# Retirement, Grandparental Childcare, and Maternal Employment*

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**Abstract:** There is an increasing literature on the effect of grandparental childcare on the labor supply of adult daughters. However, the endogeneity of grandparental childcare remains an important empirical issue. This paper proposes a new quasi-experimental approach: I make use of a Norwegian retirement reform to estimate the causal effect of the grandmother's eligibility for early retirement on the labor supply of her adult daughter. I find that grandmother's retirement increases the employment and wages of her adult daughter. I show that grandparental childcare is the most likely channel of the effects as there are no effects of grandmothers' retirement on the labor supply of adult daughters without young children or adult daughters living far from the grandmother.

**Keywords:** Retirement; Maternal employment; Childcare
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# 1 Introduction

The effect of external childcare arrangements on maternal labor supply is receiving increasing attention in the economics literature. Starting with Heckman's (1974) seminal paper on how childcare programs affect women's work effort, most of the literature has focused on formal childcare (see Blau and Currie (2006) for a review). But although formal childcare is the main form of external childcare in many countries, grandparental childcare remains important: In Western Europe, 58% of grandmothers and 49% of grandfathers with young grandchildren[1] provide childcare, and 30% of grandparents provide childcare weekly or more often (Hank and Buber, 2009). As pointed out by Compton and Pollak (2014), there is also an insurance aspect of grandparental childcare that formal childcare does not offer: Grandparental childcare offers an insurance against unanticipated or irregular needs of childcare (e.g., child sickness or sudden job meetings). During the last decades, there has been an increased academic and political interest in the role of grandparental childcare. In a recognition of the role of grandparental childcare, the UK government introduced the Specified Adult Childcare credits in the 2011-12 tax year: Family members caring for children aged 0-12, whose parents are working, can claim credits that qualify toward the state pension.

Estimating the effect of grandparental childcare on adult daughters' employment is not straightforward.[2] Grandparental childcare is likely endogenous to unobservable determinants of adult daughters' employment. Several papers use proximity of grandparents as an instrument for grandparental childcare, finding a positive impact on adult daughters' employment (Dimova and Wolff, 2008, 2011; Compton, 2013). However, proximity to grandparents is potentially also endogenous to labor supply decisions. Compton and Pollak (2014) attempt to deal with the endogeneity of proximity by analyzing a subsample of adult daughters married to men with military careers, arguing that the locational decision of these couples is more likely to be determined by military needs than by the couple's preferences for grandparental childcare. However, the results for a subsample of adult daughters married to men working in one of the most traditionally male occupations might not be valid for women in general.

The other instrument that has been used for grandparental childcare is whether or not there are any grandparents alive. Boca (2002) finds that having at least

[1] Aged 15 or less.

[2] This paper studies elderly mothers and their adult daughters. Throughout the paper, I will refer to the mother as the grandmother, even if the adult daughter has no children. The daughters will consistently be referred to as the adult daughter.

one grandparent alive has positive effects on both adult daughters' probability of working and on adult daughters' likelihood of having children. Arpino, Pronzato, and Tavares (2014) use having grandparents alive as an instrument for grandparental childcare and find positive effects of grandparental childcare on adult daughters' labor supply. It should be noted however that death of a grandparent is unlikely to be an exogenous event, as it is potentially correlated with unobserved health characteristics of grandparents and adult daughters that could affect maternal labor supply.

I study the effect of grandparental childcare on adult daughters' labor supply in a quasi-experimental setting. An early retirement (ER) reform in Norway gave grandparents working in some firms, but not all, the opportunity to retire early, and thus provides exogenous variation in the likelihood that the grandparent is working. Several papers have shown that non-working grandparents are more likely to provide regular childcare to grandchildren (Croda and Gonzalez-Chapela, 2005; Gray, 2005; Hank and Buber, 2009). To control for the non-random selection of firms into the early retirement scheme, I use a difference-in-differences design, comparing the adult daughters of grandmothers eligible for early retirement to adult daughters of grandmothers not eligible for early retirement. The difference-in-differences design is important to account for the endogeneity of the grandmother's retirement to her adult daughter's labor supply. To account for grandmothers selecting into firms participating in the early retirement scheme, I assign treatment based on the grandmother's pre-reform firm affiliation. The estimated findings are intention-to-treat effects of the grandmother's eligibility for ER on her adult daughter's employment.[3]

The main findings are two-fold. I only find effects along the margin of adult daughters who are more likely to benefit from grandmothers' retirement. For grandmothers who have more than one adult daughter, I find no effects on adult daughters' employment. Potentially, this could be due to the fact that the more adult children the grandmother has, the less potential increase in grandparental childcare per adult child is associated with grandparental retirement. When focusing on grandmothers who have only one adult daughter, I find positive effects of grandmothers' retirement on adult daughters' labor market outcomes: The full-time employment rate of adult daughters increases by 1.9 percentage points, and yearly wages by 3.6%. I also estimate a 1.7 percentage points increase in the employment rate of adult daughters, but the common trends assumption is less satisfied for this outcome.

[3]Because the grandmother's actual take-up of ER benefits could be affected by her daughter's labor supply, the setting is not suitable for an IV approach.

Although I do not have data on grandparental childcare, I show that this is the most likely channel for the estimated effects: There is no maternal employment effect of grandmothers' eligibility for early retirement for adult daughters that either have no young children or does not live close to the grandmother. Also, the effects are driven by the increase in the employment rate of adult daughters living in areas with relatively low formal childcare coverage rates.

The estimated effects have sizeable economic impacts, even if they are only present for subgroups along different margins. It is especially interesting to note the sizeable effects when considering that the studies on formal childcare in Norway have found no significant impact on maternal labor supply (Havnes and Mogstad, 2011; Black, Devereux, Løken, and Salvanes, 2014). Perhaps the findings suggest that grandparental childcare plays a more important role than previously thought? But it is also worth noting that the studies on formal childcare in Norway make use of data from the late 1970s. My findings could imply that with the increased female labor force participation rates that has happened since then, all sorts of external childcare have gained in importance, including formal childcare.

My findings imply that although early retirement reforms reduce the employment of older workers, this could to some extent be offset by an increase in maternal full-time employment rates. In general, policies that increase the ability of grandparents to provide childcare could have benefitial impacts on maternal labor supply, and might help decrease the male-female gap in employment rates.

The remainder of the paper proceeds as follows: Section 2.1 discusses the Norwegian early retirement reform, Section 2.2 discusses standard old age retirement and disability retirement, while Section 2.3 provides additional institutional details on childcare and female labor supply in Norway. Section 3.1 presents the Norwegian registry data used in this study, and Section 3.2 provides details on the empirical strategy. The main findings are presented in Section 4.1. Results on heterogeneity and mechanisms are provided in Section 4.2, while Section 4.3 shows the results from some robustness tests. I offer some concluding remarks in Section 5.

