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Retirement Timing of Women and the Role of Care Responsibilities for Grandchildren

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Abstract This article considers the potential relationship between providing care for grandchildren and retirement, among women nearing retirement age. Using 47,444 person-wave observations from the Health and Retirement Study (HRS), we find that the arrival of a new grandchild is associated with more than an 8 % increase in the retirement hazard despite little overall evidence of a care/retirement interaction. We document that although family characteristics seem to be the most important factors driving the care decision, they are also important determinants of retirement. In contrast, although financial incentives such as pensions and retiree health insurance have the largest influence on retirement, the opportunity cost associated with outside income seems to have little effect on whether a grandmother provides care. There is little evidence of substitution between caring for grandchildren versus providing care for elderly parents or engaging in volunteer activities; grandchild care is instead taken on as an additional responsibility. Our findings suggest that policies aimed at prolonging work life may need to consider grandchild care responsibilities as a countervailing factor, while those policies focused on grandchild care may also affect elderly labor force participation.

Keywords Aging · Grandparents/grandparenthood · Health and Retirement Study · Labor force participation

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Introduction

This article investigates whether caring for a grandchild might influence women's retirement decisions and, conversely, whether women's retirement might influence their propensity to provide care for a grandchild, especially in response to a grandchild's birth.[1] The importance of this question is underscored in a 2010 article surveying work–family research over the previous decade (Bianchi and Milkie 2010:719):

> The aging of the Baby Boom generation, now poised to retire in the next decade, suggests the need for increased attention to issues that surround family caregiving across households (to frail parents and adult children and grandchildren) and the intersection of this type of caregiving with changing work statuses (e.g., retirement or reduced labor force participation, a spouse's retirement).

Although the economics literature on the elderly has not historically focused on grandchild care work responsibilities (an exception is Cardia and Ng (2003)), it is an area of growing interest (Bengtson 2001). Over at least the past three decades, the number of grandparents participating in grandchild care has been increasing—a phenomenon documented with a wide range of data sources (e.g., Fuller-Thomson et al. 1997 and Guzman 2004, using the National Survey of Families and Households; Yang and Marcotte 2007, using the Panel Study of Income Dynamics; Taylor et al. 2010, using a Pew Research Survey; Laughlin 2010, using the Survey of Income and Program Participation).[2] As with caring for parents, more of the burden of caring for grandchildren falls on women (Soldo and Hill 1995), motivating our focus on grandmothers in this article. In addition, more than 50 % of grandmothers living near their grandchildren under age 13 (i.e., not coresident) reported providing childcare assistance, with an even higher percentage (64 %) of *employed* grandmothers reporting affirmatively (Guzman 2004). Evidence also suggests that grandparent care is an especially prevalent form of care for preschool-aged children (Laughlin 2010; Luo et al. 2012).

More recently, the prevalence of grandparents providing care has increased as a result of the financial crisis that began in the United States in 2007–2008, generating renewed interest in the role that grandparent caring plays in helping out the middle generation (Taylor et al. 2010). Early evidence of this phenomenon was documented in

[1] As noted by Luo et al. (2012:1144), "Grandchild care can take several forms." Vandel et al. (2003) also documented significant variation in the types of grandparent care provided during the first three years of infancy. Throughout this article, we use the terms "care," "caring," "caregiving," and "care work" interchangeably to describe the act of providing childcare assistance (including babysitting) for grandchildren, and the terms "carers," "care workers," and "caregivers" for those who provide such care. We recognize that the conventions regarding the description of such contributions have changed over the past decades and do not intend for our descriptors to convey any particular preference for one over the other. In this article, these terms should be interpreted as equally emphasizing the value of such contributions.

[2] Questions on grandparent caring were first included in the long form of the decennial census in 2000 (Simmons and Dye 2003).

Jendrek (1993), who found that of grandmothers caring for grandchildren in a noncustodial relationship, more than 60 % cited the employment of the grandchild's parents and/or wanting to help the grandchild's parents financially as reasons for providing care.

Yet, very little evidence exists regarding whether and how care responsibilities for grandchildren might affect grandmothers' retirement. Instead, much of the literature on the interaction between care work and retirement focuses on retirement decisions in the context of caring for elderly parents or infirm spouses (Coile 2004; Gustman and Steinmeier 2004; Ilchuk 2009). For other types of care arrangements—for example, caring for young children—retirement considerations have largely been ignored. As a result, the role of grandchild care responsibilities in influencing retirement plans and decisions remains unexplored.

In fact, early literature on retirement decisions did not consider familial responsibilities at all but instead concentrated largely on economic and financial considerations, such as the effects of pension and Social Security provisions (e.g., Gustman and Steinmeier 1986; Stock and Wise 1990) as well as individual characteristics, such as health (e.g., McGarry 2004). Subsequent economic research highlighted the complexity of retirement decisions and the role that both financial and nonfinancial factors might play in influencing such decisions (see Lumsdaine 1996; Lumsdaine and Mitchell 1999; and references therein). In particular, it emphasized that if factors such as care work influence the retirement decision, their omission from a retirement model could result in an overestimated impact of proposed changes in the included factors (e.g., pensions, health insurance). From a policy perspective, therefore, recognizing the interplay between increasing demand for care work and retirement decisions may inform evaluations of proposed policy changes. We consider the specific example of grandchild care work in this context.

This article aims to explore the interaction between grandchild care and retirement. In many respects, the need to provide care for grandchildren may have a different impact on the retirement decision than when spousal or dependent child caregiving is involved. For example, Pozzebon and Mitchell (1989) attributed evidence of delayed retirement among working women when their spouse is in poor health to the need to retain employer-provided health insurance coverage. Such health insurance considerations are less likely to influence the retirement decision when the care work responsibility is toward a grandchild or an elderly parent (who typically would not be covered by the potential care provider's employer-provided health insurance).

An examination of the relationship between the decision to care for a grandchild and the decision to retire can help inform our understanding of how the demographic composition of the labor force may change in the future and determine whether policies to promote later retirement may have either limited effect or unintended consequences for care work. We consider three questions in this article using a neoclassical economic approach. First, does caring for grandchildren influence the odds of women's retirement and vice versa? Second, what socioeconomic, demographic, or health factors influence these decisions? Third, how does the birth of a grandchild affect the odds of

women's retirement, and does this effect vary according to the grandmother's age, proximity, health, or the birth order of the grandchild? We considered a variety of additional questions (e.g., what factors influence transition probabilities of starting or stopping the provision of care) in the working paper precursor to this article (Lumsdaine and Vermeer 2014).

