The Unintended Effect of Medicaid Aging Waivers on Informal Caregiving

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Abstract

Medicaid aging waivers provide funding for in-home formal care to seniors. Their aim is to incentivize older adults who need long-term care to stay at home rather than move into a nursing facility. However, this policy may inadvertently shift care burdens onto informal caregivers, who would not otherwise be required to care for family members were they to enter nursing homes. In this paper, I test whether families respond to Medicaid aging waivers by increasing or reducing informal caregiving. Using data on state-level Medicaid aging waiver expenditures from 1998 to 2014 linked with the restricted access Health and Retirement Study (HRS), I investigate whether program funding is associated with the probability that an HRS respondent provides informal care to her older parents. Changes to state-level policy funding produce a quasi-experiment, which allows me to use two-way fixed effects models to estimate a causal relationship between the program and informal caregiving. My findings reveal that a 10 percent increase in Medicaid aging waiver expenditures increases the overall likelihood that an adult child becomes an informal caregiver to her parents by 0.1 percentage points (0.3 percent). The overall estimate is composed of differential effects on different types of care. While policy expenditures are positively related to the likelihood of providing help with errands, they are negatively related to the likelihood of providing help with personal care (a more intensive form of caregiving). I also find that the Medicaid aging waiver funding is positively associated with the likelihood of being a non-intensive caregiver who spends fewer hours providing care, but unrelated to the likelihood of providing intensive care. Moreover, only female caregivers reduce caregiving for personal care. The results show that non-intensive informal care is a complement for in-home formal care, and provide the first empirical evidence on the effect of the Medicaid aging waivers on the composition of care received by older Americans.

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1 Introduction

The population in the United States is aging (Hagen, 2013; National Center for Health Statistics, 2009). More than 50 percent of adults aged 65 and above are projected to need long-term care (LTC) at some point towards the end of their life cycle (Kemper et al., 2005; Brown & Finkelstein, 2008; Houser et al., 2012; Favreault & Dey, 2015; Johnson, 2017).[1] For older people who require care, market-based formal care options are expensive (Mommaerts, 2018; Hado & Komisar, 2019).[2] Furthermore, many older adults are poor, and few people have private LTC insurance (Cohen, 2014; Johnson, 2016; Costa-Font et al., 2019). As such, older Americans rely on publicly funded programs to pay for any formal care they do receive some. Medicaid is the primary public program that includes LTC coverage. Specifically, the in-home formal care for the older population is covered through the home or community-based services (HCBS) Medicaid aging waiver program.[3] These aging waivers provide states with funding to subsidize professional providers who offer in-home formal care, including help with daily services – like assistance with bathing or eating – and round-the-clock nursing services. There is, however, potential for this Medicaid program to affect informal caregiving by family members.

This paper empirically tests whether in-home formal care publicly subsidized by Medicaid aging waivers is a substitute or complement for informal care provided by adult children to their parents. How will Medicaid aging waivers affect informal caregiving? For an older person who requires LTC, a family decides whether to use institutional care, or whether to keep the older person at home and use a combination of in-home formal and informal care. The prices of intuitional care and in-home formal care are determined by the market; the price of in-home

[1] Long-term care is care provided by paid or unpaid assistants for people with limited function to live independently for a long period of time. The typical services include personal care such as bathing, dressing, eating, and walking around as well as errands care like preparing meals, running grocery and managing medication.

[2] A nursing home with 24 hour supervision costs $100,400 per year, while in-home help from a personal care worker costs $34,000 per year.

[3] Medicaid funds LTC in two different settings, the institutional setting (nursing homes) and the home or community-based setting.The services covered at home or in the community by Medicaid are in general called home or community-based services. The purpose of Medicaid HCBS is to help people who need long-term care stay at home and save Medicaid resources in nursing facilities. Medicaid HCBS serve people with conditions like children with intellectual development disability, adults with physical disability, HIV, and older people. The Medicaid aging waiver targeting at older people who are aged 65 and above, is part of Medicaid HCBS programs, see section 2 and Appendix Table A1 for details. States have different names of providing HCBS for the older population if they have this program. The common name is HCBS for the aged or elderly. For convenience and simplicity, I refer to these programs using a general name, the Medicaid aging waiver. Some states with the Medicaid aging waiver also covers the people with disabilities. This paper only focuses on the older adults who are 65 and above.