## 2 Background and Institutional Setting

### *2.1 The Norwegian early retirement reform*

The Norwegian early retirement scheme (ER) was introduced on January 1, 1989, as a result of central tariff negotations between employers' and employees' confederate organizations. The scheme offers workers in covered firms the opportunity of retiring with public pensions at an earlier age than the standard retirement age of 67. The

scheme was meant to provide a dignified retirement for "worn out" workers. The ER scheme covers firms that take part of the collective pay agreement between employers' and employees' confederate organizations, including all public firms. The share of private firms covered by the ER scheme has gradually increased since the introduction, and at present the scheme covers 80% of the Norwegian population of workers. All workers in covered firms are eligible for early retirement, subject to a set of individual criteria: The worker needs at least three years of tenure in the firm (s)he wants to retire from[4], and must fulfill several requirements related to earnings history.[5]

The ER eligibility age was 66 when the scheme was introduced, but has since been reduced by several subsequent reforms, to 65 in 1990, 64 in 1993, 63 in 1997, and finally 62 in 1998. All eligible workers in covered firms can apply for ER benefits the month after they reach eligibility age. During the period of investigation, ER benefits were conditional on full withdrawal from employment, and any labor income would result in a large offset of the received benefits.[6] However, retiring on ER benefits does not reduce future old age pensions, as these are calculated as if ER retirees had been full earners in the early retirement period. The net replacement rate for ER retirees is approximately 65%.[7] The ER benefits include a fixed minimum benefit, but most of the benefits are based on previous earnings.[8] The costs of financing the ER scheme are shared between the government and the participating firms: Participating firms cover the full costs of ER retirees aged 62-63, and 60% of costs of ER retirees aged 64-66.

This paper is not the first to use the Norwegian ER reform as a natural experiment. Several papers find that although ER is a substitute for other pathways to early labor force exits, the reform led to a significant reduction in the employment rate of affected workers (Røed and Haugen, 2003; Bratberg, Holmås, and Thøgersen, 2004; Vestad, 2013). Hernæs, Markussen, Piggott, and Vestad (2013) find that the ER reform did not impact the mortality rate of those affected by the reform. This paper is the first to use the ER reform to study family effects, along with Johnsen and Vaage (2014), who find that the ER reform increased early spousal exit from the

[4]Or employment in other ER firms in the last 5 years before retirement.

[5]10 or more years of earnings above the National Insurance System basic amount (1G); average of the top 10 yearly earnings since 1967 above 2G; yearly earnings of at least 1G the last 2 years before retirement. At present (2014), 1G equals NOK 88,370 ($14,700). The amount is adjusted on a yearly basis.

[6]This rule was changed in a major reform of the pension system in 2011. The 2011 reform happened after the period of study.

[7]The net replacement rate decreases with earnings, and differs between the public and the private sector. See Bratberg, Holmås, and Thøgersen (2004) for a more detailed discussion.

[8]See Hernæs, Sollie, and Strøm (2000) for institutional details.

labor force, with wives of husbands eligible for ER more likely to leave the labor force on disability pension.

### *2.2 Standard old age retirement and disability retirement*

The main provider of public pensions in Norway is the Natural Insurance System (NIS). This mandatory, pay-as-you-go, system covers the entire Norwegian population. The NIS provides standard old age pensions, based on earnings histories, from the statutory retirement age of 67.[9] Like the ER benefits, standard old age pensions consist of a fixed minimum benefit and a supplementary benefit based on previous earnings. In addition to the NIS pensions, workers can have occupational pensions, which commonly also have an eligibility age of 67. Public occupational pensions are fully integrated with NIS pensions, while private occupational pensions are firm based. Benefits from private occupational pensions can be based on defined contributions rather than defined benefits, and the levels vary considerably.

During the period of investigation, there has been a rising share of the elderly population on health-related benefits. Today, around 40% of all 66 year-olds receive disability benefits, which makes the disability benefit system the main early exit route from the labor market. The NIS provides disability benefits to individuals with permanent impairments that are certified by a physician, and only after relevant rehabilitation programs have been tried. Disability benefits are calculated based on projected earnings: Recipients receive benefits of a similar amount to the old age pensions s(he) would have been entitled to if s(he) had worked until the age of 67.

### *2.3 Childcare and female labor supply in Norway*

Grandparents in Nordic countries provide less regular childcare compared to their Southern European counterparts (Hank and Buber, 2009). However, two-thirds of Norwegian grandparents with grandchildren below the age of 12 provide childcare on at least a monthly basis (Hagestad and Herlofson, 2009). The Norwegian sociologist Gunhild Hagestad, who has worked extensively on grandparental childcare in Norway, characterises the role of Norwegian grandparents as that of a "reserve army", suggesting that they provide "an extra safety net, filling potential gaps between what children need and what their nuclear families and social institutions can provide" (Hagestad, 2006, p.329). Among grandparents, grandmothers are most important in terms of childcare, especially maternal grandmothers.[10]

[9] Earlier for some groups like police and firefighters, and shift-workers.

[10] The information on grandparental childcare is based on three main surveys: The longitudinal study of life course ageing, and generation (NorLAG); the Norwegian study of life course, generation

Norway has a high coverage of subsidized formal pre-school childcare.[11] The coverage rate was 60% in 2000, and has risen to 90% in 2013.[12] Formal childcare takes place either in public kindergardens (47% in 2013) or subsidized private kindergardens. Parents pay a monthly fee for formal childcare, subject to a minimum and a maximum level. The maximum monthly fee is 2,394 NOK (approx. 377 USD). In 2001, parent fees covered about 33% of the costs of public kindergardens and about 46% of the costs of private kindergardens (Lunder and Eika, 2013). Norwegian formal childcare is mainly for children aged 1-5. Before the age of 1, almost all children are cared for by their parents, who have access to publicly funded paid parental leave for almost a full year after birth. The replacement rate is 100%. Children start school the year they turn 6.[13] Children aged 6-12 attend primary school, while children aged 13-15 attend secondary school. School hours are shorter than normal work hours, but children aged 6-9 can attend a subsidized after-school care program.

The female labor force participation rate in Norway is among the highest in the world. In 2008, the female labor force participation rate was 71%, which is high compared to the male labor force participation rate of 77%.[14] Women aged 25-40 have had a particular increase in the labor force participation rate since the 1980s. However, 43% of women worked part-time in 2009. Also, the Norwegian labor market is segregated in terms of gender: 48% of women work in the public sector compared to only 19% of men.[15] Primary school teachers, nurses, and cleaners remain occupations heavily dominated by women. Blue collar occupations and engineers remain occupations dominated by men.[16]

## 3 Data and Empirical Strategy

### *3.1 Data*

The data is compiled from several sources of Norwegian administrative registry data, covering the entire Norwegian population from 1967 to 2010. The registers on

and gender (LOGG); and the Norwegian study of grandparents (NorGRAND). Together, the survey data includes responses from grandparents, parents, and grandchildren.