Data and Methods

Data

The Health and Retirement Study (HRS) is an ideal data set with which to consider the care patterns of women on the verge of retirement.[3] Begun in 1992, the HRS is a biennial survey of individuals who were born between 1931 and 1941 (and hence were roughly between ages 51 and 61 in 1992) and their spouses. The HRS surveyed more than 12,600 individuals and contained more than 5,800 variables at its inception, with detailed information on family structure, financial assets, health, and expectations.[4] Because a number of subpopulations were oversampled as part of the HRS survey design, we use household sampling weights unless otherwise noted.

We construct our sample from all the women aged 51–61 during any of the first eight waves because this age range coincides with the target range defined in Wave 1 of the data set, aimed at capturing the transition to retirement.

Sample Construction, by Wave

We briefly describe the sample construction—including sample size, continuation, new entrants, and attrition—for each wave. The sample is constructed by sequentially omitting observations that met the following selection criteria: (1) male, (2) outside the target 51–61 age range in both the current and *all* previous waves (that is, excluding those whose age at first entry was above 61 and those who in the current wave are younger than 51), (3) missing information on family/child characteristics, (4) missing income information, and (5) missing other key explanatory variables.

Table 1 details the application of these criteria for each wave. The largest sample reduction occurs as a result of the first two criteria; of the Wave 1 sample of 12,652 individuals, we drop 46.4 % due to the first criterion (that the individual be female) and another 13.5 % due to the second criterion (that the individual be between ages 51–

[3] As a condition of use, we note that "The HRS (Health and Retirement Study) is sponsored by the National Institute on Aging (grant number NIA U01AG009740) and is conducted by the University of Michigan." Where possible, we use the RAND HRS data files (St. Clair et al. 2010) for their ease of use and consistency of variables across waves. As of the initial writing of this article, the family section variables had not been included in the RAND HRS data files but were for the most part in the associated Enhanced Fat Files. For the few explanatory variables that were not available in the RAND data (e.g., family variables, such as children's characteristics), we merged data across waves using the raw HRS data.

[4] See Juster and Suzman (1995) for an excellent description of the development of the HRS; see National Institute on Aging (2007) for a more recent publication that further summarizes many features of this important survey.

61 at entry into our sample).[5] Only 0.6 % of the omissions are due to the other three criteria, resulting in 39.6 % admissible observations (5,004 individuals). Applying these selection criteria across all waves, we use 32.1 % of all observations, and delete 41.9 % due to not being female and only slightly more than 1 % due to missing information. An additional 25.6 % are dropped because they both are not within the 51–61 age range in the current wave, and they have never been within the 51–61 age range in any of the previous waves. After individuals are within the 51–61 age range (i.e., after they enter our sample), they remain in the sample even when they age beyond 61.[6] Attrition between waves is quite low; on average, more than 91 % of our admissible sample in each wave continues on to the next wave.

The number of admissible women that we use for each wave is highlighted in bold in the middle of Table 1. For example, from our initial Wave 1 sample of 5,004 women (obtained by applying the five criteria specified earlier), 492 of these individuals were not reinterviewed in the second wave (i.e., had died or were lost to follow-up, labeled "Lost since previous wave"). To the remaining 4,512 (labeled "Carry over from last wave" in Table 1) were added 558 new entrants (labeled "Newly added this wave") for a total Wave 2 sample of 5,070 individuals. In 1998 (Wave 4), the HRS was expanded to include two additional cohorts: the Children of the Depression (CODA) cohort born between 1924 and 1930, and the War Baby cohort born between 1942 and 1947. Because some members of the latter cohort fall into our sample age range of 51–61, there is a large increase in our analysis sample at Wave 4. A similar large increase occurs in 2004 (Wave 7), when the Early Baby Boomer cohort was added to the survey. The eight waves are cumulated into a pooled sample of 47,444 person-wave observations; this corresponds to 9,367 *unique* women.

Main Variables of Interest

In this section, we describe the main variables of interest in our analysis.

Caring for grandchildren For analysis of care status, we consider those women who are caring for grandchildren (the caring "treatment" group), those who have grandchildren but are not providing care (the caring "at risk" group), and those who do not have grandchildren (the caring "control" group; i.e., those who are not yet "at

[5] Although at first glance, the reduction due to this second criterion seems large, it is important to remember that the current version of the HRS reflects the merging of the original (1992) HRS sample with the Assets and Health Dynamics of the Oldest Old (AHEAD) survey. The latter survey consisted of individuals born prior to 1923 (and hence were aged 70 or older when first surveyed in 1993) and their spouses. This population was presumed by the survey designers to be retired and hence was not asked many of the questions used in our analysis. In addition, because the data set is longitudinal, the same individuals (those over age 70) are omitted in each wave to which they respond. Specifically, of the 17,293 unique women in the overall sample (e.g., all individuals after application of the first criterion), 4,619 correspond to the AHEAD survey, and 881 do not belong to any of the existing cohorts as a result of being too young. Of the remaining 11,793 women, 9,367 are included in our analysis sample (79.4 %). For more details on the structure and sampling design of the HRS, see the online HRS documentation (http://hrsonline.osr.umich.edu/sitedocs/surveydesign.pdf and http://hrsonline.isr.umich.edu/sitedocs/userg.HRSSAMP.pdf).

[6] The HRS sampling design is to add cohorts as they reach age 51. Our approach therefore corresponds to how additional cohorts are added into the HRS; in particular, first spousal observations whose birth years correspond to the new cohort are taken as members, and then additional participants are recruited to round out (i.e., make representative) the new cohort.

