration (Pollmann-Schult 2014), and even anxiety associated to worries about the child’s well-being and the public perception of childcare as a profession (Gerstenblatt, Faulkner, and Lee 2013). However, there is little literature that combines and compares the two types of care work. It has been suggested that the meaning associated with acts of caregiving has a positive effect on the caregiver’s well-being (Noonan and Tennstedt 1997; Raschick and Ingersoll-Dayton 2004). While both elderly and child care potentially give caregivers some sense of meaning, it is possible that the effect is especially pronounced with childcare, since the caregivers are able to see their efforts come to fruition when the children succeed later in life (Hammersmith and Lin 2015). This way, the two forms of care can potentially differ in how they affect a caregiver’s well-being.

In this paper, we combine the quantitative measure of amount of time spent on caregiving, with weights that introduce a qualitative component of emotional well-being. We hypothesize that caring for children is actually more rewarding due to the fact that the caregiver’s efforts might have a meaningful impact on the child as the child grows, whereas the condition of the elderly only deteriorates, which often introduces the added stressor of physical and mental disabilities. This difference between the two will in turn have a differential effect on the quality of time spent on caring for children versus the elderly. In addition, we study the potential effect of changes in population age structure on intergenerational transfers.

### 3 Data

In order to estimate quality-adjusted matrices of time transfers by age and sex, we use data from the American Time Use Survey (ATUS) and the Panel Study of Income Dynamics (PSID).

We use matrices of transfers of care time, by age and sex, for the US, extrapolated from data from the American Time Use Survey (ATUS) (2011-2013), the major study of how people spend their time in the US. ATUS data were collected from a representative sample of about 26,400 participants selected annually from the respondents to the Current Population Survey (CPS) conducted by the US Census Bureau. The respondents are asked to provide a chronological account of the activities in which they took part during a randomly selected day, as well as additional information about who was present, the duration of the activities and where the activities took place.

In addition to the main ATUS questionnaire, we considered two additional data sets that supply relevant information about certain groups of care recipients as well as describe the emotional and physical well-being of informal caregivers while performing their duties: the Eldercare Roster and the Well-being module.

The Eldercare Roster, used in conjunction with the main ATUS data set is a crucial source of information to estimate inter-household informal caregiving. It consists of detailed records of care recipients, who are classified as elderly or suffer from a condition brought about by aging, and to whom ATUS respondents were caregivers over extended periods of time. While the main questionnaire lacks basic demographic information on non-household care recipients, such as age and sex, the Eldercare Roster contains much of the required data.

The second data set within ATUS is the Well-being module. Its primary purpose is to measure the emotional and physical impact of participation in a range of activities, of which the duration and circumstances are measured in the main questionnaire. Unlike the main ATUS questionnaire, the Activity file of the Well-being module consists of sets of exactly three randomly selected activities from the pool of eligible activities per each respondent. To be selected, activities must be of at least five minutes in length and be categorized as neither sleeping, personal care or grooming, nor as invalid-score entries, such as “Don’t know” or “Refused” answers. The six indicators of affect measured across all activities and available in the Well-being module are happiness, meaning, pain, sadness, stress, and tiredness. Each of these indicators is on a 7-point Likert scale that ranges from 0 through 6, where 0 represents the lowest intensity of emotion or physical state, and 6 the highest. In this study we employ the combined samples of 2012 and 2013 Well-being questionnaires in order to ensure adequate sample size.

We complemented information from ATUS with data extracted from the Panel Study of Income Dynamics’ (PSID) disability module, which details a time diary of respondents age 60 and older in the 2013 PSID, along with their spouses or partners. This module was introduced in 2009 to include a 24-hour time diary supplement and detailed disability measures to the existing PSID questionnaire. The Disability and Use of Time (DUST) module thus provides greater insight into factors that promote subjective well-being among older adults experiencing functional loss and also those providing assistance. The pool of respondents we studied is only limited to those who indicated having engaged in activities of care. From here, we categorized our sample pool into those who have cared for children and those who have cared for adults, based on two binary questions that ask respondents if they had cared for a child or an adult respectively. From the reported list of activities the respondent had engaged in, two to three activities were randomly chosen for a series of more detailed questions pertaining to well-being. This series of detailed questions included questions that required respondents to report their moods associated with the randomly selected activities mentioned above. Within the pool of respondents who had care work randomly chosen for more detailed questioning, we looked at the self-reported levels of moods, which were recorded on a Likert scale of 0-6, associated with child and adult care; these were happiness, calmness, frustration, worry, sadness, tiredness, and pain.

