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THE IMPACT OF INFORMAL CAREGIVING INTENSITY ON WOMEN'S RETIREMENT IN THE UNITED STATES

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Abstract

With increasing pressure on retirement-aged individuals to provide informal care while remaining in the work-force, it is important to understand the impact of informal care demands on individuals' retirement decisions. This paper explores whether different intensities of informal caregiving can lead to retirement for women in the United States. Using the National Longitudinal Survey of Mature Women, we control for time-invariant heterogeneity and for time-varying sources of bias with a two-stage least squares model with fixed effects. We find that there is no significant effect on retirement for all informal caregivers, but there are important incremental effects of caregiving intensity. Women who provide at least 20 hours of informal care per week are 3 percentage points more likely to retire relative to other women. We also find that when unobserved heterogeneity is controlled for with fixed effects, we cannot reject exogeneity. These findings suggest that policies encouraging both informal care and later retirement may not be feasible without allowances for flexible scheduling or other supports for working caregivers.

JEL Classification: J22; J1; I11

Key words: informal caregiving, unpaid care, retirement, United States

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Introduction

Since the 1980s, there has been a shift in the delivery of health care into community settings in the United States (Harrington-Meyer and Parker, 2011). Informal caregivers have played a central role in the delivery of this care. In tandem with the growing demands on caregivers, the United States has implemented policies encouraging later retirement. These include policies that defer Social Security benefits, as well as reduced benefits for early retirement (Social Security Administration, 2012). With increasing pressure on retirement-aged individuals to provide informal care while remaining in the work-force, it is important to understand the impact of care demands on individuals' retirement decisions. The existing literature, however, has scarcely explored this relationship. This is a significant oversight, considering that 48% of the 65.7 million informal caregivers in the United States were aged 50 and older in 2009 (NAC and AARP, 2009).

Studies that have explored the relationship between caregiving and retirement have had inconsistent findings. This is, in part, due to limitations of the caregiving indicators used. These studies have largely overlooked the effect of caregiving *intensity* (i.e. the weekly hours of informal care) on the decision to retire. Recent research, though, indicates that caregiving intensity has a significant effect on working-aged caregivers' labor force participation (Carmichael and Charles 2003a,b; Crespo 2006; Heitmueller 2007; Lilly et al. 2010; Lilly et al., 2011; Van Houtven et al. 2013) and that the intensity of caregiving is higher for caregivers over 65 (NAC and AARP, 2009).

A further limitation of the existing literature lies in the uncertainty surrounding whether caregiving actually *leads* to retirement. Understanding the direction of causality behind a caregiving-retirement association is important. The policy implications of individuals choosing to retire due to a heavy caregiving burden are markedly different from retirees choosing to become caregivers subsequent to retirement (Heitmueller, 2007).

In the present paper, we fill these gaps in the literature, with a focus on women. Women comprise two-thirds of caregivers in the United States (NAC and AARP, 2009). This higher likelihood to take on the caregiver role has historically led to caregiving disproportionately affecting women's career paths and socioeconomic status later in life (Wakabayashi, 2006). We use the American National Longitudinal Survey of Mature Women to explore the effect of different intensities of informal care on women's retirement decisions. This survey of retirement-aged women allows us to take into consideration both time-invariant heterogeneity, as well as to explore the potential for time-varying factors that may bias estimates of the impact of informal care on retirement.

Conceptual Framework and Hypotheses

Individual allocation of time theory can be used to conceptualize the effect of informal caregiving on an individual's decision to exit the labor force (Carmichael & Charles, 2003; Heitmueller, 2007; Johnson & Lo Sasso, 2000; Pavalko & Artis,1997). Within this framework, a retirement-aged individual can make trade-offs between the time spent in the labor force and time spent on other activities, such as leisure and caregiving. If an individual has an ill family member or friend who requires care, the individual can reduce their time in the labor force, exit the labor force completely, or reduce leisure time to provide care (Carmichael & Charles, 2003; Heitmueller 2007; Johnson & Lo Sasso 2000; Pavalko and Artis 1997). Alternatively the individual could maintain or increase his or her time in the labor force to pay for formal care through increased income or employer-based insurance (Carmichael & Charles, 2003; Van Houtven et al, 2013). In the former case, it is possible that caregiving could lead an individual to retire earlier in the face of increased care duties, resulting in a positive association between caregiving and retirement. In the latter case, an individual may opt to retire later to help fund formal care, implying a negative association between caregiving and

retirement.