[11] Havnes and Mogstad (2011) studied the effect of formal childcare on maternal employment in Norway. They use a staged expansion of formal childcare in the late 70's as a natural experiment. Their difference-in-differences estimates show a statistically significant but magnitudinally negligible effect on maternal employment. Set in a period when informal childcare options were more abundant than now, the study finds that the expansion of formal childcare mostly crowded out informal childcare.

[12] Statistics Norway, 2014

[13] Before 1997, the year they turned 7.

[14] Data on labor force participation taken from: Statistics Norway (2010).

[15] Numbers from 2009.

[16] Statistics Norway, 2010.

individual data can be linked through a unique individual identifier, and contain rich demographic and socio-economic data. The demographic data includes information on gender and year of birth, in addition to annual data on: Municipality and post code of residence,[17] marital status, and number of children. Most importantly for the analysis in this paper, the demographic data contains unique parental identifiers that can be used to link data on parents and children. The socio-economic data includes detailed information on education, annual data on earnings, and a crude annual measure of hours of work.[18] The data on earnings and hours worked are from the Norwegian tax registry. Earnings are not top-coded and include labor earnings, taxable sick benefits, unemployment benefits, and parental leave payments. For the period 1992-2010, the registers also contain individual data on the take-up of different social security programs, most importantly on the take-up of ER benefits. The data contains the starting date of take-up, the yearly amount of ER benefits received, whether ER retirement is partial or full, and whether the ER retiree retired from a public or a private firm.

Employed individuals are linked to annual firm data for the period 1986-2010. Unfortunately, there is no data on whether a given firm is affiliated with the ER scheme. Therefore, I follow Vestad (2013) and Johnsen and Vaage (2014) and use individual information on the take-up of ER benefits to identify each firm's ER affiliation: The data on the entire Norwegian population of employees enables the identification of all firms in which an employee has retired on ER benefits in the period 1992-2010. These firms must be affiliated with the ER scheme. The firms in which no employees retired on ER benefits are classified as non-affiliated firms. However, some of these firms might in truth be affiliated with ER scheme even if none of their employees made use of it. The treatment variable in the empirical analysis, ER firm, therefore suffers from measurement error. The measurement error in the classification of firms as ER affiliated or not will bias the estimated coefficients downwards: Some grandmothers working in firms classified as non-affiliated with the ER scheme will in fact have the opportunity to retire early on ER benefits. Because the measurement error is likely to be larger for firms with fewer employees, I restrict the main analysis to grandmothers from firms with at least 10 employees. The choice of the minimum threshold of employees is a trade-off between increasing sample size and reducing measurement error.[19]

Table A1 shows descriptive statistics of ER and non-ER firms. ER firms have

[17] There are 435 municipalities in Norway, organized in 19 counties.

[18] The reported measure of work hours separates between four different categories: No work, 1-20 hours per week, 20-29 hours per week, and 30+ hours per week.

[19] All the main findings are robust to changing the minimum threshold.

far more employees than non-ER firms, reflecting both the fact that larger firms are more likely to be affiliated with the ER scheme, and the backward identification process used in classifying ER firms. There are also large differences in the industry classification of the ER and non-ER firms[20]: 53% of ER firms are defined as operating within the services sector (this includes the public sector), compared to only 22% of non-ER firms. Also, 17% of ER firms are classified in the trade sector, compared to almost 44% of non-ER firms. When comparing the characteristics of employees in ER and non-ER firms, the average earnings is similar, and so is the share of women in each firm. However, workers in ER firms are on average older and more educated than workers in non-ER firms. The differences between ER and non-ER firms reflect the non-random affiliation of firms with ER scheme. However, in the empirical analysis, the difference-in-differences model will account for these differences if the time trends of workers in ER and non-ER firms are parallell.

As mentioned, the register data only contains a crude measure of work hours. Therefore, it is difficult to measure variation in employment using the data on work hours. Instead, I follow Havnes and Mogstad (2011) and Løken, Lundberg, and Riise (2014) in using administratively-set earnings threshold as proxies for hours of work. These thresholds are set by the Norwegian Social Insurance Scheme to define labor market status and determine eligibility for various benefits. The thresholds are based on a basic amount, termed "1G", that is adjusted on a yearly basis.[21] I follow Havnes and Mogstad (2011) and define employment as earnings above two basic amounts (2G) and full-time employment as earnings above four basic amounts (4G).[22]

### *3.2 Empirical Strategy*

As mentioned in Section 2.1, the ER scheme unfolded gradually through a series of reforms in the period 1989-1998. There is no data on ER retirement before the period 1992-2010 and, therefore, the introduction of the reform cannot be analyzed. During the period when the reform unfolded (1989-1997), different cohorts were exposed to different ER eligibility ages. To ease the interpretation and the presentation of the findings, I exclude the cohorts exposed to the unfolding of the reform, and focus on the period after the final reform lowered ER eligibility age to 62 in 1998.[23] The main sample consists of grandmothers born between 1936 and 1941, who reached the ER

[20]The industry classification is based on 6 digit NACE-codes available for each firm. This is a standard European industry classification system

[21]At present (2014), the basic amount equals NOK 88,370 ($14,700).

[22]The main findings are robust to using various earnings threshold levels as measures of increases in hours of work.

[23]The main findings are robust to including the cohorts exposed to the unfolding of the reform in the analysis.

eligibility age of 62 in the period 1998-2003. These grandmothers are exposed to the lowest possible ER eligibility age and thus the effect of ER eligibility could potentially be the strongest for this subgroup. To avoid picking up the endogenous selection of grandmothers into ER firms, treatment is assigned on the basis of the grandmother's firm affiliation in 1988, the year before the ER reform was introduced. The treatment group is grandmothers whose pre-reform employer later became affiliated with the ER scheme, while the control group is grandmothers whose pre-reform employer did not join the ER scheme.

The empirical analysis is based on a difference-in-differences approach. Because of the data constraints, the empirical analysis cannot be based on the comparison of pre-reform periods to post-reform periods. Rather, the empirical analysis makes use of the pre-reform firm affiliation of grandmothers as a source of exogenous variation in her post-reform eligibility for early retirement. The pre-period in the model is the five-year period before grandmothers reach the ER eligibility age of 62, and the post-period is the five-year period after. The nature of the empirical design opens up the possibility of anticipation effects: Even though the pre-reform employer of the grandmother is not endogenous to the reform, treated grandmothers were aware that they could retire with public benefits from the age of 62. This could potentially affect the labor supply of her adult daughter prior to the grandmother reaching ER eligibility age. In Section 4, I will investigate whether the parallell trends assumption is satisfied and if there is evidence of anticipation effects in any of the outcomes. The empirical reduced form model, estimating the intention-to-treat effect of the grandmother's eligibility for ER on the employment rate of adult daughters, takes the following form:

$$Y_{ijt} = \alpha_1 ERfirm_j + \alpha_2 (ERfirm_j * ERage_{jt}) + \delta_i + \theta_t + \epsilon_{ijt}, \quad (1)$$

where i indexes the adult daughter, j the grandmother, and t time. Y is the outcomes of interest, related to the adult daughters' labor supply: log (age), a proxy for employment, and a proxy for full-time employment.[24] $ERfirm$ takes the value of 1 for grandmothers whose pre-reform employer joined the ER scheme, and 0 for grandmothers whose pre-reform employer did not. $ERage$ takes the value of 1 when the grandmother is of ER eligibility age (62-66), and 0 before (57-61). $\delta$ is an individual fixed effect[25] and $\theta$ is a year fixed effect. The fixed effects control for

[24] As explained in Section 3.1, the available measure on work hours is crude, and, therefore, I use earning above certain administratively-set earnings threshold as proxies for employment and full-time employment.