Table 1 Sample construction, by wave

	W1	W2	W3	W4	W5	W6	W7	W8
Usable Sample, Previous Wave		5,004	5,070	5,125	6,005	6,037	6,065	7,071
Lost since previous wave		–492	–428	–446	–513	–522	–441	–562
Carry Over Into Current Wave		4,512	4,642	4,679	5,492	5,515	5,624	6,509
% Retained From Previous Wave		90.2	91.6	91.3	91.5	91.4	92.7	92.1
Total Individuals Current Wave	12,652	19,642	17,991	21,384	19,579	18,167	20,129	18,469
Not female	–5,868	–8,227	–7,479	–8,959	–8,112	–7,458	–8,350	–7,584
Not aged 51–61[a]	–1,710	–6,189	–5,179	–6,228	–5,262	–4,458	–4,409	–3,537
Missing family/children information	–5	–73	–120	–62	–79	–128	–220	–215
Missing income information	–53	–78	–84	–127	–83	–53	–64	–58
Missing other explanatory variables	–12	–5	–4	–3	–6	–5	–15	–8
Final Admissible Sample This Wave	**5,004**	**5,070**	**5,125**	**6,005**	**6,037**	**6,065**	**7,071**	**7,067**
Carry over from last wave		4,512	4,642	4,679	5,492	5,515	5,624	6,509
Newly added this wave	5,004	558	483	1,326	545	550	1,447	558
Cumulative Total Sample	**5,004**	**10,074**	**15,199**	**21,204**	**27,241**	**33,306**	**40,377**	**47,444**

[a] This is an abbreviated definition. The exact definition of this criterion is that an individual either was above age 61 at first entry into the survey or is younger than 51 in the current wave. Therefore, if an individual is deemed "admissible" in an earlier wave (i.e., in addition to meeting the other criteria, she has met the age 51–61 criterion in an earlier wave), she continues to be included in subsequent waves, even if she ages beyond the 51–61 age range. As noted in the article, a large proportion of the observations deleted because of this criterion are respondents who were part of the original Assets and Health Dynamics of the Oldest Old (AHEAD) survey, which sampled people born prior to 1923 and their spouses. Consistent with the HRS sampling design regarding the addition of cohorts, if a respondent is initially deemed inadmissible because she is younger than 51, she joins the analysis sample upon reaching 51.

risk" for care work). The HRS questions regarding how much time was spent caring for grandchildren changed slightly across the waves. In Wave 1, the questionnaire asked whether an individual spent more than 100 hours caring for a grandchild in the past 12 months and, if the answer was yes, how many hours were spent. In Wave 2, the questionnaire asked the same question but with a lower threshold of 50 hours. In Waves 3 and beyond, the questionnaire asked the following question:

> Did you (or your husband/or your wife/or your partner/. . ./or your late husband/ or your late wife/or your late partner) spend 100 or more hours in total (since Previous Wave Interview Month-Year/in the last two years) taking care of (grand or great-grandchildren/grandchildren)?

If the answer was yes, the respondent was asked how many hours were spent by each person (respondent and spouse) individually. We define caring for grandchildren as responses of more than 336 hours in Waves 1 and 2 and responses of more than 672 (twice 336) in later waves in order to use data comparable to more than 336 hours per year across all waves.[7] We choose a higher (more than 50 or 100 hours) threshold of 336 hours per year in an attempt to distinguish potential reporting error by grandparents who may have had a grandchild visit for a two-week vacation. The sample breakdown by grandparent status and birth of grandchildren is shown in Panel A of Table 2.

New grandchild The use of grandparents for childcare assistance is particularly high when the grandchildren are of preschool age (Laughlin 2010). Because the age of the grandchildren is not reported in HRS, we construct a dummy variable for the arrival of a "new grandchild" as a proxy measure, equal to 1 if a grandchild (first or additional) has been born during the two years since the previous wave. This variable is included in our estimation to allow for the possibility that the arrival of a new grandchild may alter care work and retirement intentions, and their interaction, to a larger degree initially than as the grandchild ages. Across all waves, nearly 25 % of the person-wave observations had grandchildren born during the sampling period; more than 10 % of these had first grandchildren born. On average in each wave, 1,691 women have grandchildren born; of these, 176 are new grandmothers (women who experienced the birth of their first grandchild).

Retired For this variable, we use a RAND HRS variable, derived from the HRS employment status variable, which identifies retirement as well as other employment statuses. The RAND variable classifies an individual as retired if this response was selected, regardless of whether other statuses—such as working or disabled—were also selected. Panel B of Table 2 shows the retirement status of the sample, cumulated across waves.

[7] This definition captures a variety of types of grandchild care, including babysitting and coresidence both with and without the grandchild's parent. Luo et al. (2012) distinguished between different types using the categories "babysitting," "multigeneration household," and "skipped-generation household," and they documented care transitions into and out of each type. Because our main focus is on the interaction between caring responsibilities (however such responsibilities may arise) and retirement, we employ the coarser, single definition in our analysis.

Table 2 Grandparent status (panel A) and retirement status (panel B), by wave

	W1	W2	W3	W4	W5	W6	W7	W8
A. Grandparent Status								
No grandchildren	1,141	1,136	940	1,263	1,225	1,181	1,515	1,408
Grandmothers	3,863	3,934	4,185	4,742	4,812	4,884	5,556	5,659
(a) First grandchild born since last wave		163	232	165	139	164	175	196
(b) Other grandchild born since last wave		1,499	1,544	1,323	1,615	1,549	1,386	1,685
(c) No grandchildren born since last wave		2,272	2,409	3,254	3,058	3,171	3,995	3,778
Cumulative, across waves								
No grandchildren	1,141	2,277	3,217	4,480	5,705	6,886	8,401	9,809
Grandchildren, no care work	2,942	6,046	9,508	13,387	17,464	21,550	26,139	30,872
Caring for grandchildren	921	1,751	2,474	3,337	4,072	4,870	5,837	6,763
B. Retirement Status								
Nonretired	4,642	9,105	13,260	17,942	22,421	26,594	31,416	35,923
Retired	362	969	1,939	3,262	4,820	6,712	8,961	11,521
% Retired	7.2	9.6	12.8	15.4	17.7	20.2	22.2	24.3

Looking across all the waves in the sample provides an overview of the richness of our longitudinal data set versus the baseline (Wave 1) sample. Because the individuals in the first wave are aged 51–61, few of them are retired at baseline. The availability of subsequent waves enables us to further investigate the factors that affect the transition into retirement and, in particular, how retirement plans change with the arrival of grandchildren and/or care responsibilities. For example, of the 5,004 women in Wave 1, 7.2 % were already retired at the time of interview; over the whole sample of 47,444 person-wave observations, 24.3 % correspond to being retired.