An empirically estimated positive association between caregiving and retirement, however, does not necessarily confirm that increased informal care duties have *caused* an individual to retire. There are potential sources of endogeneity that could bias estimates of the effect of caregiving on retirement. Reverse causality is a concern if an individual with an already weak attachment to the labor force retires and then opts to become a caregiver due to the lower opportunity cost of time (Heitmueller, 2007; Van Houtven et al., 2013). In such a case a positive relationship between caregiving and retirement would be observed, but it may be due to other individual-level characteristics that drive one to exit the labor force (e.g. lower levels of ambition) or become a caregiver (e.g. higher degree of family-orientation). Due to the above concerns, it is important to take potential sources of bias into consideration when estimating the effect of caregiving on retirement.

Previous Research

Previous empirical research has explored the association between labor force participation and caregiving status of retirement-aged individuals, though most studies have not explicitly looked at a retirement outcome (Bolin et al., 2008; Clark et al., 1980; Johnson & Lo Sasso, 2000; Johnson & Lo Sasso, 2006; Kingson & O'Grady-LeShane, 1993; Lilly et al., 2010; Lilly et al., 2011; Moen et al., 1994; Orel et al., 2004; Wakabayashi & Donato, 2004). These studies often considered caregiving intensity (Johnson & Lo Sasso, 2000; Johnson & Lo Sasso, 2006; Lilly et al., 2010; Lilly et al., 2011) and in some cases addressed endogeneity concerns through panel data methods (Johnson & Lo Sasso, 2000; Johnson & Lo Sasso, 2006) or an instrumental variable approach (Bolin et al., 2008). This literature has found that caregiving individuals tend to drop out of the labor force, especially

when taking caregiving intensity into account.

The association between caregiving and retirement outcomes is less often explored, and the findings are inconsistent. In our review of the literature that looked at the association between retirement and having an ill spouse and/or being a caregiver, we found that around half of the studies concluded that caregivers were less likely to retire than non-caregivers (An et al., 2004; Blau & Riphahn, 1999; Johnson & Favreault, 2001; Kubicek et al., 2010; O'Rand & Farkas, 2002; Pozzebon & Mitchell, 1989; Schils, 2008). The other half found that a positive association with retirement (Dentinger & Clarkberg, 2002; Hatch & Thompson, 1992; Jacobs et al., 2014a; Meng, 2012; Pyper, 2006; Reitzes et al., 1998; Uriarte-Landa & Hebert, 2011; Van Houtven et al., 2013; Vlachantoni, 2010; Zimmerman et al., 2000).

With three exceptions, most of the reviewed studies did not control for caregiving intensity or did not take into consideration the potential endogeneity of caregiving. Dentinger and Clarkberg (2002) looked at transitions to retirement for women in upstate New York, disentangling causality by examining the order of caregiving and working spells. The authors provided a comprehensive set of caregiving variables, though there was no indication of the amount of care. The study found that caregiving was significantly associated with greater odds of retirement for spousal care recipients, for multiple care recipients, and for out-of-home care, but cautioned against generalizing these findings to a broader population. Meng (2012) looked at the transition to retirement in Germany. She took into account time-invariant unobserved heterogeneity through the inclusion of a random effect and caregiving intensity with continuous hours of care. This approach assumes that the unobserved factors are independent of other explanatory variables in the model. The author found that caregiving - though not intensive care - led to retirement.

Van Houtven et al. (2013) offered the most comprehensive American study on caregiving and

retirement with respect to intensity measures and the treatment of endogeneity. The authors used the Health and Retirement Survey (HRS), accounting for hours of care and types of care. They addressed both time-invariant and time-varying endogeneity concerns through the use of a fixed-effects two-stage-least squares approach. The study found that general caregiving and chore caregiving led to a higher probability of retirement and that these effects were driven by partial retirement. The authors found an insignificant effect of intense caregiving, likely due to the HRS high intensity measure topping out at an average of less than 10 hours of care per week. Earlier labor force participation literature, meanwhile, shows that an intensity threshold ranging from 10 to as high as 20 hours per week must be reached before caregiving significantly impacts labor force participation (Berecki-Gisolf, 2008; Carmichael & Charles, 2003a, b; Colombo et al., 2011; Ettner, 1995; Lilly et al., 2010; Lilly et al., 2011; Young & Grundy, 2008). The exclusion of non-parental care was also a drawback, particularly for retirement-aged individuals who are more likely than younger caregivers to care for spouses, siblings, and friends (NAC and AAPR, 2009).