[25] In this setting, the individual fixed effect is the fixed effect for each grandmother - adult daughter pairing.

time-invariant differences between the treatment and control groups, and for potential macro shocks that affect both groups. The parameter of interest, $\alpha_2$, measures the intention-to-treat effect of the grandmother's ER eligibility on the outcomes Y. The model is estimated without a set of controls, as most control variables are potentially endogenous to the grandmother's ER eligibility (marital status of the grandmother and the adult daughter, adult daughter's fertility, etc.).

As mentioned above, the estimation of Equation (1) by regression yields the intention-to-treat effects of grandmothers' ER eligibility. The underlying model, connecting grandmothers' ER eligibility to adult daughters' labor supply, I have in mind is the following: ER eligibility should decrease the employment rate of treated grandmothers, which should in turn increase the childcare she supplies to her adult daughters, which should finally increase the employment rate of adult daughters. The first step of this process is testable as I have data on the retirement of grandmothers. The second step is unobservable because I do not have data on grandparental childcare. Therefore, I will indirectly test for whether grandparental childcare is a mechanism behind the intention-to-treat effects by investigating whether the effects are driven by adult daughters who are more likely to receive grandparental childcare. Also, because the treatment needs to work through two processes to affect maternal employment, it makes it harder to identify causal intention-to-treat effects. The issue is amplified by the fact that most grandmothers have several adult children to whom they can provide grandparental childcare. The more adult children, the lower is the potential supply of grandparental childcare per adult child. One solution is to focus on grandmothers that have only one adult child. However, that would drastically reduce the sample size because most women born 1936-1941 have more than one child. Motivated by the fact that maternal grandmothers supply more childcare than paternal grandmothers (Hagestad and Herlofson, 2009), I make a compromise by focusing on grandmothers with only one adult daughter[26]. This increases the potential supply of grandparental childcare per adult daughter, but does not reduce the sample size too much. Table A2 shows that there are no overall large differences between the full sample and the sample where the grandmother has only one adult daughter along a range of observable characteristics. However, as the main results will reveal, there are no effects of grandmothers' ER eligibility when the grandmother has more than one adult daughter, and this should be taken into account when considering the external validity of the findings of this study.

For the sample of grandmothers with only one adult daughter, Table A3 reports observable characteristics of the treated and control groups, as measured the year

[26]She could still have adult sons (and daughter-in-laws).

grandmothers turn 61. Grandmothers working in ER firms are more educated and earn more than grandmothers working in non-ER firms. They are also more likely to be married. For the adult daughters of treated and control grandmothers, the differences are smaller, especially in terms of age, yearly earnings, and proximity to the grandmother. However, they are somewhat less likely to be married and have children. Although there are some differences between the treatment and control groups, these are often small in absolute terms. Also, the difference-in-differences approach allows for systematic differences between treatment and control groups, as long as they follow parallell time trends in the investigated outcomes.

# 4 Results

## *4.1 Main results*

This section shows the main results from the estimation of the difference-in-differences model by OLS regression. The results show that there is a positive effect of the grandmother's eligibility for ER on the log (wage) and employment rates of adult daughters. However, this is only true for grandmothers with only one adult daughter. The empirical analysis will therefore focus on this subgroup.

Table 1 shows the effects of the grandmother's eligibility for ER on labor market outcomes of adult daughters. The difference-in-differences results compare average outcomes of treatment and control groups in the five years before the grandmother reaches ER eligibility age to the five years after. The results are presented separately by whether the grandmother has one adult daughter or more. Table 1 shows that eligibility for ER decreases the probability that the grandmother is working by approximately 14 percentage points. For grandmothers with only one adult daughter, the grandmother's eligibility for ER has a positive effect on labor market outcomes: The proxy for employment (yearly earnings above >2G) increases by 1.7 percentage points, while the proxy for full-time employment increases by 1.9 percentage points. Wages increase by 3.6%. The economic significance of the effects is large. However, for grandmothers with more than one adult daughter, I find no effects of the grandmother's eligibility for ER on labor market outcomes of adult daughters. This is possibly because the potential increase in grandparental childcare per adult daughter is less for this group. However, there could also be differences between the preferences for grandparental childcare and maternal labor supply between grandmothers with one or more adult daughters. As there are no effects of the grandmother's eligibility for ER when she has more than one adult daughter, the rest of the presented results are for the subgroup of grandmothers with

only one adult daughter. This is important to note when considering the external validity of the findings.

The validity of the results from the difference-in-differences model is based on the assumption that the treatment and control groups have common time trends in the outcomes. Figure 1 shows the time trends in outcome variables: Panel (a) shows that prior to reaching ER eligibility age, treated and control grandmothers have similar time trends in the likelihood of working. After reaching ER eligibility age, treated grandmothers have a significant decrease in the likelihood of working compared to control grandmothers. Panel (b) shows the time trend in the log (wages) of adult daughters. The time trend is quite similar both before and after the grandmother reaches ER eligibility age. However, the treated adult daughters have lower log (wages) in the pre-treatment period and higher log (wages) in the post-treatment period, compared to control adult daughters. Panel (c) shows the time trends in the proxy measure of adult daughters' employment: Earnings above 2G. Here, the time trends are less similar, and there is an increase in the relative employment rate of treated adult daughters also in the pre-treatment period. Panel (d) shows the proxy measure of adult daughters' full-time employment: Earnings above 4G. Here, the time trends and levels are similar in the pre-treatment period, while the treated adult daughters have a relatively larger increase in the full-time employment rate in the post-treatment period. Overall, Figure 1 shows that, apart from the proxy for adult daughters' employment rate, the parallell trend assumption is close to satisfied.