Key Explanatory Variables

Work status and job characteristics Six categories of employment status are included in our analysis. The variable *Part-retired* is a dichotomous variable equal to 1 if the answer to the RAND HRS question, "At this time, do you consider yourself to be completely retired, partly retired, or not retired at all?" is "partly retired," and 0 otherwise. Similarly, *Self-employed* is equal to 1 when the response to the RAND HRS question, "Do you work for someone else, are you self-employed, or what?" (regarding the current main job) is "self-employed." The other employment status variables (also dichotomous measures) are derived from the RAND HRS variable that divides the response to the question on employment status into mutually exclusive categories:

- *Work FT* is equal to 1 if the respondent is working full-time, defined as working for more than 35 hours per week and more than 36 weeks per year, and 0 otherwise.
- *Work PT* is equal to 1 if the respondent is working part-time, and 0 otherwise.
- *Unemployed* is equal to 1 if the respondent is unemployed, and 0 otherwise.
- *Out of LF* is equal to 1 if the respondent is not in the labor force, and 0 otherwise.

We additionally include two variables designed to capture whether the individual has flexibility with respect to the hours she works. *Can cut hrs* is a dichotomous measure equal to 1 if (1) the answer to the question, "Could you reduce the number of hours in your regular work schedule?" is yes, (2) the respondent is self-employed, or (3) the respondent reports that her hours vary a lot from week to week; otherwise, it is 0. *Hrs/week* is the average number of hours worked per week on the respondent's main job.

Demographic characteristics The demographic characteristics are variables available in or constructed from the RAND HRS and are dichotomous variables equal to 1 if the condition is true, and 0 otherwise. These variables include *Black*, *Hispanic*, and *Married*. The *Age* variable indicates the age of the respondent in years at the end of each interview, constructed by RAND as the age at the date on the end of the interview relative to the respondent birth date. The education variables are constructed using the "highest degree" variable because it is consistently defined across all waves. Because the available level of granularity of the higher-level degrees varies across waves, we include only the following set of dichotomous measures (equal to 1 if the variable name is the highest degree obtained): *High School* (or passing a high school equivalency

exam), *Associate*, *Bachelor*, and *Graduate/Professional* (e.g., MA, MBA, PhD, MD, JD).

Income and wealth For the variables in this section, we use the constructed income variables from the RAND HRS data. The RAND HRS data set consists of imputations of all asset and income types using a consistent method. A detailed description of the method used is given in the RAND HRS documentation (St. Clair et al. 2010). All variables in this section are reported in nominal dollars and are transformed via logarithm to reduce the effect of large outliers. These variables are *Earnings* (the sum of a respondent's wage, bonus/overtime pay, commissions, tips, second job or military reserve earnings, professional practice or trade income), *Family income* (the total income of the respondent and her spouse), *House value* (the value of the house less mortgages and home loans), and *Liquid wealth* (the aggregated value of all nonhousing assets, such as checking and savings accounts, CDs, savings bonds, T-bills, stocks, and bonds, minus debt).

We also include pension and annuity income as a separate variable (*Pen/ann wealth*, the sum of the respondent's income from all pensions and annuities) to capture possible differences in the likelihood of labor force exit as a result of such cash flows.

Family characteristics The fourth set of variables considers family arrangements. Some family characteristics, such as the number of grandchildren or the care responsibilities of the respondent, are available in the RAND Enhanced Fat Files. However, family data in HRS that pertain to an "other person" observation (such as characteristics of the respondents' children) are not yet included in the RAND Enhanced Fat Files for each wave and are therefore obtained from HRS directly. In addition to the overall number of living children (*#children*) and grandchildren (*#grandchildren*), we include the number of children still living at home or temporarily away at school (*#live@home*) and four attributes of the subset of children who themselves have children (and therefore might need help with grandchild care), specifically the number that: (1) are married (*#Kids married*), (2) male (*#Kids male*), (3) own their own home (*#Kids house*), and (4) work full-time (*#Kids work FT*). Note that these four variables are conditional on having children (i.e., they reference the parents of the grandchildren). For women who do not have grandchildren, these variables take a value of 0, regardless of whether they have children.

The HRS does not separately track how near each of the grandchildren lives to the grandparent, other than through coresidence (*Coresident GC*).[8] To approximate the proximity of the grandchildren, we construct the following two dichotomous measures: *One < 10 miles* (equal to 1 if at least one child—who also has at least one child—lives within 10 miles) and *All < 10 miles* (equal to 1 if *all* the children that have at least one child live within 10 miles).

Altruism Finally, two dummy variables measure alternative types of altruistic behavior. The variable *Care parent* is a dichotomous variable equal to 1 if a question such as the

[8] There is also not a separate variable for grandchild coresidence in all waves; therefore, we construct this variable by first considering whether children live in the home, and then considering whether those children have children.

following[9] is answered affirmatively: "How about another kind of help? Have you [or your (husband/partner)] spent 100 or more hours in the past 12 months helping your parent(s) (or stepparents) with basic personal needs like dressing, eating, and bathing?" Similarly, the dichotomous variable *Volunteer* is equal to 1 if the respondent did volunteer work totaling 100 hours or more for religious, educational, health-related, or other charitable organizations, and 0 otherwise.

Health We control for health using two relatively basic measures. *Health* is the self-assessed health status of the respondent (on a scale of 1 to 5, with 1 being the best health), and *Disabled* is a dichotomous variable, constructed from the question on employment status in the RAND enhanced fat files.

Spouse variables Because an individual's decisions regarding care work and retirement may be influenced by (or jointly determined with) those of her spouse, we also include variables that capture spousal characteristics—whether the spouse is working full- or part-time (*Full-time SP* and *Part-time SP*, respectively), disabled (*Disabled SP)*, retired (*Retired SP*)—constructed analogously to the respondent characteristics. *Health SP* is a dichotomous variable based on the self-assessed health status of the spouse (on a scale of 1 to 5, with 1 being the best health), set equal to 1 if the self-assessed health status response is equal to 4 ("fair") or 5 ("poor"), and 0 otherwise. The original variable (with five options) is available in the RAND HRS data.

These variables are equal to 0 for persons who are unmarried.