The abovementioned studies had different definitions of retirement. Dentinger and Clarkberg (2002) defined retirement as any exit from paid work that enabled the individual to earn a pension or receive a retirement package. Meanwhile, Meng (2012) defined retirement by whether the individual received a public pension or was an institutionally-relevant age and unemployed. Van Houtven et al. (2013) used self-assessed retirement status and hours worked to define fully and partially retired states. None of these studies differentiated between different paths to retirement (e.g. disability or unemployment paths or retirement and returning to work). Given the diversity of the retirement definitions, it is likely that the impact of caregiving on "retirement" is sensitive to how retirement is defined.

Our review highlighted that the inclusion of intensity measures and taking the endogeneity of

caregiving into consideration often leads to a significant association between caregiving and labor force participation. It is important to apply these insights to retirement outcomes. Only three retirement studies addressed intensity and endogeneity concerns, and the findings with respect to caregiving intensity and retirement were mixed. In this study, we build off the existing literature that models both time-invariant and time-varying sources of endogeneity. We add to the existing literature by considering a broader pool of care recipients who are more likely to receive care from retirement-aged individuals. We also explore caregiving intensity thresholds that have been established in the labor force participation literature, but which previous longitudinal studies on caregiving and retirement have not explored. Finally, we allow for different definitions of and paths to retirement, which previous American caregiving literature has not considered.

Methods

Empirical Approach

A woman's decision of whether or not to retire can be expressed as follows:

$$Y_{it} = f(CG_{it}, X_{it}, \delta_i, \epsilon_{it})$$

where Y_{it} is whether or not individual i is retired at time t; CG_{it} is a measure of caregiving or caregiving intensity; X_{it} is a vector of demographic, socioeconomic, family, and pension-related factors; δ_i is a time-invariant, individual-specific error component; and ϵ_{it} is an individual - and time-varying error component (Van Houtven et al., 2013).

We model each individual's time-invariant unobserved heterogeneity with a fixed effect which allows δ_i to be correlated with CG_{it} and X_{it}. We also adopt an instrumental variable approach

to determine whether we need to treat our caregiving measures as endogenous (i.e. whether the individual-and time-varying error component is correlated with our caregiving measures).

We estimate a two-stage least squares model with fixed effects. In the first stage equation, a vector of instruments, Z_{it}, is used to predict the probability of providing care along with a vector of exogenous variables, X_{it}. The instruments are correlated with informal care but not with the individual- and time-varying error component. Previous research has explored a number of options for instrumenting informal care in models that predict labor market participation, including number of siblings, parental characteristics, household member health status, and distance from family members (Bolin, 2008; Crespo, 2007; Ettner, 1995; Heitmueller, 2007; Johnson & Lo Sasso, 2006; Van Houtven et al., 2013; Wolf & Soldo, 1994;).

A panel approach with fixed effects must have time varying instruments. As such, we explore the instruments that capture dynamic parental and household member characteristics. These include whether or not the individual had their last living parent pass away in the previous two years and whether or not the individual has a parent who is widowed or single. In the former case, it is possible that an individual transitioned from being a caregiver to a non-caregiver if their last living parent recently passed away. In the latter case, it is likely that having a single parent increases a woman's likelihood of providing care to that parent, since the parent's spouse cannot help with this care (Van Houtven et al., 2013). Finally, we consider whether there is a household member with a chronic illness or disability, aside from the respondent. The health of household members is highly correlated with the caregiving decision, but is unlikely to impact the retirement decision except through caregiving or the caregiver's health, for which we have controls in our model (Ettner, 1996; Heitmueller, 2007).

We test the validity and strength of our instruments with tests of underidentification (Kleibergen-

Paap rk LM statistic), overidentification (i.e. the Sargan-Hansen test of overidentifying restrictions), and weak identification (i.e. the joint F-statistic of the instrumental variables in the first stage equation). We also assess whether the predictions from a model treating caregiving as exogenous differ significantly from a model where it is treated as endogenous using two Sargan-Hansen statistics.