informal care is the opportunity cost that an adult child faces if she provides care to her aging parent. Medicaid aging waivers subsidize in-home formal care purchased on the market, leading to two shifts in the relative prices of these care options: a reduction in the price of in-home formal care relative to in-home informal care, and a reduction in the price of staying home relative to entering a nursing facility. Both relative price changes could affect informal caregiving. First, for families that opt to keep the older parent at home, the relative decrease in price of in-home formal care will discourage use of informal care (through the substitution effect); the income effect could increase or decrease use of informal care (depending on whether it is a normal or inferior good for the family). Second, the decrease in price of in-home care relative to institutional care could cause some families to avoid nursing homes and allow older parents stay at home longer, potentially increasing the need for informal care in the home setting. In summary, the overall predicted effect of Medicaid aging waivers on informal caregiving to older parents is ambiguous.

This study makes several contributions to the existing literature. First, this paper explores the causal relationship between Medicaid aging waivers and informal care. Closely related to this paper, Muramatsu & Campbell (2002) use one wave of the Assets and Health Dynamics among the Oldest Old (AHEAD) data with state expenditures of HCBS in 1992 and show that generous HCBS expenditures are associated with more personal formal care use and no less informal personal care assistance. My study uses longitudinal data, taking advantage of changing state-level funding for the Medicaid program, and controls for individual fixed effects. In addition, my study investigates not only the effects of Medicaid HCBS programs on overall care but also the effects by type of care and composition of caregivers. I also show the channels through which the Medicaid program affects informal care which is not studied in Muramatsu & Campbell (2002).

Second, the relationship between in-home formal care and informal care shown in this study has direct relevance to LTC policy discussion. It is documented that the involvement of informal caregivers in LTC reduces unmet needs and improves quality of life for care recipients (Callahan et al., 2009; Samus et al., 2014; Griffin et al., 2017). However, how to integrate informal caregiving into the health care team and coordinate informal caregivers with formal care providers is challenging to policymakers. For example, Medicare Advantage Plans expanded the supplemental benefits by increasing family caregiver support services such as adult day care and

counseling beginning in 2019. The 2020 COVID-19 pandemic makes in-home formal care less feasible and risky so some state Medicaid programs are temporarily allowing informal caregivers to be subsidized for providing care to beneficiaries (Fox-Grage & Spradlin, 2020). The findings in this paper combining these initiatives provide empirical evidence to inform the debate about how policymakers subsidize LTC care to address the growing needs of a rapidly aging population.

Third, relatively little is known about whether LTC policies relieve informal caregivers, or shift additional care burdens onto informal caregivers given the fact that informal caregiving is exceedingly common and costly. Around 66 million people provide some kind of informal care to their family members (Council, 2010). The costs of caregiving on families and the economy are large. In 2014, unpaid caregiving nationwide was estimated to be valued at $522 billion since informal caregivers usually have to adjust their work schedule by working fewer hours or withdrawing from work completely in order to cover their caregiving responsibilities (Chari et al., 2015; Weber-Raley & Smith, 2015). Furthermore, upwards of 75% of informal caregivers are women, and women spend 50% more time giving care than men (Institute on Aging, 2012). Informal caregivers are often older themselves and face high risks associated with providing care to their older parents (Schmitz & Westphal, 2017). In 2014, there were around 40.4 million informal caregivers who are 65 and above. As a result, a vulnerable population bears much of the burden of informal caregiving to older Americans. In the paper, I address this gap by estimating the effect of public policy on informal caregiving by older adult children to their aging parents.

To identify such causal effect of Medicaid aging waivers on informal caregiving, I use variation in state-level policy expenditures between 1998 to 2014, linked with the restricted access Health and Retirement Study (HRS) data. Using this state-year panel data, I utilize a two-way fixed effect strategy with a continuous treatment variable that compares the changes in informal caregiving for respondents in states expanding or shrinking the size of Medicaid aging waivers (treated states) and that of respondents in states with little or unchanged Medicaid aging waiver spending (control states).[4] The identifying variation comes from the timing of changes to state-level funding of Medicaid aging waivers.