Pension and health insurance variables The final set of variables considers pension and health insurance factors that might influence attachment to one's job. In the RAND HRS data set is a variable that shows the types of pension plans in which the respondent is included. From that, we construct three dichotomous measures: *Have DB plan* (equal to 1 if the respondent has only a defined benefit type of plan for her current job), *Have DC plan* (equal to 1 if the respondent has only a defined contribution type of plan for her current job), and *Exp pension* (equal to 1 if the respondent has any pension plan at all—whether a defined benefit plan, a defined contribution plan, or both—and therefore expects to receive pension benefits in the future).

Four health insurance variables are constructed from a single categorical variable in the RAND HRS data set and are equal to 1 if the condition holds, and 0 otherwise: *Emp HI* (the respondent has health insurance coverage through either her own or her spouse's employment plan), *Ret HI* (the respondent has retiree health insurance coverage under any employer-provided plan, either her own or her spouse's), *Own HI* (the respondent's health insurance coverage is from her own employment plan only), and *Spouse HI plan* (the respondent's health insurance coverage is from her spouse's employment plan only). We additionally use the HRS data to construct the *Paymore* variable, equal to 1 if the respondent will have to pay an additional premium for health insurance if she retirees. If the individual currently has health insurance coverage but does not report access to retiree coverage, the value of this variable is 1.

[9] This question is taken from the Wave 1 (1992) questionnaire; the exact wording of the question has changed slightly over the years. For example, more recent surveys reference "since the previous interview on [date]" rather than asking about time spent in the past 12 months.

Methods

The theoretical approach we use is a neoclassical economic one, as used by Becker (1976, 1981) to characterize aspects of family behavior (e.g., fertility, divorce) as the result of economic decisions, in the context of a life-cycle framework that recognizes intertemporal tradeoffs.[10] The life-cycle model has often been used in the economics literature on retirement decisions (e.g., Gustman and Steinmeier 1986; Pozzebon and Mitchell 1989; Stock and Wise 1990) to explicitly capture the economic tradeoff between allocating more time to paid work and less time to nonpaid work activity (and as a result, earning more) versus allocating less time to paid work and more time to nonpaid work activity (but having less income as a result). Early life-cycle models of retirement focused solely on financial factors as determinants of the retirement decision, but more recent studies have incorporated nonpecuniary factors, such as health and caring responsibilities. It is, therefore, an appealing model to use to consider the time and financial tradeoffs between working for pay and caring for grandchildren, but it has not yet been used to explore this question. We follow McGarry (2006:213) in assuming that (in the context of providing parent care), "A potential caregiver maximizes a standard utility function by comparing the marginal value of providing an hour of care with the value of an hour spent working or enjoying leisure," and that an altruistic care provider (in our context, a grandmother) derives utility from her own consumption of both market goods and leisure, as well as her family's (and specifically her grandchildren's) well-being. In other words, at a given point in time, an individual chooses a retirement date R that maximizes her utility, $U = f[C(R), L(R), U_f(R)]$, where utility is a positive function of planned future consumption (C), years spent outside of paid employment (L), and family utility (U_f), all of which are functions of a variety of covariates (such as age, health status, and income). The time spent outside of paid employment is divided into two forms, $CG + NCG$, representing the sum of time spent caring for grandchildren (CG) and time spent in *any* other unpaid activity (NCG: i.e., not caring for grandchildren, although it could include other forms of care). The benefit of this formulation is that it recognizes the fact that the desirability of the two unpaid categories can differ without having to specify *how* (i.e., whether positively or negatively) they differ. Utility is maximized subject to the budget constraint equating consumption with the present discounted value of income over the balance of the individual's life (this includes income from own earnings, Social Security benefits, pensions, and assets) plus the present discounted value of nonlabor income.

Following Pozzebon and Mitchell (1989), the model assumes that (1) the employment and care work decisions of other members of the family (in our case, the individual's children and spouse) are taken as given, and (2) it is necessary to designate a planning date for computation of income projections. Because of the nature of the data, we assume that the planning date is the date of survey interview on which the data were collected. Although this assumption is not particularly desirable (it is more standard, in dynamic models, to assume that the planning date is a fixed age or horizon for all individuals), we use it in this setting because we cannot observe the true planning date. In addition, although prospective grandparents may exert indirect influence on the

[10] See Lumsdaine and Vermeer (2014) for more details on our theoretical approach.

fertility of their children, we assume that the children's fertility decisions are independent of the grandmother's employment status and retirement decision.

We begin by documenting the relationship between care status and work and computing transition probabilities between various work/caregiving states.[11] Cox proportional hazard models (Cox 1984) are used to estimate the times to retirement and caring for grandchildren; that is, in both cases, we assume the rates of retirement and caring $\lambda_i(t)$ at age t, i = retirement, caring, are given by

$$\lambda_i(t;X) = \exp(\mathrm{X}\beta)\lambda_{0i}(t),$$

where $\lambda_{0i}(t)$ is the baseline hazard function when (without loss of generality) $X = 0$. In other words, the log relative hazard is linear in a set of explanatory variables, X. The baseline sample consists of the subsample of individuals who are either (1) not retired (for the retirement hazard) or (2) not caring for grandchildren (to estimate the caring hazard). This model is estimated using unweighted observations given the lack of consensus regarding incorporation of weights in the estimation of a Cox model when the weights are time-varying (as they are in the HRS). The Cox proportional hazard model is preferable to a probit model because it recognizes the dynamic option-value nature of the life-cycle decision—that is, by remaining in the current state, an individual retains the "option" to leave the noncare work or nonretirement states under more advantageous terms at a later age (see, e.g., Stock and Wise 1990). Although using a joint (or a family) model of caring for grandchildren and retirement decision-making is perhaps even more desirable, such models are well-known to be typically quite complex and hence require substantial simplifying assumptions for tractability (e.g., Cardia and Ng 2003).