I further investigate the validity of the difference-in-differences approach by performing a time-to-event analysis. Normally, time-to-event analyses set the time-period just immediately prior to the event as the base year, and compare differences between the treatment and control groups in other time periods to the difference in the treatment and control groups in the base year. However, as explained in Section 3.2, there could be anticipation effects in the setting I study: Adult daughters know whether the grandmother is eligible to retire early, and could respond by increasing their labor supply prior to the grandmother reaching ER eligibility age. Therefore, I use the time period of five years before the grandmother reaches ER eligibility age as the base year, and compare other time periods to this base year. Table 2 shows the results of this time-to-event analysis. The first column shows that the effect of the grandmother's ER eligibility only occurs after she reaches ER eligibility age, and increases over time. At age 62, the first year of ER eligibility age, treated grandmothers are 10 percentage points less likely to work than control grandmothers. At age 66, treated grandmothers are 15.3 percentage points less likely to work than control grandmothers. Investigating the outcomes of the adult daughters, there is

a 4% increase in wages already when grandmothers are aged 61, which I interpret as an anticipation effect. However, the estimated coefficient is only significant at the 10% level. The estimated effect on adult daughters' wages increases in the post-treatment period, from 5.5% when grandmothers are aged 62 to 7.6% when grandmothers are aged 66. In the post-treatment period, the estimated coefficients are statistically significant at the 5% level. The time-to-event analysis shows that there are positive effects on the employment rate of treated adult daughters already in the pre-treatment period: When grandmothers are aged 60 and 61, there is a 1.9 and 2.3 percentage points increase in the employment rate. The difference in employment rates increases in the post-treatment period, to 3.6 percentage points when the grandmothers are aged 66. However, in combination with the dissimilar time trends in the employment rates observed in Figure 1, the time-to-event analysis indicates that the estimated results on employment are likely not interpretable as causal effects of the grandmother's ER eligibility. The time-to-event analysis is more promising for the proxy for adult daughters' full-time employment. In the pre-treatment period, the difference in full-time employment rates is negligible between the treatment and control groups. In the post-treatment period, the point estimates of the coefficient increase to between 1.6 and 2.4. The estimated coefficient is only statistically significant at the 5% level when grandmothers are aged 66. However, bearing in mind that the empirical analysis aims to identify intention-to-treat effects, and that the estimated effects are not scaled by either the grandmother's take-up of ER benefits or the hours of childcare provided, I interpret the results from the time-to-event analysis as favorable to the finding that the grandmother's eligibility for ER has a causal effect on the full-time employment rates of adult daugthers.

### *4.2 Heterogeneity and Mechanisms*

This section reports whether the main findings differ by important characteristics of the adult daughter. As data on grandparental childcare is not available, this section is important in indicating whether grandparental childcare is a driving mechanism behind the main finding that grandmothers' ER eligility increases the full-time employment rate of adult daughters. The section shows that the main findings are driven by adult daughters who are more likely to receive grandparental childcare. The results presented in this section are based on the difference-in-differences model being estimated on the sample of grandmothers with only one adult daughter.

Table 3 shows the results of estimating the difference-in-differences model separately for adult daughters with and without young children. I have defined young children as children between ages 0 and 12 as this is the period they attend pre-school

or primary school. The definition is in line with that used by Compton and Pollak (2014). The main findings are driven by adult daughters with young children, as expected if grandparental childcare is a key mechanism. For adult daughters without young children[27], there are no statistically significant effects, and the point estimates are close to zero. For adult daughters with young children, grandmothers' ER eligibility increases the full-time employment rate of adult daughters by 2.9 percentage points, and wages by 5.2%. The estimated coefficients are significantly larger than those estimated on the pooled sample of adult daughters.

Table 4 shows the effects of grandmothers' eligibility for ER on the labor market outcomes of adult daughters by the proximity of adult daughters to the grandmother. If grandparental childcare is a driver of the main findings, then results should be stronger for adult daughters living close to the grandmother, as grandmothers living near their adult daughters can provide more childcare on a regular basis. Also, the insurance aspect of grandparental childcare is only present if the grandparent lives close enough to be able to step in on a short notice. The register data does not provide distance or commuting time data, so my measure of proximity is whether the adult daughter and the grandmother live in the same municipality.[28] Table 4 shows that the main findings are driven by adult daughters who live close to the grandmother. For this subgroup, grandmothers' ER eligibility increases the full-time employment rate by 2.4 percentage points, and wages by 6.8%. For adult daughters who live in a different municipality than the grandmother, there are no statistically significant effects on labor market outcomes. The point estimates on log (wage) and the employment rate are close to zero, while the point estimate on the full-time employment rate is 1.4.

Table 5 splits the sample by the formal childcare coverage of the adult daughter's municipality of residence.[29] The municipalities are split into four different quartiles based on their coverage rates: The bottom quartile has 83.9% coverage or less, the third quartile has coverage rates between 83.9% and 88.1%, the second quartile has coverage rates between 88.1% and 91.9%, and the top quartile has coverage rates above 91.9%. As the formal childcare sector is large in Norway, there is not a lot of variation in the coverage rates between the different quartiles. However, if grandparental childcare is a driver of the main findings, and a potential substitute for formal childcare, then the effects should be larger for adult daughters living in

[27]This group includes both adult daughters with children above the age of 12 and adult daughters without children.

[28]Results, available upon request, are similar when using whether they live in the same county as a measure of proximity.

[29]Childcare coverage data: Number of kindergarden seats in 2008 divided by number of children in kindergarden age in 2008. Taken from the Statistics Norway online database.

municipalities with lower levels of formal childcare coverage. Table 5 shows that this seems to be the case: The effects on labor market outcomes are only statistically significant at the 5% level for the group of adult daughters living in the municipalities with the lowest coverage rates of formal childcare. For this subgroup, grandmothers' ER eligibility increases the full-time employment rate of adult daughters by 3.3 percentage points, and wages by 5.3%. The point estimates on the labor market outcomes of daughters living in municipalities with higher formal childcare coverage rates are still sizeable, but not statistically significant.[30]

Table 6 shows that the main findings are driven by adult daughters that are married. For this subgroup, grandmothers' ER eligibility increases the full-time employment rate of adult daughters by 2.7 percentage points, and wages by 3.8%. For unmarried daughters, the point estimates are a 1.1 percentage points increase in the likelihood of full-time employment and a 3.2% increase in wages, but these are not statistically significant. That the findings are driven by married adult daughters could be because unmarried daughters have a more inelastic labor supply, even if their need of grandparental childcare is potentially higher than that of married daughters. Another explanation could be that married adult daughters are more likely to have (young) children.

The final set of results presented in this section examines if there is socio-economic heterogeneity in the findings. Table 7 shows the results of estimating the difference-in-differences model separately for adult daughters with and without a college degree at the time the grandmother reached ER eligibility age. The main findings are driven by adult daughters without a college degree: There is 2.0 percentage points increase in the full-time employment rate, and a 4.7% increase in wages. For the sample of adult daughters with a college degree, the point estimates are close to zero and not statistically significant. A potential explanation could be that adult daughters who have invested in education are more likely to work anyway.

### *4.3 Robustness Tests*

I have performed two tests to check whether the main findings are robust to changing some of the sample selection criteria. As mentioned in Section 3.1, I restrict the sample to grandmothers working in firms with at least 10 employees to reduce the measurement error in the treatment variable. Table A4 shows that the main findings are robust to increasing the minimum number of employees in grandmothers's firms to 15. As I explained in Section 3.2, I restrict the sample to grandmothers born

[30]Potentially, this could be due to smaller sample sizes for the higher quartiles of formal childcare coverage rates.