The conceptual framework suggests that the effect of Medicaid aging waivers on informal care should vary based on the type of care subsidized by this policy. The Medicaid aging waiver

[4]The method is effectively a difference-in-differences.

covers more home-based personal care services such as bathing, dressing and toileting and less on errands assistance such as household chores, transportation and managing medication. Thus, the substitution effect of this program on personal care should be stronger than that on errands care. For this reason, the empirical model not only estimates the overall effect of Medicaid aging waivers on informal care but also separately for personal care, which demands more complicated tasks or time, and errands care which requires low-level effort or time commitment. In addition, the opportunity cost of caregiving may differ depending on the gender of caregivers. The Medicaid aging waiver might affect female caregivers stronger if they face a lower implicit cost of providing informal care to their parents. The empirical results also investigate the effect of Medicaid aging waivers on informal caregiving by gender.

I find that the expansion of Medicaid aging waiver funding is associated with an increase in informal caregiving. A 10 percent increase in annual Medicaid aging waiver funding (about $20 million) is associated with the overall likelihood of becoming an informal caregiver who provides either personal care or errands care by 0.1 percentage points – about a 0.3 percent effect. However, I also find evidence of a shift in the type of care. The Medicaid aging waiver expansion is associated with a 0.15 percentage points (0.4 percent) increase in the probability of providing errands assistance, but is associated with a 0.06 percentage points (0.6 percent) decrease in the likelihood of providing personal care. This suggests that while the policy does induce adult children to help their parents, the help is primarily in the form of less intensive tasks which may have a lower implicit cost, and which are not directly subsidized by the Medicaid aging waivers. For similar contexts in other nations, Stabile et al. (2006) employ variation in the generosity of home care programs across provinces in Canada and estimate that an increase of similar scale in spending on home care benefits decreases the chance of giving care by 0.3 percentage points. Viitanen (2007) shows that similar expansion on formal care subsidized by public programs for the older population in European context decreases informal caregiving by 0.15 percentage points.

I also find evidence of differential responses to the policy depending on the gender of caregivers. For females, a 10 percent increase in Medicaid aging waiver funding increases the probability that daughters become informal caregivers by 0.09 percentage points (0.2 percent). The likelihood that daughters provide errands care increases by 0.16 percentage points (0.4 percent) when policy funding increases by 10 percent. The Medicaid aging waiver also relieves the

personal care burden on daughters by 0.12 percentage points (1 percent). However, for males, Medicaid aging waivers have no effect on personal care. According to the conceptual framework, Medicaid aging waivers do shift some personal care burden away from female caregivers and allow them to help more on less-intensive errands assistance.

To better understand the estimates, I explore the channels through which the Medicaid aging waiver affects informal care. I find evidence that the decrease in price of in-home formal care relative to institutional care is an important driver of the results. A 10 percent Medicaid aging waiver funding increase significantly reduces the likelihood of parents living in nursing homes by 0.08 percentage points (1 percent). Furthermore, the policy affects the living arrangements of older parents. An increase in Medicaid aging waiver funding increases the probability that parents live with adult children by 0.07 percentage pointss (1 percent). My findings confirm the results of existing studies on the HCBS programs, which demonstrate that these programs have been effective in helping families avoid institutionalization (Amaral, 2010). I also find evidence that the policy effect on overall care is mainly driven by non-intensive caregivers who provide less than 1,000 hours over two years.

My paper connects with several branches of literature. First, the study is related to the literature that estimates the effects of broad publicly financed policies on care choices.[5] The findings from these policies are mixed. Ettner (1994) and Stabile et al. (2006) show that publicly funded home care benefits lead to a substitution of informal care for more formal in-home care. Hoerger et al. (1996) find that generous Medicaid reimbursement of nursing home care is associated with increased use of nursing homes. Grabowski & Gruber (2007) also find that generous Medicaid nursing home reimbursement increases nursing home use and Hoerger et al. (1996) find an increase of the probability entering nursing homes. Grabowski et al. (2010) show that an increase of state Medicaid bed-hold funding – which funds nursing homes to reserve beds of hospitalized Medicaid residents – increases the hospitalization rate in skilled nursing facilities. Cutler & Sheiner (1994) estimate that a spend-down policy – which increases state Medicaid

[5]There are potentially three main public policies related to LTC coverage: Medicaid, Medicare and Paid Family Leave. Medicare only covers older people with acute conditions after discharge from hospitals for at most 100 days. Paid family leave policies are not popular. As of 2018, only four states have such a policy: Washington, New Jersey, California and Rhode Island. In addition, paid family leave policy only covers six weeks of care for children and seriously ill family members. The Medicaid aging waiver program is therefore the primary program that can offer LTC to the growing older population.