Results

The Link Between Caring for Grandchildren and Work

Figure 1 establishes the link between labor force participation and caring for grandchildren among women in two age categories, separately for those without grandchildren, those with grandchildren but not providing care, and grandmothers who are caring for their grandchildren. Panel A shows the proportion of women working full-time (i.e., more than 35 hours per week and more than 36 weeks per year); Panel B shows the proportion working for pay. Panel c gives the average self-reported probability of working full-time beyond age 65 for the subsample of women who are younger than 65 and working full-time when surveyed. Within each age group, having grandchildren—and further, providing care for them—is associated both with decreased labor force attachment and lower expectations about future attachment. These differences are more pronounced at younger ages (51–54): those caring for grandchildren in this age group work for pay about 10 % less than noncaregiving grandmothers and 21 % less than those without grandchildren. However, these differences are also evident in the older age group. The divergence in labor force attachment

[11] Descriptive statistics showing the bivariate relationships between all our covariates and the key variables of interest are contained in the working paper precursor to this article (Lumsdaine and Vermeer 2014: appendix A2).

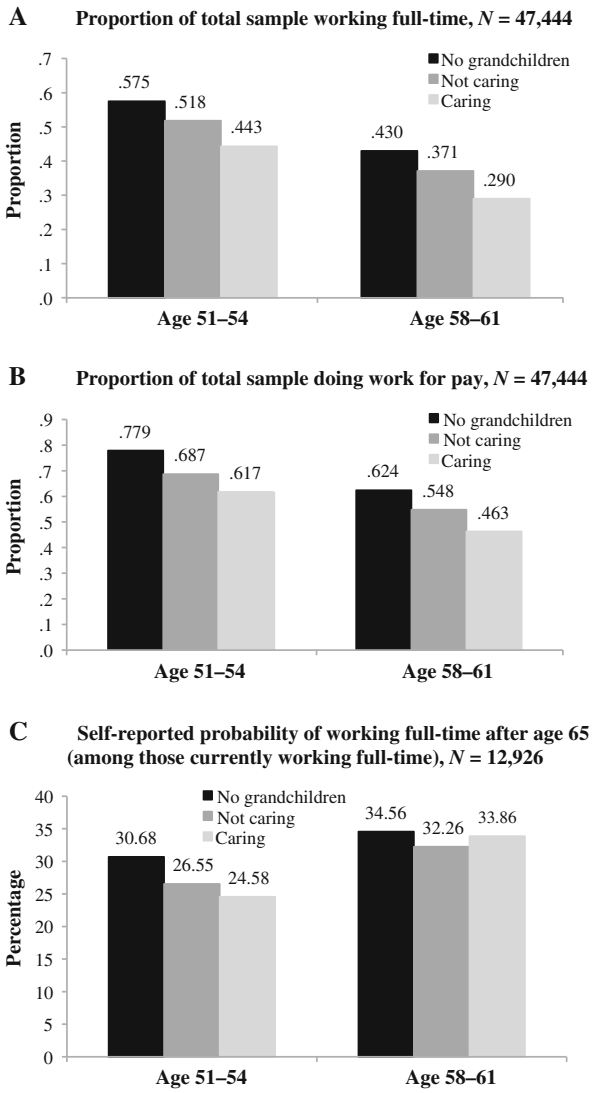

Fig. 1 Female labor force attachment, by age, care status. Proportions and percentages are weighted values

between caring grandmothers and their noncaregiving counterparts is even more pronounced when considering full-time work and the older age group (58–61); among these individuals, those caring for grandchildren are nearly 22 % less likely to be working full-time than noncaregiving grandmothers and 33% less likely to be working full-time than those without grandchildren.

Transitions

Because we retain individuals throughout all waves even when they age beyond 61, the overall sample (of 47,444 person-wave observations) consists of more than 79 % grandmother observations. Using the approach taken in McGarry's (2006) study on

Table 3 Transitions between retirement and care work, sample of grandmothers

	Time $t+1$				
Time t	Not Retired/Not Providing Care (1)	Caring Only (2)	Retired Only (3)	Retired/Caring (4)	Total (5)
Not Retired/Not Providing Care					
Number	13,444	1,741	2,500	269	17,954
% of row	76.0	9.8	12.7	1.4	100.0
Caring Only					
Number	2,018	1,661	319	276	4,274
% of row	47.0	40.9	6.5	5.6	100.0
Retired Only					
Number	1,063	123	4,124	412	5,722
% of row	18.3	2.3	72.3	7.1	100.0
Retired/Caring					
Number	147	121	474	361	1,103
% of row	13.0	10.5	42.9	33.7	100.0
Total	16,672	3,646	7,417	1,318	29,053

Note: Percentages are weighted values, and counts are unweighted.

caring for elderly parents, rather than track the transitions of a single cohort, we stack the information for all grandmothers from all eight waves of our sample to consider transitions among the following four states: (1) working (not retired) and not caring for grandchildren, (2) caring only, (3) retired only, and (4) retired and caring. In addition to providing an elegant representation of the transitions into and out of both caring and work, the McGarry (2006) study provides a natural comparison to our results in order to highlight potential differences between the effects of grandchild care versus parent care responsibilities; we discuss these differences at the end of this section.

Table 3 considers transitions into and out of various work/caring states from one wave (time t) to the next (time $t+1$) for individuals who were grandmothers at time t, so that each row of the table represents the transitions from the state in the column labeled "Time t" to each of the four possible states (columns 1 to 4). This yields a sample of 29,053 transition observations. Not surprisingly, there is a fair amount of persistence in all four states (the diagonal of the table), with more than 67 % of the sample remaining in the same state as they were in the previous wave. The persistence in caring states (the second and fourth elements of the diagonal) is much lower, at roughly one-half that in the noncaregiving states (the first and third elements of the diagonal), regardless of retirement status. Further, there is evidence of substantial movement into and out of both the retirement and the caring states. Although 11.6 % of the sample retired between consecutive waves (the sum of the numbers in columns 3 and 4 of the "Not Retired/Not Providing Care" and "Caring Only" rows, divided by the total number of observations), less than one-half as many (5 %) "unretired": that is, they engaged in paid work after having reported themselves as retired in the previous wave (the sum of the numbers in

columns 1 and 2 of the "Retired Only" and "Retired/Caring" rows, divided by the total number of observations). Therefore, for at least some of the sample, there is evidence that retirement is not an absorbing state. Similarly, there is evidence of transitions into and out of caring for grandchildren. Although 8.8 % began caring between consecutive waves, another 10.2% stopped caring from one wave to the next.