## 4 Matrices of Time Transfers by Age and Sex

In this paper, one of the inputs for our models consists of matrices of intra-and inter-household time transfers that we previously estimated (Dukhovnov and Zagheni 2015) using data from the American Time Use Survey (2011-2013). Matrices of intra-household flows of caregiving time can be estimated directly from time use diaries, since the respondents record the time dedicated to various caregiving activities as well as the

unique identifiers of household members that benefited from the time. Inter-household transfers of caregiving time cannot be estimated directly, since the respondents do not record the age and sex of care recipients. Inter-household flows are thus obtained indirectly by combining available information about time dedicated to inter-household caregiving activities, by age and sex, as they are reported in diaries, with frequencies of care recipients in various age and sex groups listed by the caregivers in the ATUS Eldercare Roster. The matrices of intra- and inter-household time transfers are then combined into a single tabulation of overall time transfers in terms of caregiving activities, by age and sex. More details about the methodology can be found in Dukhovnov and Zagheni (2015).

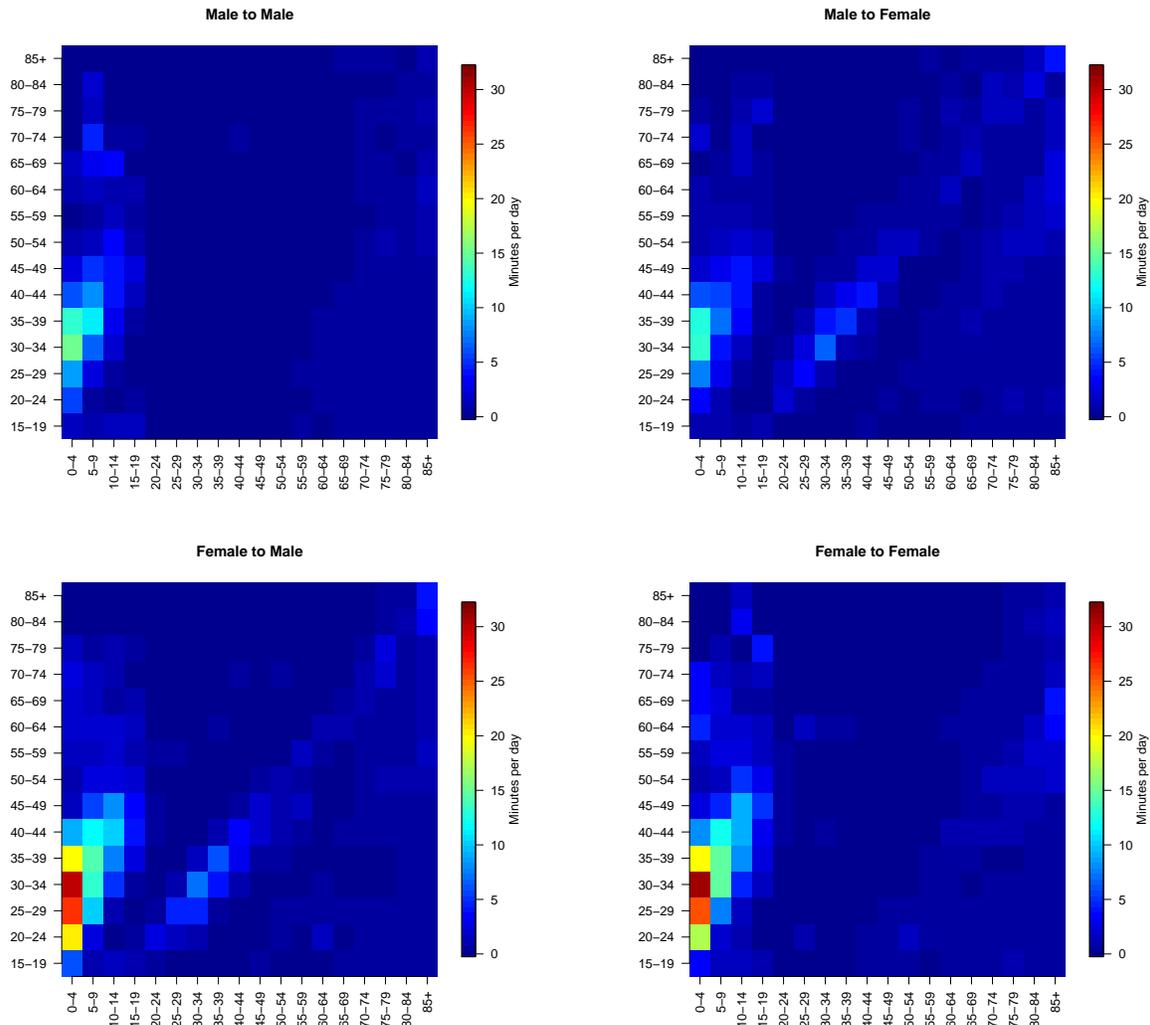


Figure 1: Graphic representation of matrices of time transfers related to caregiving activities in the US, estimated from the American Time Use Survey (2011-2013). In each panel, the color-coded values indicate average per-capita time transfers from the age groups on the rows to the age groups on the columns.