income eligibility by expanding the income eligibility threshold – increases nursing home utilization. McKnight (2006) shows that the reduction of Medicare home visit payment in the 1990s decreases the reliance on home visits, but is not offset by increases in other forms of care. Orsini (2010) demonstrates that the constraint of Medicare home visits also induces more older people to live in shared living arrangements. Pezzin et al. (1996) suggest no or little substitution between formal care and informal care using the largest home care demonstration experiment, Long-Term Care Channeling Demonstration. In addition, Goda et al. (2011) explore how social security benefit notch affects nursing home use and find that an increase in the generosity of social security benefits in low-education population increases the probability of using paid home health care. Arora & Wolf (2018) show that a presence of the paid family leave in California reduces nursing home utilization. My results add to this literature suggesting that publicly subsidized in-home formal care is a complement for overall informal care and reduces use of nursing home care.

Second, my paper connects to the literature of informal caregiving. Women in general take up the majority of informal caregiving. Accordingly, many studies about informal care focus on female caregivers. Casado-Marín et al. (2011), Heger (2014) and Crespo & Mira (2014) explore the specific labor market costs of female caregivers in Europe with the argument that women bear the brunt of informal caregiving. Jacobs et al. (2017) show that female caregivers tend to retire earlier. However, Carmichael & Charles (2003) show that gender matters in informal caregiving. The female caregivers bear the costs because they have a lower ability in the labor market and are more likely to be unemployed. The costs of male caregivers are mainly driven by their lower capability to earn. More papers find evidence about heterogeneous effects of female caregivers and male caregivers in labor market performance (Glauber, 2019; Van Houtven et al., 2013; Nizalova, 2012; Johnson & Lo Sasso, 2000) as well as in retirement decisions (Meng, 2012). The results in my study show that females benefit more from the Medicaid aging waiver by relieving some personal care burden and shifting towards less intensive errands care.

Third, my paper is directly related to Medicaid HCBS programs. Amaral (2010) shows that Medicaid HCBS programs encourage more people to stay at home and help to avoid nursing homes. Van Houtven & Domino (2005) use North Carolina Medicaid waiver claims data for disabled and blind adults and find that the Medicaid waiver significantly reduces expenditures in

institutions. Pande et al. (2007) show that the Medicaid aging waiver in South Carolina helps frail older people stay at home longer. Other papers about Medicaid HCBS programs mainly focus on its cost-effectiveness and prediction of future expenditures at state or national level (Miller et al., 1999; LeBlanc et al., 2000; Van Houtven & Domino, 2005; Grabowski, 2006; Ng et al., 2011).

The paper proceeds as follows. Section 2 describes the institutional background of Medicaid HCBS and aging waivers. Section 3 outlines a simple model of public policy on care choices. Section 4 describes the data, how the sample is selected, and presents descriptive statistics. Section 5 shows the empirical model. Section 6 reports the results of Medicaid aging waivers on informal caregiving. Section 7 analyzes the channels through which Medicaid aging waivers affect informal care. Section 8 probes robustness checks on the estimates. Section 9 concludes.

2 Institutional Background

2.1 Medicaid home and community-based services HCBS

Historically, Medicaid only funded LTC in institutional settings such as nursing homes for older people and people with many conditions such as cognitive disabilities, physical disabilities, mental health disabilities, and disabling chronic diseases. With costly nursing home care, Medicaid LTC expenditures increased significantly over the years. To contain the massive growth in LTC expenditures and satisfy the public's preference for having LTC at home or in their communities, starting in the early 1980s, Medicaid implemented the HCBS program. Medicaid HCBS mainly funds three programs that comprise the majority of its enrollment and spending: a mandatory home health state plan, an optional personal care state plan, and optional waivers.[6] The Medicaid HCBS state plans are available to every Medicaid eligible person with limited resources.[7] The Medicaid optional waivers allow states to waive general requirements in the regular Medicaid programs such as Medicaid state plan programs. For example, Medicaid waivers can select a particular population to serve, set limits on participants, and expand coverage

[6] Medicaid HCBS also include other state plan programs such as Community First Choice providing supplementary services for people who prefer to stay at home and Section 1915(i), helping intellectual or developmental disabled people. In 2018, the spending of waivers is about $62.5 billion, accounting of 58% of the total Medicaid spending. State plans expenditures are $20.6 billion, comprising 23% of the total Medicaid funding. The size of Community First Choice is small, about 9% of the total Medicaid expenditures.