The majority of our observations are either "not retired and not providing care" (17,954 of the 29,053, or 61.8 % of the sample, computed as the number of observations in the first row of the table divided by the total number of transitions) or "retired only" (5,722, the fifth row of the table, or 19.7 % of the sample). Although more than three-quarters (76 %) of those working (not retired) and not providing care continue in this state, nearly 10 % of these individuals assume caring responsibilities without leaving the labor force altogether. The remaining 14 % retire, with about 10 % of those retiring also beginning care work around the same time as the retirement transition (i.e., between the same waves). These proportions are consistent with McGarry's (2006) study of caring for elderly parents. She found that 78.6 % of those working and not providing care continued in that state, nearly 7 % assumed care responsibilities without leaving the labor force, and 14.5 % retired; the proportion of those retiring that also began providing care around the same time was similarly 10 %.

Proportional Hazard Results

Caring for Grandchildren

Table 4 contains results from the estimation of the Cox proportional hazard models used to estimate noncare work and nonretirement survival, assuming that the individual is currently not providing care or not retired, respectively. All independent variables in both regressions are as of the preceding wave. That is, variables in wave $t - 1$ are used to estimate the probability that failure occurs at time t. For ease of interpretation, hazard ratios are reported; coefficient estimates and associated robust standard errors are available from the authors on request. A hazard ratio greater than 1 means that an individual is more likely to provide care (column 1) or to retire (column 2), with higher values of that explanatory variable. Conversely, a ratio less than 1 implies that the individual is less likely to provide care or retire, respectively.

There is little evidence that the propensity to provide care for grandchildren depends on retirement or any other labor force status. Although those who are retired are nearly 7 % more likely to provide grandchild care than those who are not retired, the difference is not significant. Neither do pecuniary factors appear to influence the propensity to provide care; none of the income/wealth or pension/health insurance variables are significant.[12] In contrast, the birth of a grandchild (even to those who are already grandmothers) is strongly associated with new care work responsibilities.

Relative to those that had no new grandchildren born, women who have new grandchildren born are 69.7 % more likely to be providing care for grandchildren two years later; this increased propensity is even higher than for individuals who have coresident grandchildren (more than 52 % more likely to be providing care than those who do not). Each additional year of age is associated with a more than 6 % lower

[12] Liquid wealth is significant at the 90 % level of confidence, however.

Table 4 Cox proportional hazard models (hazard ratios reported)

	Failure: Caring for Grandchildren *N* = 25,497 (No. of failures = 1,678) (1)	Failure: Retirement *N* = 26,621 (No. of failures = 3,223) (2)
Caring for Grandchildren		1.096†
Retired	1.065	
New Grandchild	**1.697*****	**1.085***
Work Status and Job		
Part-retired	0.946	**1.667*****
Work FT	0.875	1.052
Work PT	0.915	1.139
Unemployed	0.976	1.324
Out of LF	1.224	1.202
Can cut hrs	1.010	**0.888****
Self-employed	1.085	**1.201***
Hrs/week	1.003	**0.995***
Demographics		
Black	**1.298*****	1.094†
Hispanic	1.087	0.921
Married	1.042	0.975
Age	**0.938*****	**1.135*****
High school	1.038	**1.101***
Associate	**1.300***	1.114
Bachelor	1.049	**1.195***
Graduate/Professional	**0.653****	**1.355*****
Income and Wealth		
Earnings	1.000	**1.041*****
Family income	0.986	0.982
House value	0.999	1.006
Liquid wealth	0.993†	**1.009****
Pen/ann wealth	1.013	**1.030*****
Family Characteristics		
#children	1.015	**0.972***
#live@home	1.000	**0.890*****
#kids married	0.992	**0.950***
#kids male	**0.941***	0.998
#kids house	0.957	**1.055***
#kids work FT	**1.141*****	0.999
One <10 miles	**1.944*****	**0.903***
All <10 miles	**1.242****	1.056
#grandchildren	0.993	**1.014****
Coresident GC	**1.525*****	1.106

Table 4 (continued)

	Failure: Caring for Grandchildren N = 25,497 (No. of failures = 1,678) (1)	Failure: Retirement N = 26,621 (No. of failures = 3,223) (2)
Altruism, Health, Spouse		
Care parent	1.152†	1.086
Volunteer	1.118†	1.025
Health	**0.943***	**1.067*****
Disabled	**0.718****	**1.405*****
Health SP	0.985	0.931
Disabled SP	1.201	**1.213***
Full-time SP	0.954	0.892†
Part-time SP	0.764	0.934
Retired SP	0.986	**1.272*****
Pension/Health Insurance		
Have DB plan	0.979	**1.262****
Have DC plan	0.968	0.899
Exp pension	0.902	**1.385*****
Emp. HI	0.871	**0.795***
Ret HI	1.093	**1.551*****
Own HI	1.053	1.160
Spouse HI plan	1.228	**1.228***
Paymore	1.060	0.998
Log Pseudo-Likelihood	–13,363.1	–25,721.2

Notes: In order to be included in the regression, women need to be in the sample for a minimum of two consecutive waves. Independent variables are measured at time $t - 1$ (i.e., as of the previous wave). We do not use weights in the Cox proportional hazard regression. If a respondent is between ages 51 and 61 in an earlier wave, she continues to be included in the subsequent wave, even if she ages beyond 61. Nonretired/noncaregivers who reenter the sample at a later time (after they drop out of the sample because of missing observations) are included in the sample only if they are still nonretired/noncaregivers. Robust standard errors are used to determine levels of significance.

$^{\dagger}p < .10$; $^{*}p < .05$; $^{**}p < .01$; $^{***}p < .001$

propensity to provide care for grandchildren, and grandmothers who have attained the highest educational level are almost 35 % less likely.

One interpretation of why the arrival of a new grandchild is associated with caring despite retirement not being a significant determinant is that grandmother caring may be driven more by demand than by supply.[13] Consistent with this interpretation, the results show that family characteristics have the greatest influence on the propensity to provide care for grandchildren, even after we control for the grandmother's own

[13] Our finding is also consistent with the literature that notes especially strong demand for grandparent care when the grandchild is of preschool age (e.g., Luo et al. 2012). We are grateful to our anonymous referees for suggesting this interpretation.

characteristics. Each additional child who works full-time is associated with a 14 % increase in the likelihood that a grandmother is caring for her grandchildren. Those who have at least one child living within a 10-mile radius are nearly twice as likely (94 % more) to assist with grandchild care responsibilities. In contrast, each additional male child is associated with a nearly 6 % lower likelihood of caring for one's grandchildren. There is little evidence of either altruistic complementarity or substitutability; the care hazard between those who engage in other volunteer work or care for infirmed parents or parents-in-law differs only from the care hazard of those who do not at the 10 % level of significance. Those who are in worse health or those who are disabled are less likely to be care providers (about 6 % and 28 %, respectively).