Figure 1 shows our estimates of overall flows of caregiving time by age and sex. Several important features emerge. First, we observe that the large majority of time transferred is from parents to young children, with notable sex differences: women spend about twice as much time caring for young children than men. Second, transfers from grandparents to grandchildren are noticeable. In particular, it is relevant to observe that gender differences emerge, with grandfathers spending more time with grandsons and grandmothers spending more time with granddaughters. Third, we observe a ridge along the main diagonal of the matrix of transfers for people of the opposite sex. This indicates substantial transfers to spouses. Finally, there are some sex differences in time dedicated to the elderly, and time needed by the elderly. Elderly women seem to have slightly higher care needs than elderly men. Middle-aged women spend slightly more time with the elderly than middle-aged men.

## 5 Well-being associated to childcare and adult care

### 5.1 Evidence from the American Time Use Survey

In terms of well-being and emotional affect, informal caregivers engaging in childcare report very high levels of happiness and meaning, on average 5.0 and 5.42, respectively. The scores associated with adult care are lower, trailing on average about 0.66 and 0.58 scale points below childcare, for the respective moods. When we consider negative feelings, we observe that respondents report higher levels of emotions, such as pain, sadness, and stress when doing adult care than when engaging in childcare. While these measures are not rated high on average, below 1.0 for pain and sadness and 2.5 or less for stress and tiredness on the 0-6 scale, levels of negative emotions and dissatisfaction across adult care activities are higher than in childcare activities. Finally, tiredness in childcare is rated higher with a mean score of 2.51, whereas adult care activities are on average somewhat less tiring with a lower score of 2.11. In contrast to several other types of activities, such as household work, leisure, and main job activities, childcare is thus rated higher than all in terms of happiness and meaning, but, at the same time, is more tiring than any of the mentioned activities.

The difference in distribution of weighted means of childcare and adult care across various emotions and physical states is highly statistically significant ( $|t| > 4$ ,  $p < .001$ ) for all but pain ( $t = -1.46$ ,  $p = .145$ ). As such, overall there is a high degree of confidence in the results of the above comparison. Figure 2 summarizes the descriptive results. It shows average scores of emotional affect associated with a number of time use activities, and the outcome of the test of significance for differences in the average scores of emotional affect related to childcare and adult care.

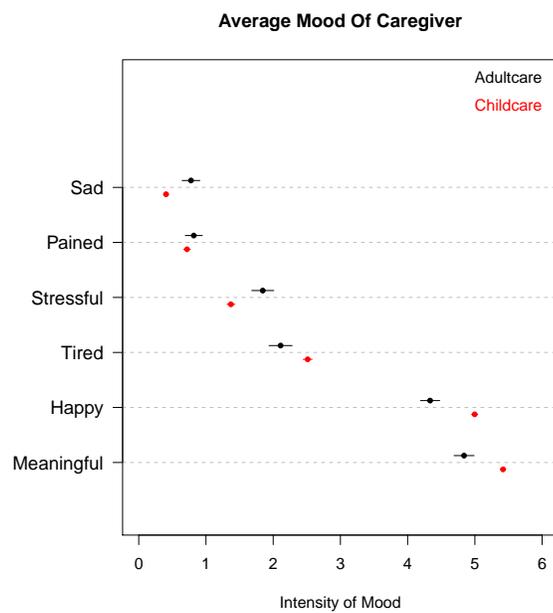


Figure 2: Average mood scores by type of care activity. Source: own elaborations on ATUS data. Confidence intervals were generated at 95% level.

## 5.2 Evidence from the Panel Study of Income Dynamics

Data from the Panel Study of Income Dynamics (PSID) confirms the result obtained from ATUS that there is indeed a difference in the moods individuals feel when engaging in childcare and adult care. On an aggregate level, respondents on average report more positive feelings (happy and calm) and less negative feelings (frustrated, worried, sad, tired, pain) when caring for children below 18, as opposed to caring for adults (see figure 3). Even with small sample sizes of 316 and 403 for respondents who participated in adult care and childcare respectively, a difference-in-mean test indicated that all moods except sadness were significantly different at a significance level of 0.05.

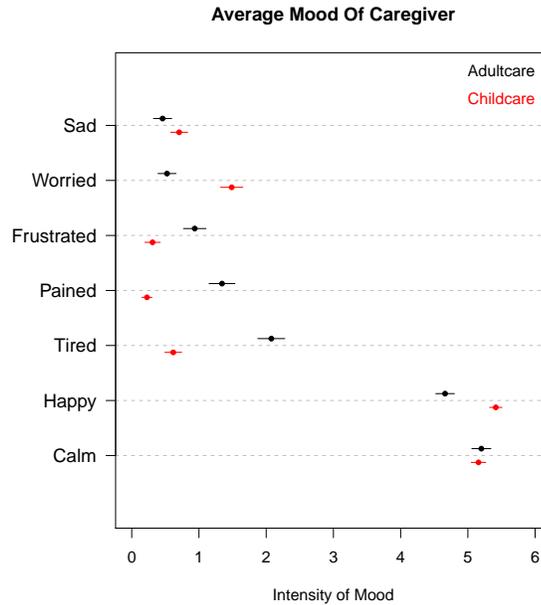


Figure 3: Average mood scores by type of care activity. Source: own elaborations on PSID data. Confidence intervals were generated at 95% level.