We use a linear prediction model to enable the use of two-stage least squares estimation. We employ a generalized method of moments approach due to the presence of clustered errors (Van Houtven et al., 2013). Stata 12 SE was used for all analysis (StataCorp, 2011).

Ethical approval was not sought, as we used publicly available secondary data with no individual identifiers. This was in accordance with University of Toronto's *Research Involving Human Subjects: Guide on Ethical Conduct*.

Data

We use the American National Longitudinal Survey of Mature Women (NLSMW). This nationally representative survey followed 5,083 women from 1967 when they were aged 30 to 44 until 2003. By 2003, there were 2,809 women aged 66 to 81 remaining in the survey. The NLSMW has detailed labor force, retirement and caregiving data from 1992 onwards. As such, we focus on the last six waves of data from 1992 to 2003 (i.e. the 1992, 1995, 1997, 1999, 2001, and 2003 waves).

Dependent Variable

The dependent variable is a binary indicator for whether or not the individual identifies herself as retired. Retirement literature has tended to classify an individual as retired if he or she self-identifies as such and is not working any hours in the labor force. We note, however, than it is possible for individuals to self-identify as retired if they dropped out of the labor force early (e.g.

for child rearing) and never returned. This is especially the case, as the labor force status variable in the NLSMW does not have a category for homemakers in some years. Given the timespan of our data, we are able to check whether the individual was in the labor force at any point between 1967 and 1992. We limit our definition of "retired" to individuals who were in the labor force at some point between 1967 and 1992 (i.e. between the ages of 30-44 and 50-64), who self-identify as retired, and who are not working any hours in the labor force. We explore alternate definitions of retirement in our sensitivity analysis.

Independent Variables

Our main independent variables pertain to informal caregiving. The NLSMW asks individuals if they regularly spend time helping or taking care of a relative or friend with a health limitation inside the household or outside the household. As such, we define our informal care indicator as a binary variable for whether or not the individual provides care to someone inside or outside the home. There are also questions pertaining to the number of hours per week spent providing such care both inside and outside the household. Our main caregiving intensity variables are binary variables constructed from the sum of the two caregiving variables (i.e. hours of in- and out-of-home care). As our aim is to test whether higher intensity caregiving can lead to retirement, we test intensity thresholds of 10 hours per week, 15 hours per week, and 20 hours per week in separate models. These are the intensity levels at which working-aged individuals drop out of the labor force in the existing literature (Berecki-Gisolf, 2008; Carmichael & Charles, 2003a, b; Colombo et al., 2011; Ettner, 1995; Lilly et al., 2010; Lilly et al., 2011; Young & Grundy, 2008). In separate models, we interact the caregiving intensity dummies with the caregiver dummy to determine if there was an incremental effect of providing intense informal care.

We control for age and its square and include a dummy for whether or not the individual was at or over age 65 (i.e. when women of this cohort could collect full Social Security benefits). We include dummy variables for ages nearing full retirement age (i.e. ages 60 to 65) in different specifications. A dummy variable for marital status is also included. To capture socioeconomic status, we include education level (i.e. less than high school, high school diploma, some college, or a college degree) and household income adjusted to 2003 dollars. We control for whether or not there was an individual in the household under 18 years of age and the number of household members, which might impact the available time and number of individuals who could provide care. The individual's health status is controlled for with self-rated health dummies (i.e. excellent, good, fair, or poor health relative to other women her age). We include a variable that captures the individual's current job-related pension level in 2003 dollars. All regressions include a regional dummy indicating whether the individual lived in the South or not, as this was the only regional variable available across all waves. Wave dummies are included to capture any time trends.

Instrumental variables

In the first-stage equation of our two-stage least squares estimation, we include four instrumental variables. The first two variables are indicators for the marital status of the individual's mother and father. Binary variables were constructed indicating whether the respondent's mother or father was widowed or single. The third instrumental variable is a dummy variable indicating whether the respondent's last living parent died in the previous two years before the current survey year. This was constructed using retrospective data from later waves asking in which year the individual's parent died. The last instrumental variable was a binary variable indicating whether there was a household member (aside from the respondent) who had a chronic illness or disability.

Sensitivity Analyses

Sensitivity analyses explored other caregiving characteristics. These included duration of care (i.e. the number of waves the individual indicated they were a caregiver) and place of care (i.e. whether the care was provided in the individual's home or out of her home).