[7] In general, the eligibility limit for older applicants is around $2,313 per month in income and $2,000 in assets. See details about the eligibility of each state: https://www.medicaidplanningassistance.org/medicaid-eligibility/.

through generous financial requirements which are not allowed in regular Medicaid programs. Medicaid waivers "waive" these requirements to realize the specific purpose of these programs. The popular waiver which targets older adults who are 65 and above is the Medicaid aging waiver, which is the focus of this paper.[8]

2.2 Medicaid aging waivers

The mission of Medicaid aging waivers is to provide LTC for older adults at home, as well as to improve their quality of life by allowing them to age in place. The specific features of Medicaid aging waivers are the following. First, the Medicaid aging waiver serves only older people who are 65 and above with a certain level of LTC needs. Second, each state can set its own income and asset eligibility criteria for the Medicaid aging waiver. In 2018, most states used 300% Supplemental Security Income (SSI) as the income eligibility cutoff ($27,756/year for an individual), and $2,000 as an asset limit.[9] Third, each state has flexibility to determine the scope of services covered in Medicaid aging waivers.[10] Participants in Medicaid aging waivers are informed of all qualified service providers and have freedom to choose any type of providers available in the program. The majority of Medicaid aging waivers cover home-based services, and equipment or technology modifications for convenience of the elderly staying at home.[11] The enrolled providers in Medicaid aging waivers are paid directly through the Medicaid claims processing system.[12] Thus, eligible older people can purchase in-home formal care with an affordable price. Over the past 20 years, the expenditures of Medicaid aging waivers have dramatically expanded (Figure A1).[13]

Medicaid aging waivers are optional programs funded by the state and federal governments. To gain a Medicaid aging waiver, states first submit an initial application to the federal Centers for Medicare and Medicaid Services (CMS). The application demonstrates the waiver's design

[8] Some other Medicaid waivers include waivers serving the blind or disabled, intellectual or developmental disabled children, children with mental illness, people with HIV/AIDS, people with brain injury. The total expenditures of Medicaid aging waiver are approximately $40 billion in 2017, making up 65% of the total waiver expenditures.

[9] 5% of the states use 100% SSI, 16% use 100% to 300% SSI in between, 79% use 300% SSI as the income limit; 11% do not 0, 4% use $1,600, 77% use $2,000, 8% use $2,500 to 4,000 as the asset limit.

[10] States can also limit the geographic area served in the Medicaid aging waiver. This geographic limitation is optional and most of the states do not limit service geographic coverage.

[11] In 2018, 85% of states provide home-based services, 70% offer nursing or therapy services, 78% cover equipment and technology modifications, 40% include round-the-clock services, 61% furnish with day services and 62% have case management services.

[12] For other payment methods, states need to specify the details and necessities of these payment methods.

[13] The expenditures on nursing homes are very stable over the 20 years.

and details in each section such as waiver eligibility, services covered, service delivery and cost-effectiveness. CMS makes approval decisions primarily based on two criteria: cost-neutrality and the state's capability to serve the older population in the application. Most importantly, states need to justify the cost neutrality requirement that the total expenditures of participants covered at home in the Medicaid aging waiver cannot exceed the spending if these participants were to be served in nursing facilities. The most used strategy is to cap enrollment, the service coverage, units of services, and the total expenditures in the application.[14] Besides, states need to justify that the services covered under the waiver satisfy the needs of participants and the services are provided by qualified providers. Specifically, the qualifications and verifying procedures of the qualifications for service providers are detailed in the application. For example, the state verifies whether the provides meet required licensure and certification standards every year. States are also required to demonstrate that they have designed and implemented a system to monitor the service providers.[15] The state can create regional or state Quality Councils to evaluate the performance of providers and deal with complaints about providers such as abuse, neglect and exploitation.

In general, an approved Medicaid aging waiver lasts five years, so the expenditures in each covered year should be cost-neutral, as justified in the application. Once approved, CMS monitors the operation and execution of Medicaid aging waivers. The central office in Baltimore, Maryland of CMS has primary authority of Medicaid aging waiver administration. In addition, there are ten regional offices that represent CMS to monitor and administer the operation of Medicaid aging waivers for states in the region. Additionally, states are required to submit annual report to disclose the performance of Medicaid aging waivers. Any operational problems detected by CMS and failure to satisfy any of the requirements will cause amendments of Medicaid aging waivers in each year.