We also explored gender differences in moods associated with care work. On the whole, women had higher mean values for happiness, calmness, sadness, tiredness and pain when caring for children, and had higher mean values for frustration, worry, sadness, tiredness and pain when caring for adults. Further selecting gender groups from within our sample pool, however, meant that the sample sizes for further analyses were even more limited. Within the adult care group itself, only 82 respondents were male while 161 were female. Within the childcare group, there were only 58 males and 206 females. A difference-in-mean test only detected a statistically significant difference in pain between males and females who performed adult care, while the childcare respondents significantly differed only in sadness.

The respondents were further divided into 9 age groups ranging from 45 years of age to 85 and above. With childcare, there seems to be a general increase in happiness and calmness as the age of the caregiver increases. Frustration, however, initially decreases with age but spikes back up once the caregiver is past the age of 75. A similar trend

is seen with tiredness, and this is perhaps due to the fact that as caregivers get older, they become physically less able to engage in high-energy activities that might be part of childcare. The other negative feelings such as worry, sadness and pain, seem to generally decrease on the whole as the age of the caregiver increases.

Because of the small sample size in PSID data, we could not provide a definitive answer about the relationship between moods and key demographic variables like age and sex.

## 6 The impact of demographic change on quality-adjusted care time

In this section, we evaluate the effect of expected changes in the composition of the US population, according to United Nations projections, on quality-adjusted indices of dependency.

### 6.1 Indices of positivity and negativity associated to childcare and adult care

We combine information about moods in the ATUS and in the PSID to calculate indices of positivity and negativity associated to activities related to child care and adult care. We then weigh the matrices of care production using these indices. In an analogy to the extensive literature about monetizing time, here we weigh time, but the currency is not dollars. Instead it's an index of emotional positivity or negativity associated with the activity.

We considered the categories of moods used in ATUS and PSID, and defined two categories: positive emotions and negative emotions. For each datasets, we calculated the mean score of each mood that respondents reported.

Each mood is reported on a scale from 0-6. For positive moods (ATUS: happiness, and meaningfulness; PSID: happiness and calmness), 6 is the most positive value. For negative moods (ATUS: pain, sadness, stress, tiredness; PSID: frustration, worry, sadness, tiredness, pain), 6 is the most 'negative' value. For negative moods, we thus calculated the difference between 6 and the values reported, since lower values indicate more positivity. In other words, taking the difference between 6 and the reported score indicates 'lack of negativity'. By doing so, for all the moods, whether we consider them negative or positive, we ended up with a scale from 0-6, where 0 indicates high negativity and 6 high positivity.

We computed the average positivity across the type of moods for the two datasets (ATUS: 6 moods; PSID: 7 moods) and weighted those values by the sample size of each dataset (ATUS: 526 for adult care, 3225 for childcare; PSID: 243 for adult care, 264 for childcare), in order to reflect differences in uncertainty with respect to estimates from the two datasets. Finally, we rescaled the obtained averages in order to obtain negativity and positivity 'ratios' such that adult care negativity and adult care positivity summed up to 1, and the childcare negativity and childcare positivity also summed up to 1. The overall indices for moods related to childcare and adult care, when we combine ATUS and PSID data, are reported in Table 1.

Adultcare Indices			Childcare Indices		
	Positive	Negative		Positive	Negative
Mean	4.727	1.128	Mean	4.948	1.052
Ratio	0.807	0.193	Ratio	0.825	0.175

Table 1: Average indices of positive and negative moods associated with childcare and adult care obtained by combining data from ATUS and PSID.

## 6.2 Matrices of time transfers weighted by the ‘positivity’ of the activities

We used the positivity and negativity indices that we computed in the previous section in order to weigh the matrices of time transfers by age and sex proposed by Dukhovnov and Zagheni (2015). More specifically, we considered the matrices represented in figure 1 and we multiplied all care time consumed by age groups 0-4, 5-9, and 10-14 by the positivity/negativity ratios generated for childcare, and all other age groups by the ratios for adult care. As a result, the overall matrix of time transfers was splitted into two components: a matrix that depicts flows of ‘positive’ time and one that represents flows of ‘negative’ time while caring for children and adults. The two matrices are designed in a way that they sum up to the original matrix of overall time transfers.

Figure 4 shows matrices of time transfers by age and sex, separated in terms of positive time and negative time. They sum up to the original matrix of overall time transfers. The matrices highlight the large differences in time production by gender. Women, who dedicate more time to caregiving than men, have higher levels of positive care time as well as negative care time. Overall, the size of positive time is larger than negative time for both men and women. In figure 4, the panels are all on the same scale. That is useful to provide a general comparison of levels across matrices. However, figure 4 is not ideal to pinpoint the relative size of the age distribution of positive and negative care time across age groups.