We also considered that a binary outcome based on individuals self-identifying as "retired" is likely an oversimplification. There are multiple paths to retirement that are not picked up by such a definition, including individuals who took the unemployment or disability routes into retirement (Jacobs et al., 2014a; Maestas, 2010; Van Houtven et al., 2013). These individuals may still self-identify as retired, but could differ in important ways from those who chose to retire. As such, we also conducted analyses taking alternate routes to retirement into consideration. Specifically, if individuals indicated that they were unemployed or disabled in the cycle before they retired, then we excluded these individuals from the retired category in alternate analyses. We also conducted analyses that excluded individuals who indicated that they were "homemakers" in earlier waves from the "retired" category.

To determine whether caregiving had an effect on *permanent* retirement decisions (i.e. that people did not self-identify as retired and return to work in a later cycle), we conducted analyses excluding any individuals who retired and returned to work from the "retired" category. Finally, we conducted analyses with a definition of retirement that included partial retirement (i.e. individuals who self-identified as retired but still worked some hours).

Results

Sample Characteristics

Table 1 summarizes the sample's characteristics in 1992. These means and proportions have been adjusted with population sample weights provided by the NLSMW to make them nationally representative. The women's ages ranged from 55 to 69, with an average of 62 years. Only 12% of the women were fully retired in 1992. Just over 20% of the women in the sample were caregivers. Of these caregivers, just over one-third provided at least 20 hours per week. The majority of the caregivers (71%) indicated that they provided care outside their home, 34% indicated that they provided care within the home, and 5% provided care both inside and outside the home. Most women (58%) were married. Around 40% of women lived in the South. Overall, most of the sample has at least high school education, with the largest proportion of women having only a high school diploma. Just above 10% of women had a minor in the household, and on average there were 2 individuals living in the household. The largest proportion of women (45%) rated their health as good, with only 9% indicating poor health. While only 12% of women self-identified as retired, 19% of women were in receipt of a pension. The mean annual pension was $8,584, conditional on receiving a pension.

Table 2 summarizes the results bivariate analysis using t-tests and chi-squared tests comparing the sample characteristics of caregivers versus non-caregivers. Overall, we find that caregivers were slightly less likely to be retired, though this difference was not statistically significant. Caregivers were under a year younger than non-caregivers and significantly more likely (65% versus 57%) to be married. Caregivers were also more likely to have a high school diploma than non-caregivers. Non-caregivers were more likely to have poorer health, with a slightly lower proportion of caregiving

women indicating fair health relative to non-caregivers.

Instrumental Variable and Endogeneity Tests

We first tested whether or not our equation was identified (i.e. our instruments were correlated with caregiving), and were able to reject the null that the equation was underidentified. The Sargan-Hansen test of overidentifying restrictions was also conducted, testing the joint null hypothesis that the instruments were valid (i.e. uncorrelated with the error term) and that the excluded instruments were correctly excluded from the retirement equation. We failed to reject the null, a further indication of the validity of our instruments. Finally, using the rule of thumb from Staiger and Stock (1997), we found that the joint F-statistic of the excluded instruments in our first stage equation was greater than 10 (F-statistic=212.57).

Given the indications that our instruments were valid, we then conducted an endogeneity test to determine whether caregiving can be treated as exogenous using two Sargan-Hansen statistics. We failed to reject the null hypothesis that caregiving could be treated as exogenous. As such, we concluded that a fixed-effects model without the two-stage least squares estimation would be used as our base case analysis. We present the results from our two-stage instrumental variable estimation with fixed effects in Appendix 1 for comparison purposes, but our preferred results based on our specification tests are from the linear probability models that treat informal care as exogenous; it is those results that are presented below.

Multivariate Results

Table 3 outlines the results of our fixed effects regressions, exploring different caregiving intensity measures. In the baseline caregiving equation (Model 1) as well as the intensity models (Models

2, 3, and 4), there was no significant effect of caregiving on retirement. Models 2 and 3 indicate a positive incremental effect of intense caregiving (i.e. 10 hours per week and 15 hours per week, respectively) on retirement, but neither of these coefficients was statistically significant. There was a larger and statistically significant incremental effect of intense caregiving for women who provided at least 20 hours of weekly care. These women were 3 percentage points more likely to retire. We note that a similar pattern was apparent in our two-stage instrumental variable approach with fixed-effects (Appendix 1). In these models, intense caregiving was statistically significant at the 20 hour threshold, though the magnitude of the incremental intensity effect was smaller (i.e. 2 percentage points).