1936-1941 to ease the interpretation of the findings. The cohorts born 1936-1941 were all subject to an ER eligibility age of 62. The cohorts born 1923-1935 were also affected by the ER reform, but with different ER eligibility ages. Unfortunately, there is only data on take-up of ER benefits from 1992 and onwards. Therefore, it is only possible to investigate outcomes for those with grandmothers who reach ER eligibility age from 1992 and onwards. The oldest cohort who can be included is grandmothers born in 1929 who reached the ER eligibility age of 65 in 1992. As a robustness check, I include cohorts born 1929-1935 in the analysis. These cohorts were subject to ER eligibility ages of 65 (born 1929), 64 (born 1930-1934), or 63 (born 1935). Instead of comparing outcomes five years before and after the grandmother reaches the age of 62, I construct a new time variable that is 0 in the year the grandmother reaches ER eligibility age, -1 in the year before the grandmother reaches ER eligibility age, 1 in the year after the grandmother reached ER eligibility age, and so forth. Table A5 shows that the main findings are robust to including more cohorts of grandmothers in the analysis. Because standard retirement age is 67, the post-treatment period is shorter for those exposed to a higher ER eligibility age than 62. This might explain why the point estimates are smaller and that there is some loss of statistical significance when the sample includes cohorts born 1929-1935.

Table A6 shows the effect of the grandmother's eligibility for ER on a range of different earnings thresholds. The effect is positive and statistically significant across the different thresholds, suggesting that the effect on the proxy for full-time employment is not driven by the selected earnings threshold. The increase in the likelihood that adult daughters will pass administratively-set earnings thresholds adds to the evidence that grandmothers' ER eligibility increased hours of work for adult daughter.

## 5 Conclusion

This paper proposes a new quasi-experimental approach in dealing with the endogeneity of grandparental childcare, and investigates the causal effect of grandmothers' eligibility for early retirement on the labor market outcomes of adult daughters. Using a Norwegian early retirement reform that provides exogenous variation in the grandmothers' retirement eligibility age, I find robust evidence that the grandmother's eligibility for retirement increases the labor supply of her adult daughter. The effects are a 1.9 percentage points increase in the likelihood of full-time employment and a 3.6% increase in yearly wages. There is also a 1.7 percentage points increase in the likelihood of employment, but the parallell trends assumption required for the

validity of the difference-in-differences model is less satisfied for this outcome.

Also, the positive effects are only found for grandmothers who have only one adult daughter. For grandmothers with more adult children, the potential increase in grandparental childcare per adult child is less, which could explain why I find no effects of grandmother's eligibility for early retirement on the labor supply of adult daughters with sisters. However, because not all grandmothers make use of the eligibility for ER, the intention-to-treat estimates can only uncover effects if the underlying average treatment effect on the treated is significantly large. It is therefore not surprising that difference-in-differences model estimating intention-to-treat effects only uncovers positive effects for subgroups where the take-up of ER eligibility is higher among grandmothers or the average treatment effect of grandmothers' retirement is larger.[31]

Even absent data on grandparental childcare, I show that this is a likely mechanism: There are no effects on the labor supply of adult daughters that either do not have young children or do not live close to their grandmother. Also, the effects are driven by adult daughters living in municipalities with relatively low formal childcare coverage rates, which is to be expected if grandparental childcare is a substitute for formal childcare. The findings suggest that policies that increase the ability of grandparents to provide childcare can potentially increase maternal full-time employment rates.

[31]Larger average treatment effects of grandmothers' retirement imply that grandmothers' retirement leads to a larger increase in the grandparental supply of childcare.

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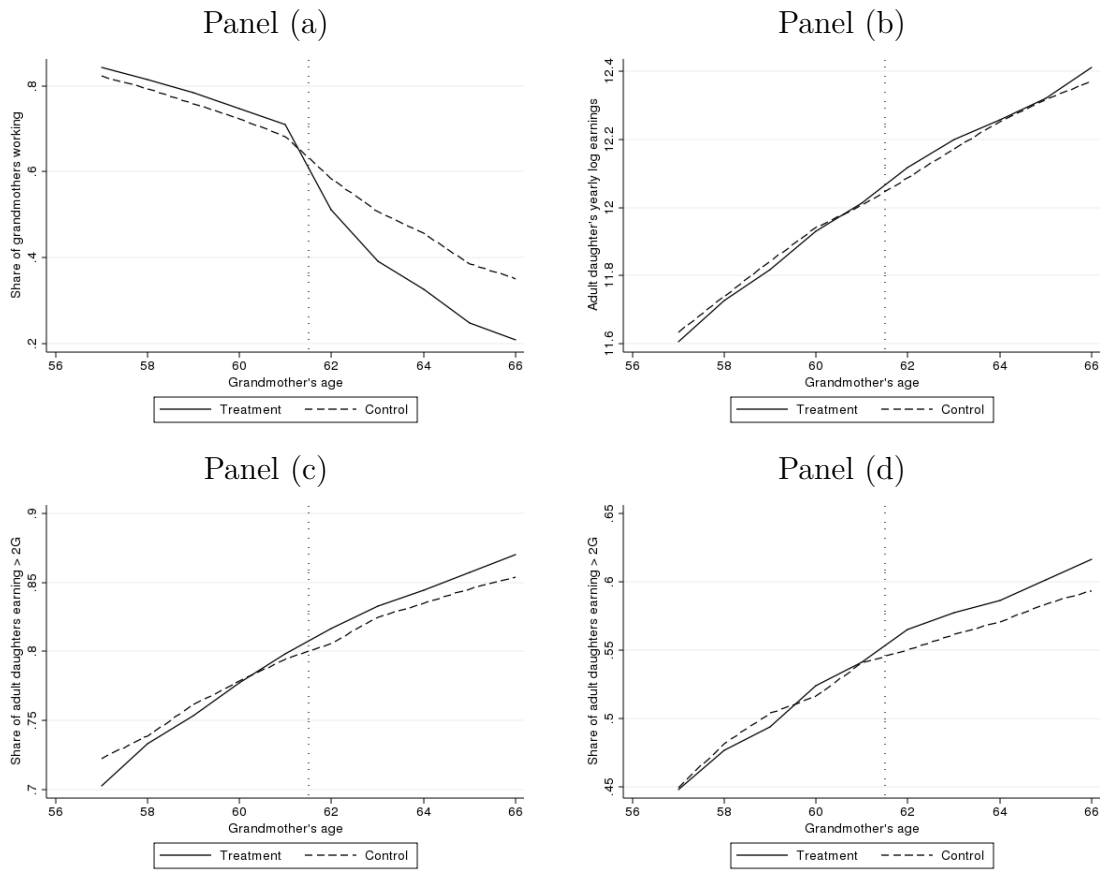


**Figure 1.** Time trends in outcome variables

*Notes:* The figures show the difference between the treatment and control groups when grandmothers are aged between 57 and 66.