Figure 5 shows the difference in proportions between the positive and negative matrices. Matrices similar to those in figure 4 were calculated, with each cell representing the proportion of time a particular age group transfers to another age group, relative to all the time produced and consumed (which is the sum of all the entries in the matrix). The difference in proportions between the resulting positive and negative matrices is represented in figure 5. The cells shaded blue are cells where there is more positive than negative time transferred, while the cells shaded orange are where more negative time is transferred. In other words, in blue areas, caregivers experience generally positive feelings, in relative terms, while the orange areas are where caregivers experience generally negative feelings.

The moods associated with the two different types of care are apparent: childcare is generally a more positive experience while adult care is a more negative one. Parents caring for their children under the ages of 4 have the most positive experiences, but this positivity seems to taper off as their children grow older. Even elderly individuals, probably grandparents, also experience childcare as generally positive. Most age groups find caring for teenagers between 15-19 a negative experience. A big part of negative care also occurs between caregivers and care receivers of similar ages, suggesting spousal

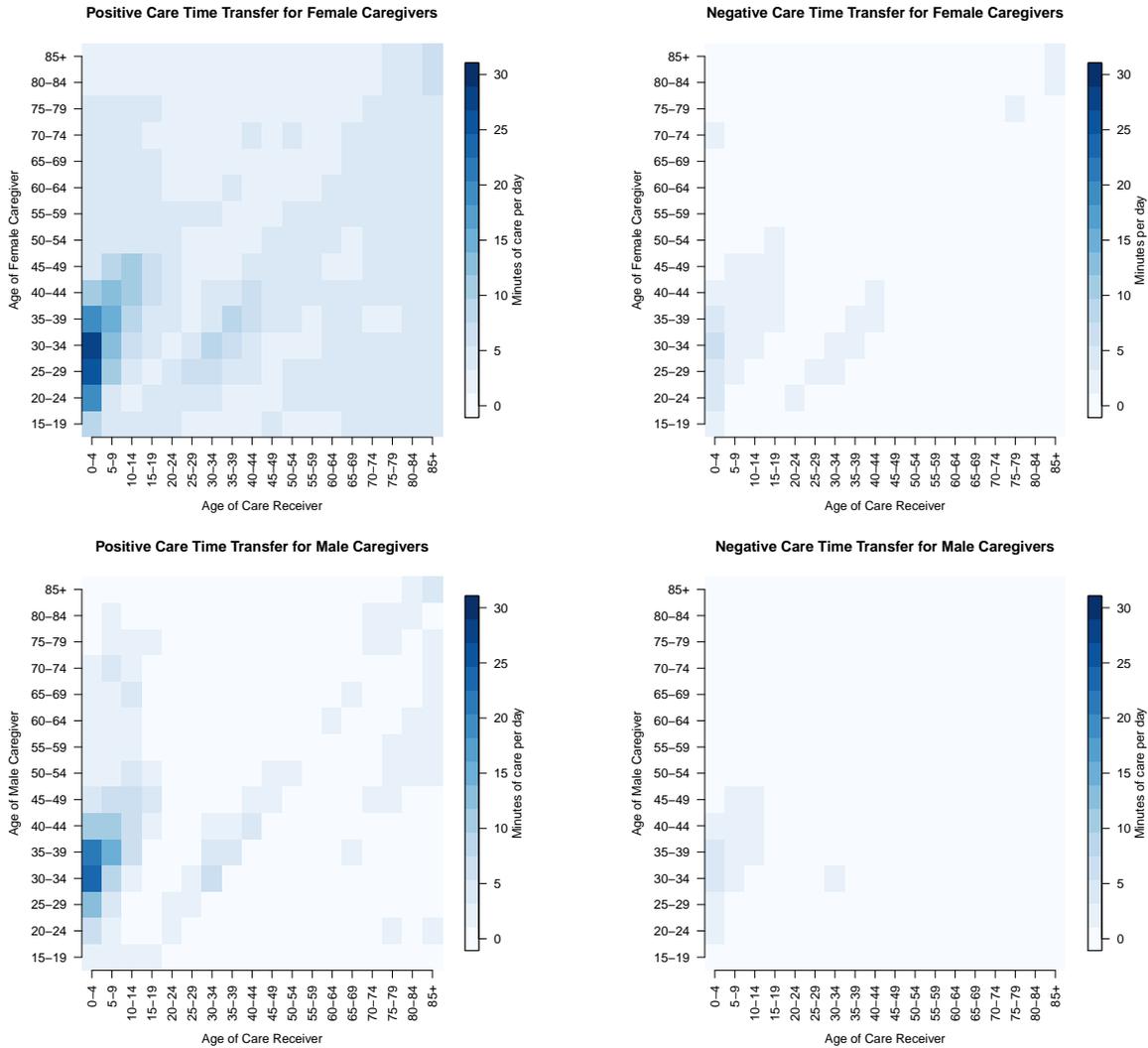


Figure 4: Graphic representation of matrices of time transfers by age and sex, separated in terms of positive time and negative time. In each panel, the color-coded values indicate average per-capita time transfers (positive or negative) from the age groups on the rows to the age groups on the columns.

care. It is possible that this negativity is due to circumstances where one spouse requires the care of the other, such as in the aftermath of an accident or health issue. Another significant area of negativity comes from caring for parents, where middle-aged adults are caring for their elderly parents above the age of 75. Even for elderly individuals, caring for their elderly spouses seems to be a generally negative experience, compared to caring for children.