Labor Force Participation

The second column of Table 4 contains results from the estimation of a Cox proportional hazard model exploring the relationship between work survival of an individual and several explanatory variables. We study the time between when a working woman first enters the sample until she retires and investigate whether caring responsibilities influence the retirement timing. The main variables of interest are the caring and grandchild variables. As with the care results, hazard ratios are reported.

Having additional grandchildren or a new grandchild born between two subsequent waves increases the probability of retirement by 1.4 % and 8.5 %, respectively, but having other care responsibilities (either for grandchildren or parents) does not appear to affect the probability of retirement significantly.[14] Workers who are older, are disabled or in poorer health, are partly retired or self-employed, have a retired or disabled spouse, or are more highly educated are more likely to retire; those who have jobs that allow them to reduce their weekly hours or who already work fewer hours are less likely to retire. In addition to the result that caring responsibilities influence retirement timing, we find strong evidence that many family characteristics affect the likelihood of retiring. Although having more children who own their own home is associated with a 5.5 % *increase* in the probability of retiring, having more children, more children living at home, more children who are married, or at least one child living nearby is associated with a significantly *lower* probability of retiring.

Higher earnings, liquid wealth, or pension income is also significantly associated with a higher probability of retirement; even larger effects result from pension and health insurance variables, emphasizing the well-documented incentive effects associated with such variables (e.g., Gruber and Madrian 1995; Stock and Wise 1990). Individuals who expect a pension, have a defined benefit plan, or have retiree health insurance obtained through their own or their spouse's employer are between 25 % and

[14] The p values on the caring for grandchildren and caring for parents variables are .052 and .203, respectively; although neither is statistically significant at the 95 % level of confidence, the caring for grandchildren variable is significant at the 90 % level of confidence. It is also possible that the lack of significance on the caring variable in the retirement equation reflects the censoring that occurs as a result of the new grandchild effect because when those grandmothers retire, they have reached "failure" in the Cox proportional hazard sense, meaning that their subsequent caregiving is no longer available to assist with identification of a retirement effect. To consider this possibility, we reestimate the Cox proportional hazard model omitting the "new grandchild" variable. In this case, the p value on the caring variable declines to .042; in addition, the coefficients on the other variables are qualitatively unchanged.

55 % more likely to retire. In addition, women who have employer-provided health insurance are more than 20 % less likely to retire—a result that is consistent with the concept of "job-lock" that has been discussed extensively in the economics literature (see, e.g., Gruber and Madrian 2002 and references therein).

Discussion and Conclusions

This article has considered the relationship between caring for grandchildren and the timing of women's retirement. We find little evidence that care work is related to the opportunity cost associated with outside income. In particular, job characteristics—such as being able to reduce hours, or the existence of pension or health insurance benefits—seem to be unrelated to the likelihood of caring for grandchildren. Instead, caring for grandchildren is strongly related to both the grandmother's health and disability status, her demographic characteristics, and the characteristics of her children. In addition, the arrival of a new grandchild greatly increases the likelihood of providing care, consistent with the literature that documents strong demand for care in the early years of a grandchild's life. We find little evidence of substitution between caring for grandchildren and caring for elderly parents or engaging in volunteer activities.

Consistent with previous literature, our results show that some of the most important factors that affect the retirement decision are financial incentives, such as pensions and retiree health insurance. This finding corroborates the results from traditional retirement models that do not include nonpecuniary factors, such as unpaid care work. In addition, both poor health and disability increase the probability of retirement, as does having a disabled or retired spouse. Even controlling for these factors, however, having a new grandchild additionally increases the probability of retirement by more than 8 %, an effect similar in magnitude to the health effect. In contrast, we find little evidence that caring for parents or grandchildren directly increases the probability of retirement beyond the new grandchild effect; in both cases, the results are not statistically significant at the 95 % level of confidence.

There are a number of possible explanations for our finding that the arrival of a new grandchild increases the propensity to be caring and/or retired by so much. In addition to such caring providing a possible new attractive alternative to paid work, it may be indicative of a response to demand from the middle generation so that they may participate more fully in the labor market, as noted in the National Alliance for Caregiving and AARP (2009) study and Taylor et al. (2010). Indeed, we find a positive association between the number of children working full-time and the probability of caring for grandchildren. In addition, our finding that those who can reduce the number of hours they work are less likely to be retired indicates a desire to stay working in the face of such additional demand, consistent with results of Pavalko and Henderson (2006). This suggests that flexible work arrangements may mitigate any retirement effects that are associated with caring for grandchildren.

Our findings suggest a number of interesting policy implications. First, policies aimed at extending the years spent working (such as are being discussed in the context of shoring up the Social Security trust fund and addressing the challenges associated with an aging population) may have limited effect if retirement decisions are primarily driven by family considerations, such as the arrival of a new grandchild or health

deterioration. Second, it is possible that policies that address childcare needs of younger generations may reduce informal care demands on those of retirement age and hence keep the older generation in the workforce longer (i.e., either working until an older age or working more hours). Whether this is the case depends largely on whether retirement to provide caregiving is a necessity or a choice; that remains a topic for future research.

In summary, our results contribute to the literature that has examined the interaction between care work and labor force participation by specifically examining women caring for grandchildren in the context of the retirement decision. Taken together, our findings suggest that labor force participation is the more dominant activity. When we consider transitions of retirement-age women who are both working and caring for grandchildren, we find that women are nearly eight times more likely to give up caring responsibilities than they are work responsibilities. We also find, however, that the arrival of a new grandchild, as well as a number of other family attributes, significantly affects the probability of women's retirement, even after we control for financial and health effects that more typically have been associated with influencing the retirement decision. Our results show that in addition to family characteristics being most important to the grandchild care decision, they are also important to the retirement decision.

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