For each state, the state Medicaid agency administers and operates the Medicaid aging waiver. Medicaid agencies may directly operate the waiver or assign local contracted entities to perform administration and operation as long as the authority of Medicaid aging waiver is maintained. Some states might experience unexpected delay of implementing the waiver lacking the operational system and unexpected deviation from the approved waiver by redesigning a modified waiver. After the initial approval period, continuation of the current waiver requires states to submit a renewal

[14] For example, how many users utilize adult daycare, the average units per user, etc. There are many people each year on the waiting list because of this requirement.

[15] For example, states have complaint making and processing system.

application which CMS central office and regional offices determine whether states continue to meet these requirements.

Figures 1 to 4 display the variation of timing of Medicaid aging waiver funding change for each state from 1998 to 2014. The states are divided into four tiers based on the funding level of their Medicaid aging waivers.[16] The funding changes of Medicaid aging waivers from survey year to survey year is in ten millions which is the standard scale of policy variables. The mean of funding of Medicaid aging waivers is around $200 million. Per the design of Medicaid aging waivers, there is much variation in the timing of funding change across states as shown in Table 1. Some states amend their policy quite often while some states barely change them.[17] For example, states like Vermont and Rhode Island stop having Medicaid aging waivers and consolidate the covered services into other Medicaid HCBS programs. Their expenditures of Medicaid aging waivers drop to zero separately in 2006 and 2010.[18] Figures A2 to A5 show the detail funding pattern of Medicaid aging waivers and HCBS resources for each state.

In addition to the Medicaid aging waiver, other state plans under Medicaid HCBS programs might also cover home-based care for the older population. The total Medicaid HCBS expenditures are 10 times larger than the funding of Medicaid aging waivers. However, these plans are available to every Medicaid eligible state resident and cannot be specifically limited to the older population.[19] As shown in Table A1, the home health state plan provides more services involved with nurses and professionals and the personal care state plan offers services such as personal care and household activities at homes, work sites, foster care, or assisted living facilities. There are indeed some overlapping services offered in these programs and Medicaid aging waivers. States with generous Medicaid HCBS funding might allocate more resources to Medicaid aging waivers.[20] I explore

[16] States with low expenditures are states having Medicaid aging waiver expenditures below 25 percentile of that in the United States; median, 25 to 50 percentiles; median high, 50 to 75 percentiles and high, above 75 percentiles. Low states: Delaware, Nevada, North Dakota, Rhode Island, South Dakota, Tennessee, Utah, Vermont and Wyoming; median states: Alaska, Hawaii, Idaho, Iowa, Louisiana, Maine, Massachusetts, Montana, Nebraska, New Hampshire, New Mexico and New York; median high: Alabama, Arkansas, California, Colorado, Connecticut, Indiana, Kansas, Kentucky, Maryland, Michigan, Mississippi, Missouri, New Jersey, Oklahoma, South Carolina and West Virginia; high states: Florida, Georgia, Illinois, Minnesota, North Carolina, Ohio, Oregon, Pennsylvania, Texas, Virginia, Washington, and Wisconsin.

[17] Arizona does not have Medicaid aging waiver for the years 1998 to 2014. Rhode Island and Vermont stops providing Medicaid aging waivers in 2010 and 2006, separately.

[18] In the robustness check, I excluded these states with zero in Medicaid aging waiver funding.

[19] In 2018, approximately 3 million enrollees receive Medicaid HCBS, 2.5 million beneficiaries served under Medicaid aging waivers (85%).

[20] Arizona is the only state that does not offer Medicaid aging waiver throughout the sample years. Vermont and Rhode Island stop offering this policy in 2006 and 2010, separately. During the transition period, these two states

whether funding for these other programs also impact informal caregiving of older people in Section 8.