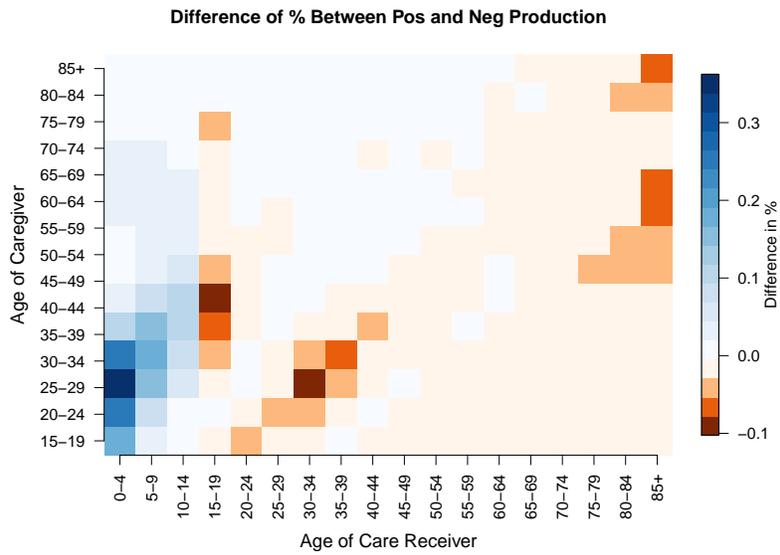


Figure 5: Graphic representation of the difference between matrices of proportions of positive and negative time associated with transfers of care time. The blue cells indicate a relatively positive experience for caregivers, while the orange cells indicate generally negative experiences for caregivers. The color gradient indicates the magnitude of positivity/negativity experienced, with darker colors suggesting a more positive/negative experience respectively.

### 6.3 Age profiles of positive and negative time transferred

Profiles of positive and negative time production and consumption by age can be obtained from the matrices in figure 4. The per-capita profiles would be the marginals of the matrix.

In the context of a stable equilibrium, the profiles of production by age can also be obtained or interpreted as the leading eigenvector of the matrix of fractions of time production for the receiving group. Here we explain the intuition.

Consider a population with  $m$  age groups, indexed by  $i$ . Total time production (positive or negative) for age group  $i$ ,  $t_i$ , is written as:

$$t_i = z_{i1} + z_{i2} + \cdots + z_{im} \quad (1)$$

where  $z_{ij}$  is the time flow from group  $i$  to group  $j$ . The expression can be rewritten to represent the flows between groups as the fraction of total time production for the receiving group. Thus, if we write:

$$q_{ij} = \frac{z_{ij}}{t_j}$$

the model is expressed as:

$$t_i = q_{i1}t_1 + q_{i2}t_2 + \cdots + q_{im}t_m \quad (2)$$

or, equivalently:

$$-q_{i1}t_1 - q_{i2}t_2 - \cdots + (1 - q_{ii})t_i - \cdots - q_{im}t_m = 0 \quad (3)$$

By letting  $Q$  be the  $m \times m$  matrix containing all the coefficients  $q_{ij}$ , and  $T$  the  $m \times 1$  vector containing all the transfer  $t_i$  terms, the model is written in a more compact form as:

$$[I - Q]T = 0 \quad (4)$$

or, equivalently:

$$QT = T \quad (5)$$

The solution of equation 5 is that  $T$  is the eigenvector of  $Q$  associated to the leading eigenvalue. In other words, per-capita profiles of production by age in steady state can be interpreted as the eigenvector of a matrix of the type of  $Q$  associated to the leading eigenvalue. This result is general and applies to various classes of production profiles, including the standard ones generated within the context of the National Transfer Accounts project.

Figure 6 shows the age profiles of positive and negative time production. Assuming the relative per capita production of each age group remains constant over the years, the age profiles of positive and negative time production can be used to generate future aggregate care time production, based on future population estimates.