We also found a large and significant effect of being 65 and older, with these individuals being 10 percentage points more likely to be retired than those below 65. We did not find that age dummies for 60 to 64 were statistically significant. Having a higher family income also had a very small and negative effect on the likelihood of retirement. Those with less than excellent health were more likely to be retired, though the only significant value was for good health.

Sensitivity Analyses

Any care in the home or any care out of the home had positive but statistically non-significant effects on retirement. While providing intense care outside the home was positively associated with retirement, this effect was not statistically significant. The latter could be related to a lack of statistical power due to fewer observations of in-home caregivers.

Our sensitivity analyses altering the definitions of retirement also yielded some interesting findings. When we excluded individuals who were out of the workforce due to disability or unemployment prior to retirement, we found similar results. Excluding individuals who self-identified as

"homemakers" in earlier waves also yielded consistent results. Similarly, including individuals who were "partially retired" did not alter the results from the base case analysis. Excluding individuals who retired and returned to work from our definition of "retired", however, did alter our results. Intensive caregiving was not associated with retirement when defined in this way.

Discussion

In this paper, we have explored the effect of caregiving on women's likelihood of retirement. We have built off existing literature by including a more comprehensive set of care recipients, caregiving intensity measures, and definitions of retirement. Our results indicate that these methodological differences are important in assessing the effect of caregiving intensity on retirement. Whereas previous research does not find a consistent intensity effect for caregiving, we find that when all care recipients are included and a wider breadth of intensity thresholds is used, there is a significant effect of more intense caregiving on women's retirement. It is not surprising that including caregiving to a spouse, other family member, or friends would lead to a stronger effect of caregiving on retirement, as 50% of the care provided by caregivers over age 65 in the United States is to these individuals (NAC and AARP, 2009). It is around the age of retirement that these types of care - especially spousal care - become more common. This factor should be incorporated in caregiving and retirement research. Further, the inclusion of intensity thresholds from the broader caregiving-labor force participation literature demonstrates that there are longer-term exits from the labor market due to high intensity care.

We were also able to limit the likelihood that this retirement effect was due to individuals already out of the labor force (i.e. unemployed and disabled individuals) self-identifying as retired. Also, contrary to Van Houtven et al. (2013), we did not find that the caregiving effect was driven by

partial retirement for higher intensity thresholds. The individuals in our sample were fully retired, and still experienced an intense caregiving effect. Our sensitivity analysis did, however, call into question the permanency of these retirement decisions. It seems that women may choose to retire due to caregiving, but this does not preclude a return to the labor force in subsequent years.

Similar to previous research that used an instrumental variable approach to predict the effect of intensive caregiving on labor force participation, we did not reject the exogeneity of caregiving (Bolin et al., 2008; Heitmueller, 2007; Van Houtven et al., 2013). As such, our findings support recent evidence from Van Houtven et al. (2013) that controlling for time-invariant heterogeneity is sufficient when trying to account for endogeneity in caregiving and retirement models.

There were limitations to keep in mind. First, it is possible that the significant attrition by 1992 might have been non-random and altered the representativeness of the sample. While this is a possibility, evaluations have been conducted comparing the characteristics of the NLSMW sample to those of the Current Population Survey (CPS) in 1995. The findings indicated that the characteristics of similar women still closely matched those in the CPS (Zagorsky & Rhoton 1998).

Another limitation concerns the use of a pre-Baby Boomer cohort. This could imply that our results are less applicable to the current cohort of retiring Baby Boomers. One might hypothesize that the stronger labor force attachment of the Baby Boomers could potentially attenuate the caregiving effect on retirement. However, we note findings from Jacobs et al. (2014b) that indicate that the labor force participation penalty for pre-retirement aged women was not significantly different across cohorts of pre-Baby Boomers and Baby Boomers.

Finally, consistent controls for family assets (e.g. level of assets or home ownership) were unavailable. However, for the cycles in which the family assets were available, they were highly correlated with family income and pension earnings, which were included in all of our models.