3 Theoretical Framework

I use a simple model which represents a two-person family with an adult child, the potential informal caregiver, and an older parent, the potential informal care receiver to illustrate how family decision-making may respond to public policy.[21] The parent has two options of living arrangement: home and nursing home. The model setting is analogous to the framework outlined in Hoerger et al. (1996) and Pezzin et al. (1996). The family utility is $U = U(X, FC, IC, L, Q, u)$, where X is a numeraire of consumption goods, FC is formal care that can be subsidized by public policy at home or in nursing homes if eligible. IC denotes informal care which can be provided by the adult child at home or is zero if the parent lives in a nursing home. Informal care from an adult child might not only directly improve health condition of the parent per se but also indirectly monitor health changes on a regular basis (Friedman & Tong, 2020) or help with health problems by talking to doctors and accompanying parents (Byrne et al., 2009; Van Houtven & Norton, 2004). L is the leisure time, Q is the health condition of the older parent, and u represents the family's preference for privacy at home and professional services provided at nursing homes.

The family maximizes the utility function subject to a standard budget constraint and the parent has to be placed in a nursing home if $Q < Q_{min}$. Q_{min} is the cutoff of health condition of the parent that the family can choose between living at home or living in nursing facilities. The constraint describes the family's preference over privacy or amenities at home and professional services available in nursing homes conditional on health status of the parent. If health condition of the parent is below this threshold, the family values more services provided by nursing homes and the parent is better off placing in a nursing home than aging at home. For parents who are severely sick and require extensive LTC needs, the nursing home care is necessary and provides higher utility level than in-home setting regardless of the allocation of in-home formal and

still offer the participants services. I also estimate the model excluding these states as robustness check in Section 8.

[21] The adult child and parent may not live together. The term "family" refers to a broader kin network (Edmonds et al., 2005).

informal care. For parents who are healthier, they can choose their living arrangement depending on their preferences. If they prefer to enjoy the privacy and company of family members, they can choose to stay at home. If they value the quality of professional services provided in nursing institutes, they can choose to live in nursing homes. The constraint also describes the finding shown that health status is significantly correlated with living arrangement (Brown et al., 2002; Liang et al., 2005). Q_{min} is exogenously determined and can be changed by public policy.

Medicaid aging waivers alter the utility optimization problem through two scenarios. First, the Medicaid aging waiver reduces the financial burden of LTC for the parent staying at home by subsidizing professional providers and allows the eligible family to purchase in-home formal care at a cheaper price from the market, P. On the one hand, it decreases the price of formal care relative to the informal care for parents staying at home. The relative price change makes in-home formal care more affordable so the family substitutes more formal care for informal care, $\frac{\partial FC(U^*)}{\partial P} < 0$. This substitution effect reduces the consumption of informal care $\frac{\partial IC(U^*)}{\partial P} > 0$. On the other hand, due to the lower price of formal care, the real income of the family increases. The family is better off by consuming more formal care with a lower price. The income increase results in an increase or decrease in the consumption of informal care depending on whether informal care is a normal good ($\frac{\partial IC}{\partial I} > 0$) or inferior good ($\frac{\partial IC}{\partial I} < 0$). Overall, the effect of Medicaid aging waiver on informal care is determined by the sign of $\frac{\partial^2 U}{\partial FC \partial IC}$. If substitution effect dominates income effect, $\frac{\partial^2 U}{\partial FC \partial IC} < 0$, in-home formal care covered by Medicaid aging waivers substitutes for informal care. If income effect dominates substitution effect, $\frac{\partial^2 U}{\partial FC \partial IC} > 0$, in-home formal care subsidized by Medicaid aging waivers complements for informal care.

Second, Medicaid aging waivers decrease the health condition threshold of older people, $\frac{\partial Q_{min}}{\partial P} < 0$. The Medicaid aging waiver can offer part of professional services that would only be available otherwise in nursing homes to eligible parents at home. The cheaper services allow relatively healthier parents with strong preference for home setting to age in place and access in-home formal care. The exogenous reduction in the cutoff of health condition changes the constraint over living arrangement faced by the family. Informal care is zero for the family with parents living in nursing homes without the intervention of public policy. The Medicaid aging waiver increases the chance of parents staying at home thus potentially increases the consumption of informal care.

This framework suggests that the effect of Medicaid aging waivers on informal care should vary based on the type of care subsidized by this policy and the implicit costs by caregiver characteristics. First, the Medicaid aging waiver covers more extensive services such as round-the-clock services which provide in-home residential habilitation and home-based services like personal care. Thus, the typical family should respond stronger to the care services provided most by the Medicaid aging waiver. For this reason, the empirical model not only estimates the overall effect of Medicaid aging waiver on informal care but also separately for personal care which demands more complicated tasks or time and errands care which requires low-level effort or time commitment. Second, the opportunity cost of caregiving may differ depending on the gender of caregivers. The Medicaid aging waiver might affect female caregivers stronger if they face a lower implicit cost of providing informal care to their parents. The empirical results also investigate the effect of Medicaid aging waivers on informal care by gender.