**Total Per Capita Daily Care Time Production by Age Group (2010)**

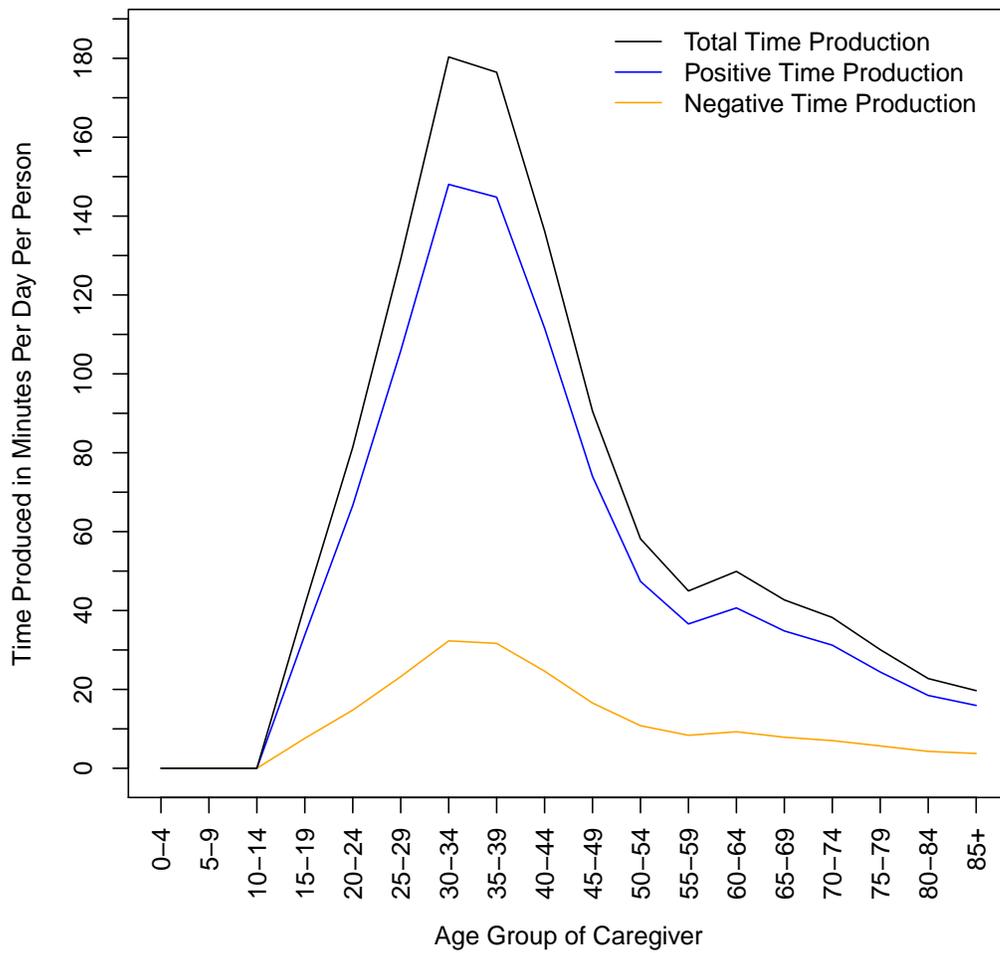


Figure 6: Per-capita age profiles of positive and negative care time production.

## 6.4 Projections for the positive and negative care support ratio

In order to evaluate the potential consequences of population aging on well-being related to caregiving activities, we combined our estimates of time transfers, weighted by the index of positivity and negativity, with age-specific population projections generated by the United Nations (World Population Prospects), for the years 2010-2060.

Due to the fact that each sex group produces care time differentially, we had to ensure that aggregate care time production values had to be calculated separately for each gender before we added the values of both genders together to obtain aggregate care time production for the entire population. We weighted the production of care time, while leaving the consumption of care time the same as those values previously calculated by Dukhonov and Zagheni (2015), because the moods that we used to generate weights were reported only by the caregivers, or the producers of care time.

To obtain care support ratios, we divided the aggregate weighted care time production values by the aggregate care time consumption values for each year. Therefore, the positive care support ratio reflects the fraction of care time during which the caregiver experiences positive emotions, over the total care time consumed. Similarly, the negative care support ratio reflects the fraction of care time during which the caregiver experiences negative emotions, over the total care time consumed. By adding the two together, we would obtain the total care support ratio, which reflects the total care time produced over the total care time consumed. In other words, to calculate positive and negative care support ratios, we keep the same denominator as traditional care support ratios. The numerator is instead divided into two parts, positive time and negative time, that sum up to the total time produced.

Figure 7 shows our estimated care support ratios where time dedicated to caregiving is weighted by positive and negative moods associated to the caregiving activities. The indicators are designed so that the sum of the positive and negative care ratios is equal to the total care ratio. The figure shows what would happen to the ratio between overall time ‘produced’ by caregivers and time ‘consumed’ by care receivers, if people behaved like today on a per-capita basis, and the only change in the future is a demographic one, with population age structure changing according to UN projections. This hypothetical scenario indicates that the overall care support ratio is expected to decline, although not dramatically. However, population aging also implies that an increased proportion of transfers would have negative feelings associated to them, as the positive care ratio is expected to decline at a faster rate than the negative care ratio. In other words, even though in the near future the needed re-adjustments in terms of ‘production’ of care may not be extremely large with respect to total time, the composition of the time transfers indicates an expected deterioration in overall well-being associated to caregiving, due solely to demographic change. This trend may potentially have significant mental health consequences.