Previous research has found that assets are highly correlated with both of these factors (Alvarez-Cuardado and Long, 2011; Gale, 1998). Further, to the extent that assets do not change over time, some of the asset effects could be controlled for with the fixed effects.

Conclusion

In a policy environment that encourages later retirement but which increases caregiving demands on individuals, our findings have some important implications. In our sample, nearly one-third of caregivers provided intensive care that increased their odds of retirement by 3 percentage points. From other national surveys, we know that such intensive care is provided by approximately 17.1 million individuals in the United States (NAC and AARP, 2009). Currently, support for these caregivers is limited at the federal level to the unpaid leave guaranteed by the 1993 *Family and Medical Leave Act*. If the expectation is that these individuals will work longer while providing this care, there needs to be an increase in the supports available to working caregivers. These include the possibilities for flexible work schedules, which previous research has highlighted as a potentially effective policy to facilitate caregivers remaining in the workforce (Colombo, 2011).

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Tables

Table 1: Weighted Means and Proportions of NLSMW Characteristics, 1992

	N	Mean	SE
Retired	2620	12%	0.01
Age	2620	62.28	0.06
South	2953	40%	0.01
Married	2953	58%	0.01
Education			
Less than high school	2346	37%	0.01
High school	2346	42%	0.01
Some college	2346	12%	0.01
College	2346	9%	0
Family income	2953	$43,247.48	841.09
# household members	2953	2.2	0.02
Child under 18 in household	2953	11%	0.01
Self-rated health			
Excellent	2908	23%	0.01
Good	2908	45%	0.01
Fair	2908	22%	0.01
Poor	2908	9%	0.01
Retirement pension	2894	$931.70	52.95
Caregiver	2953	21%	0.01
>=10 hrs | caregiver=1	2953	55%	0.02
>=15 hrs | caregiver=1	2953	40%	0.02
>=20 hrs | caregiver=1	2953	35%	0.02
In home care | caregiver=1	2953	34%	0.02
Out of home care | caregiver=1	2953	71%	0.02

Source: National Longitudinal Survey of Mature Women, 1992

Table 2: Descriptive Overview of Caregivers versus Non-caregivers, 1992

	Caregivers			Non-Caregivers			
	N	Mean	SE	N	Mean	SE	Sig
Retired	569	11%	0.01	2051	12%	0.01	
Age	629	61.6	0.17	2324	62.13	0.09	**
South	629	43%	0.02	2324	39%	0.01	
Married	629	65%	0.02	2324	57%	0.01	**
Education							
Less than high school	494	33%	0.02	1852	35%	0.01	
High school	494	48%	0.02	1852	41%	0.01	**
Some college	494	10%	0.01	1852	14%	0.01	
College	494	9%	0.01	1852	10%	0.01	
Family income	629	$41,427.79	2,200.72	2324	$43,792.68	1,329.59	
# household members	629	2.29	0.05	2324	2.18	0.02	
Child under 18 in HH	629	10%	0.01	2324	12%	0.01	
Self-rated health							
Excellent	629	24%	0.02	2279	23%	0.01	
Good	629	48%	0.02	2279	44%	0.01	
Fair	629	22%	0.02	2279	23%	0.01	*
Poor	629	6%	0.01	2279	10%	0.01	
Retirement pension	619	$1,541.54	62.97	2275	$1,629.58	49.49	

* $p < .05$, ** $p < .001$, *** $p < .001$

Note: t-tests and Chi-squared tests used in bivariate analysis

Source: National Longitudinal Survey of Mature Women, 1992

Table 3: Fixed Effects Linear Probability Model of Determinants of Women's Retirement, 1992-2003