**Table 1.** Effects of grandmothers' ER eligibility on adult daughters' labor market outcomes

| | Grandmother | Adult daughter | | |
|---|---|---|---|---|
| | work | log (wage) | Employment | Full time |
| *Grandmothers with only one adult daughter* | | | | |
| ERfirm*ERage | -.142*** | .036*** | .017*** | .019*** |
| | (.008) | (.014) | (.006) | (.007) |
| N | 13,229 | 13,075 | 13,229 | 13,229 |
| *Grandmothers with more than one adult daughter* | | | | |
| ERfirm*ERage | -.144*** | -.002 | -.005 | -.020 |
| | (.005) | (.010) | (.005) | (.005) |
| N | 26,104 | 25,825 | 26,104 | 26,104 |

*Notes:* Employment and full-time employment are proxied by yearly earnings above certain administratively-set earnings thresholds, as explained in Section 3.1. Robust SEs in parentheses. Year and Individual FE. *p<0.10, **p<0.05, ***p<0.01.

**Table 2.** Time-to-event analysis

| | Grandmother | Adult daughter | | |
|---|---|---|---|---|
| | work | log (wage) | Employment | Full time |
| *Grandmother's age* | | | | |
| 58 | .002 | .026 | .014** | -.004 |
| | (.003) | (.017) | (.007) | (.008) |
| 59 | .007 | .012 | .012 | -.008 |
| | (.005) | (.020) | (.009) | (.009) |
| 60 | .005 | .029 | .019* | .008 |
| | (.006) | (.022) | (.09) | (.010) |
| 61 | -.002 | .040* | .023** | .002 |
| | (.007) | (.024) | (.010) | (.011) |
| 62 | .100*** | .055** | .031*** | .016 |
| | (.009) | (.024) | (.010) | (.011) |
| 63 | .139*** | .057** | .028*** | .018 |
| | (.010) | (.024) | (.010) | (.012) |
| 64 | .149*** | .049** | .029*** | .017 |
| | (.010) | (.024) | (.010) | (.012) |
| 65 | .156*** | .051** | .032*** | .019 |
| | (.010) | (.023) | (.010) | (.012) |
| 66 | .153*** | .076*** | .036*** | .024** |
| | (.010) | (.023) | (.010) | (.012) |
| N | 13,229 | 13,079 | 13,229 | 13,229 |

*Notes:*Employment and full-time employment are proxied by yearly earnings above certain administratively-set earnings thresholds, as explained in Section 3.1. Robust SEs in parentheses. Year and Individual FE. *p<0.10, **p<0.05, ***p<0.01.

**Table 3.** Effects by young grandchildren

| | Grandmother | Adult daughter | | |
|---|---|---|---|---|
| | work | log (wage) | Employment | Full time |
| *Grandchildren aged 0-12* | | | | |
| ER-firm*ER-age | .155*** | .052*** | .025*** | .029*** |
| | (.009) | (.017) | (.008) | (.009) |
| N | 9,038 | 8,982 | 9,038 | 9,038 |
| *No grandchildren aged 0-12* | | | | |
| ER-firm*ER-age | .113*** | .005 | .002 | -.002 |
| | (.014) | (.024) | (.011) | (.013) |
| N | 4,191 | 4,093 | 4,191 | 4,191 |

*Notes:* Employment and full-time employment are proxied by yearly earnings above certain administratively-set earnings thresholds, as explained in Section 3.1. Robust SEs in parentheses. Year and Individual FE. *p<0.10, **p<0.05, ***p<0.01.

**Table 4.** Effects by proximity

| | Grandmother | Adult daughter | | |
|---|---|---|---|---|
| | work | log (wage) | Employment | Full time |
| *Live in the same municipality* | | | | |
| ER-firm*ER-age | .138*** | .068*** | .030*** | .024** |
| | (.011) | (.009) | (.009) | (.010) |
| N | 6,947 | 6,841 | 6,947 | 6,947 |
| *Live in different municipalities* | | | | |
| ER-firm*ER-age | .146*** | .001 | .004 | .014 |
| | (.011) | (.020) | (.009) | (.011) |
| N | 6,282 | 6,234 | 6,282 | 6,282 |

*Notes:* Employment and full-time employment are proxied by yearly earnings above certain administratively-set earnings thresholds, as explained in Section 3.1. Robust SEs in parentheses. Year and Individual FE. *p<0.10, **p<0.05, ***p<0.01.

**Table 5.** Effects by formal childcare coverage

| | Grandmother | Adult daughter | | |
|---|---|---|---|---|
| | work | log (wage) | Employment | Full time |
| *Bottom quartile (≤83.9%)* | | | | |
| ER-firm*ER-age | .133*** | .053** | .023** | .033** |
| | (.014) | (.026) | (.011) | (.014) |
| N | 4,066 | 4,016 | 4,066 | 4,066 |
| *3. quartile ((83.9%,88.1%))* | | | | |
| ER-firm*ER-age | .158*** | .026 | .011 | .022 |
| | (.015) | (.025) | (.012) | (.014) |
| N | 3,673 | 3,625 | 3,673 | 3,673 |
| *2. quartile ((88.1%,91.9%])* | | | | |
| ER-firm*ER-age | .159*** | .045 | .024 | .013 |
| | (.017) | (.032) | (.015) | (.016) |
| N | 2,606 | 2,581 | 2,606 | 2,606 |
| *Top quartile (>91.9%)* | | | | |
| ER-firm*ER-age | .113*** | .031 | .119 | .007 |
| | (.018) | (.031) | (.014) | (.017) |
| N | 2,672 | 2,645 | 2,672 | 2,672 |

*Notes:* Employment and full-time employment are proxied by yearly earnings above certain administratively-set earnings thresholds, as explained in Section 3.1. Childcare coverage rates as of 2008. Robust SEs in parentheses. Year and Individual FE. *p<0.10, **p<0.05, ***p<0.01.

**Table 6.** Effects by adult daughter's marital status

| | Grandmother | Adult daughter | | |
|---|---|---|---|---|
| | work | log (wage) | Employment | Full time |
| *Married* | | | | |
| ER-firm*ER-age | .149*** | .038** | .019** | .027** |
| | (.011) | (.019) | (.009) | (.010) |
| N | 6,254 | 6,207 | 6,254 | 6,254 |
| *Unmarried* | | | | |
| ER-firm*ER-age | .135*** | .032 | .015* | .011 |
| | (.011) | (.020) | (.009) | (.011) |
| N | 6,975 | 6,868 | 6,975 | 6,975 |

*Notes:* Employment and full-time employment are proxied by yearly earnings above certain administratively-set earnings thresholds, as explained in Section 3.1. Robust SEs in parentheses. Year and Individual FE. *p<0.10, **p<0.05, ***p<0.01.