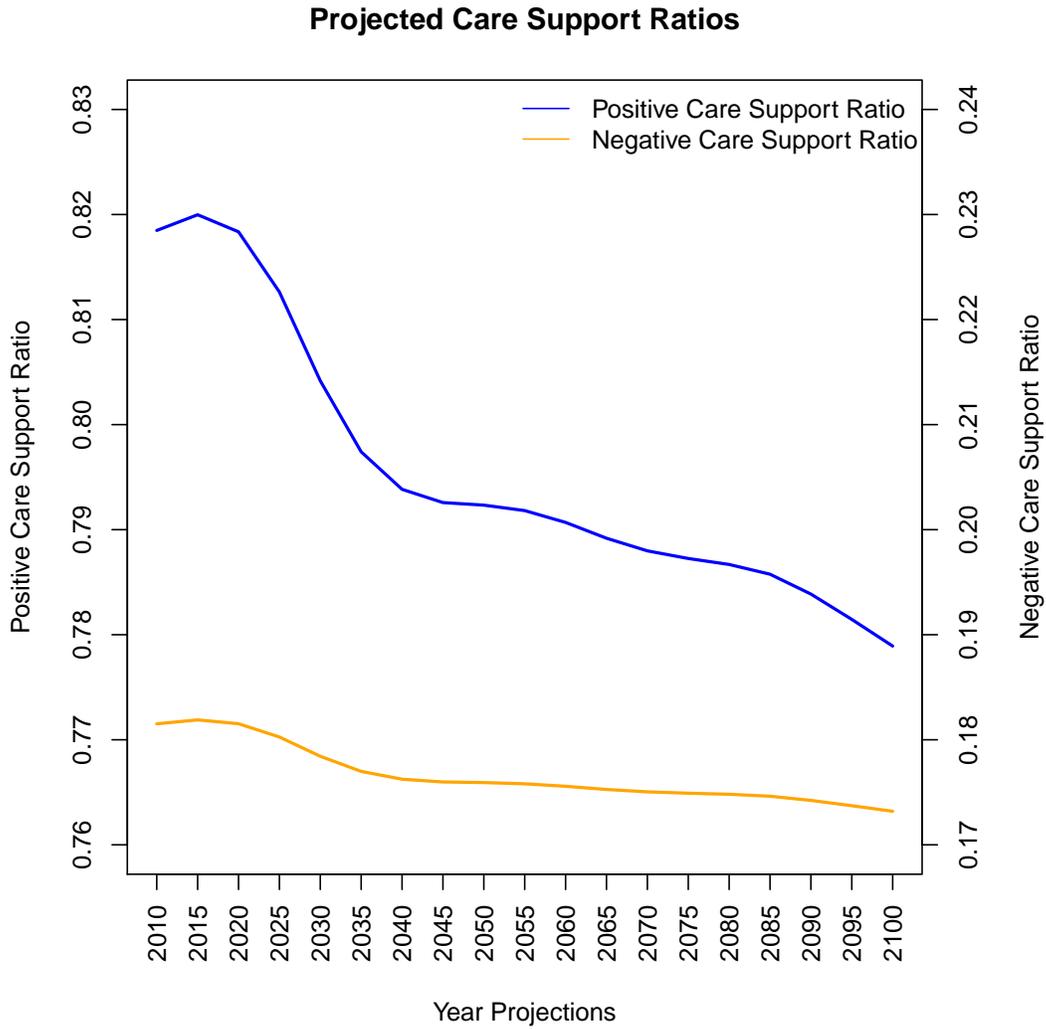


Figure 7: Care support ratios where time dedicated to caregiving is weighted by positive and negative moods associated to the caregiving activities. The sum of the positive and negative care ratios is equal to the total care ratio.

## 7 Conclusion

In this article, we proposed a framework to evaluate the impact of demographic change on “who gives time to whom.” We used matrices of who transfers time to whom, by age and sex, and weighed time flows by self-reported indicators of well-being, for activities related to childcare and adult care.

The empirical analysis based on the American Time Use Survey and the Panel Study of Income Dynamics (PSID) Disability and Use of Time Module revealed that people have more positive feelings and less negative moods when caring for children as opposed to caring for adults. Projections for the next several decades indicate that, although reductions in care support ratio would be relatively small, population aging implies that an increased proportion of transfers would have negative feelings associated to them, with potentially significant mental health consequences.

Future work done in the same vein can capitalize on the fact that the PSID data contains responses from both the head of the household, and the head’s partner. In the event that either indicate having cared for the other, we can obtain mood scores for both caregiver and care receiver to get further insight into the subjective mood weights associated with producing care time and receiving care time.

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