	Model 1			Model 2			Model 3			Model 4		
	Coef.	SE	Sig	Coef.	SE	Sig	Coef.	SE	Sig	Coef.	SE	Sig
Caregiver	0.01	0.01		-0.01	0.02		-0.01	0.02		-0.02	0.02	
Caregiver*Caregives >=10 hrs				0.03	0.02							
Caregiver*Caregives >=15 hrs							0.03	0.02				
Caregiver*Caregivers >=20 hrs										0.05	0.02	*
Age	-0.08	0.03	**	-0.08	0.03	**	-0.08	0.03	**	-0.08	0.03	**
Age squared	0.0005	0.0002	**	0.0005	0.0002	**	0.0005	0.0002	**	0.0005	0.0002	**
Age 65 and over	0.1	0.02	***	0.1	0.02	***	0.1	0.02	***	0.1	0.02	***
Married	0.0004	0.03		-0.001	0.03		-0.002	0.03		-0.003	0.03	
Lives in south	0.01	0.06		0.01	0.06		0.01	0.06		0.01	0.06	
Education												
Less than HS												
HS	-0.01	0.03		-0.01	0.03		-0.01	0.03		-0.01	0.03	
Some college	-0.04	0.04		-0.04	0.04		-0.04	0.04		-0.04	0.04	
College	-0.08	0.05		-0.08	0.05		-0.08	0.05		-0.08	0.05	
Household Income ($1000s)	-0.001	0.0002	***	-0.001	0.0002	***	-0.001	0.0002	***	-0.001	0.0002	***
Retirement pension ($1000s)	0.001	0.001		0.001	0.001		0.001	0.001		0.001	0.001	
Number of HH members	0.02	0.01		0.02	0.01		0.02	0.01		0.02	0.01	
Children under 18 in HH	0.004	0.03		0.004	0.03		0.004	0.03		0.004	0.03	
Self-rated health												
Excellent (Ref)												
Good	0.04	0.02	**	0.04	0.02	**	0.04	0.02	**	0.04	0.02	**
Fair	0.04	0.02		0.04	0.02		0.04	0.02		0.03	0.02	
Poor	0.04	0.03		0.04	0.03		0.04	0.03		0.04	0.03	
Constant	3	1.05	***	3.07	1.05	**	3.08	1.05	**	3.11	1.05	**
N	7986			7935			7935			7935		
F-stat	77.34			73.77			73.72			74.06		

* p < .05, ** p < .001, *** p < .001

Source: National Longitudinal Survey of Mature Women, 1992-2003

Note: Year dummies included, but not show.

Appendices

Table A1: Two-stage Least Squares Fixed Effects Linear Probability Model of Determinants of Women's Retirement, 1992-2003

	Model 1			Model 2			Model 3			Model 4		
	Coef	SE	Sig	Coef	SE	Sig	Coef	SE	Sig	Coef	SE	Sig
Caregiver	-0.02	0.04		-0.19	0.13		-0.13	0.1		-0.13	0.09	
Caregiver*Caregives >=10 hrs				0.17	0.11							
Caregiver*Caregives >=15 hrs							0.12	0.08				
Caregiver*Caregivers >=20 hrs										0.15	0.07	*
Age	-0.08	0.03	**	-0.07	0.03	**	-0.08	0.03	**	-0.08	0.03	**
Age squared	0.0005	0.0002	**	0.0005	0.0002	**	0.0005	0.0002	**	0.0005	0.0002	**
Age 65 and over	0.1	0.02	***	0.1	0.02	***	0.1	0.02	***	0.1	0.02	***
Married	0.003	0.03		0.003	0.03		0.002	0.03		0.0007	0.03	
Lives in south	0.02	0.06		0.01	0.06		0.02	0.06		0.02	0.06	
Education												
Less than HS												
HS	-0.01	0.03		-0.001	0.03		-0.003	0.03		-0.002	0.03	
Some college	-0.04	0.04		-0.03	0.04		-0.03	0.04		-0.03	0.04	
College	-0.08	0.05		-0.07	0.05		-0.07	0.05		-0.07	0.05	
Household Income ($1000s)	0	0	***	0	0	***	0	0	***	0	0	***
Retirement pension ($1000s)	0	0		0	0		0	0		0	0	
Number of HH members	0.02	0.01		0.02	0.01		0.02	0.01		0.02	0.01	
Children under 18 in HH	0	0.03		0	0.03		0	0.03		0	0.03	
Self-rated health												
Excellent (Ref)												
Good	0.04	0.02	**	0.04	0.02	**	0.04	0.02	**	0.04	0.02	**
Fair	0.04	0.02		0.04	0.02		0.04	0.02		0.04	0.02	
Poor	0.04	0.03		0.05	0.03		0.04	0.03		0.04	0.03	
N	7351			7477			7477			7477		
F-statistic	82.5			77.57			78.17			78.44		

* $p < .05$, ** $p < .001$, *** $p < .001$

Source: National Longitudinal Survey of Mature Women, 1992-2003

Note: Year dummies included, but not show.