**Table 7.** Effects by adult daughter's educational attainment

| | Grandmother | Adult daughter | | |
|---|---|---|---|---|
| | work | log (wage) | Employment | Full time |
| *College* | | | | |
| ER-firm*ER-age | .164*** | -005 | .003 | .008 |
| | (.014) | (.025) | (.011) | (.014) |
| N | 4,120 | 4,104 | 4,120 | 4,120 |
| *No college* | | | | |
| ER-firm*ER-age | .131*** | .047*** | .021*** | .020** |
| | (.009) | (.017) | (.00) | (.009) |
| N | 9,109 | 8,971 | 9,109 | 9,109 |

*Notes:* Employment and full-time employment are proxied by yearly earnings above certain administratively-set earnings thresholds, as explained in Section 3.1. Robust SEs in parentheses. Year and Individual FE. *p<0.10, **p<0.05, ***p<0.01.

# Appendix Tables

**Table A1.** Descriptive statistics of ER vs. non-ER firms

| | ER-firms | | Non-ER firms | |
|---|---|---|---|---|
| | Mean | SD | Mean | SD |
| Employees | 104.77 | 231.20 | 39.87 | 91.06 |
| *Sector* | | | | |
| Primary | .019 | .136 | .013 | .112 |
| Manufacturing | .173 | .378 | .129 | .335 |
| Construction | .030 | .171 | .041 | .199 |
| Trade | .168 | .374 | .435 | .496 |
| Transport | .023 | .149 | .031 | .172 |
| Services | .528 | .499 | .219 | .413 |
| *Employee characteristics* | | | | |
| Average earnings (1,000 NOK) | 143.96 | 39.02 | 140.40 | 57.84 |
| Average years of education | 11.21 | 1.72 | 10.62 | 1.41 |
| Average age | 41.57 | 4.74 | 38.56 | 5.97 |
| Share women | .595 | .268 | .599 | .269 |
| N | 5706 | | 3438 | |

*Notes:* Pre-reform characteristics of the firms in 1988.

**Table A2.** Descriptive statistics for full sample vs. sample of grandmothers with only one adult daughter

| | Full sample | | | Grandmothers w/ only 1 adult daughter | | |
|---|---|---|---|---|---|---|
| | Mean | SD | N | Mean | SD | N |
| *Grandmother* | | | | | | |
| Year of birth | 1938.57 | 1.69 | 39,333 | 1938.64 | 1.68 | 13,229 |
| Employed | .704 | .457 | 39,333 | .709 | .454 | 13,229 |
| Years of education | 10.41 | 2.72 | 39,104 | 10.59 | 2.74 | 13,107 |
| Married | .735 | .441 | 39,333 | .728 | .225 | 13,229 |
| Earnings (1,000 NOK) | 181.20 | 103.66 | 32,220 | 189.13 | 107.43 | 10,826 |
| *Adult daughter* | | | | | | |
| Age | 33.03 | 3.63 | 39,333 | 32.96 | 3.62 | 13,229 |
| Years of education | 12.44 | 3.06 | 39,221 | 12.56 | 3.16 | 13,192 |
| Married | .483 | .500 | 39,333 | .473 | .499 | 13,229 |
| Earnings (1,000 NOK) | 192.07 | 123.60 | 39,219 | 197.67 | 128.05 | 13,191 |
| Have children | .729 | .445 | 39,333 | .703 | .457 | 13,229 |
| # of child. \| have child. | 2.07 | .88 | 28,658 | 2.00 | .83 | 9,303 |
| Live in same muni. as GM | .511 | .500 | 39,333 | .525 | .499 | 13,229 |

*Notes:* Characteristics measured when grandmothers are aged 61, one year before they reach ER eligibility age.

**Table A3.** Descriptive statistics for the treated and control groups

| | Treated | | | Control | | |
|---|---|---|---|---|---|---|
| | Mean | SD | N | Mean | SD | N |
| *Grandmother* | | | | | | |
| Year of birth | 1938.65 | 1.68 | 10,175 | 1938.63 | 1.68 | 3,054 |
| Employed | .711 | .453 | 10,175 | .701 | .458 | 3,054 |
| Years of education | 10.78 | 2.83 | 10,078 | 9.95 | 2.29 | 3,029 |
| Married | .730 | .444 | 10,175 | .723 | .447 | 3,054 |
| Earnings (1,000 NOK) | 193.98 | 107.26 | 8,442 | 171.93 | 106.30 | 2,384 |
| *Adult daughter* | | | | | | |
| Age | 32.92 | 3.63 | 10,175 | 33.08 | 3.60 | 3,054 |
| Years of education | 12.65 | 3.20 | 10,146 | 12.29 | 3.00 | 3,046 |
| Married | .470 | .499 | 10,175 | .483 | .500 | 3,054 |
| Earnings (1,000 NOK) | 198.06 | 127.88 | 10,146 | 196.38 | 128.60 | 3,046 |
| Have children | .698 | .459 | 10,175 | .720 | .449 | 3,054 |
| # of child. \| have child. | 2.01 | .84 | 7,105 | 1.98 | .82 | 2,198 |
| Live in same muni. as GM | .526 | .499 | 10,175 | .523 | .500 | 3,054 |

*Notes:* Characteristics measured when grandmothers are aged 61, one year before they reach ER eligibility age.

**Table A4.** At least 15 employees in grandmother's 1988 firm

| | Grandmother | Adult daughter | | |
|---|---|---|---|---|
| | work | log (wage) | Employment | Full time |
| ER-firm*ER-age | .135*** | .030** | .016** | .015* |
| | (.008) | (.015) | (.007) | (.008) |
| N | 12,314 | 12,165 | 12,314 | 12,314 |

*Notes:* Employment and full-time employment are proxied by yearly earnings above certain administratively-set earnings thresholds, as explained in Section 3.1. Robust SEs in parentheses. Year and Individual FE. *p<0.10, **p<0.05, ***p<0.01.

**Table A5.** Including all cohorts of grandmothers in the sample

| | Grandmother | Adult daughter | | |
|---|---|---|---|---|
| | work | log (wage) | Employment | Full time |
| ER-firm*ER-age | .164*** | .019* | .010** | .010* |
| | (.005) | (.010) | (.004) | (.005) |
| N | 25,393 | 25,092 | 25,393 | 25,393 |

*Notes:* Employment and full-time employment are proxied by yearly earnings above certain administratively-set earnings thresholds, as explained in Section 3.1. Robust SEs in parentheses. Year and Individual FE. *p<0.10, **p<0.05, ***p<0.01.

**Table A6.** Alternative earnings thresholds

| | Adult daughter's earnings | | | | | |
|---|---|---|---|---|---|---|
| | $> 1$G | $> 2$G | $> 3$G | $> 4$G | $> 5$G | $> 6$G |
| ER-firm*ER-age | .011** | .017*** | .014* | .019*** | .022*** | .017*** |
| | (.005) | (.006) | (.007) | (.007) | (.007) | (.005) |
| N | 13,229 | | | | | |

*Notes:* Robust SEs in parentheses. Year and Individual FE. *p<0.10, **p<0.05, ***p<0.01.