4 Data

4.1 Medicaid HCBS and HRS data

I use Medicaid policy information on aging waiver funding for each state for years 1995 to 2014. The state application and annual report of Medicaid aging waivers are publicly available in the CMS website.[22] These applications and reports detail the services covered, service definitions, and the total expenditures in covered years. These annual reports also serve as the foundation for CMS to evaluate the cost-neutrality of the renewal applications. For some states, they may have more than one waiver serving the older population. The total expenditures of Medicaid aging waivers are calculated across each year, and these are used as the main treatment variable.

The second data source is the Health and Retirement Study (HRS). The HRS provides survey data on a sample that is representative of individuals aged 51 and above. The HRS interviews respondents and their spouses every two years and adds a new sample to represent a new cohort every six years. The sample years in this paper are 1998 to 2014. Appendix Table A2 shows how respondents in different cohorts enter the survey and the number of unique individuals in interview

[22] https://www.medicaid.gov/

types. The survey also collects information on family members of respondents such as parents.[23]

The HRS restricted data includes the state of residence of respondents and their parents from 1998 to 2014. I combine the HRS data with the Medicaid aging waiver funding data by merging the Medicaid HCBS policy data with HRS based on the state of residence of each of a respondent's parent.[24] The resulting data are a state-year panel from 1998 to 2014 with observations every other year for individuals and their parents.

The third data source is the American Community Survey (ACS) of state characteristics from 2004 to 2014. These state characteristics include the total population, the older population (65+), the unemployment rate, poverty rate, gender percentage, education level and the political affiliation of governors. I use these state attributes to test the identification assumption in Section 5.

4.2 Sample selection

To study how Medicaid aging waivers affect caregiving by HRS respondents, I first restrict the sample to respondents with at least one living parent when they enter the survey.[25] Then I exclude the observations with missing care values and with missing state values of parents. Respondents drop out of the sample when their parents die. The resulting sample, which I call *the full sample*, consists of 35,811 observations and 10,613 unique individuals from 1998 to 2014. Appendix Table A3 Panel A demonstrates the number of individuals with at least one living parent when they are first surveyed from 1998 to 2014.

4.3 Dependent variables

The most relevant variables for the current study come from questions on informal care that HRS respondents provided to their older parents. The HRS asks respondents whether they provided any care in the past two years to their parents, and if yes, how many hours respondents gave personal care (dressing, eating and bathing) and errands assistance (errands, household chores and transportation). The total informal care hours are summed over personal care and errands

[23] Since the HRS respondents are older themselves, the parents of these older respondents are more likely to be dead in my study years. Table A2 Panel B reports the number of respondents who do not have living parents across 1998 to 2014.

[24] The policy funding is lagged one year to be merged with the HRS data. For example, the 2000 HRS wave is merged with expenditures of Medicaid aging waivers in 1999.

[25] Since the HRS is representative of people aged 51 and above, many of these people have already lost their parents died before the HRS respondents enter into the survey.

assistance hours. If the total care hours provided by HRS respondents are larger than zero, I define them as informal caregivers, indexed by a care indicator.[26] The same idea applies to personal care and errands care, for both of which I create indicators. An intensive caregiving indicator is constructed using the cutoff of 1,000 hours over the last two years, which is common in the literature (Van Houtven et al., 2013). Unfortunately, in the case that both parents are alive, the reported care hours in the HRS do not distinguish between care hours provided to mothers or fathers separately.

In order to explore the channels through which the Medicaid aging waivers affect informal caregiving, I create a nursing home indicator and living with HRS respondents indicator. These two indicators are constructed from the question that asks respondents with whom their mother and father live. The living with respondent indicator is equal to 1 if respondents live with their mother or father, 0, otherwise. The nursing home dummy is 1 if the mother or father is in a nursing home, 0, otherwise. The other options are living by self, living with other children, living with relatives, living in retirement centers, and living with others. Additionally, I explore the proximity of respondents to their parents. The living within 10 miles with respondent dummy is indexed by 1 if respondent's mother or father lives within 10 miles of the respondent, 0, otherwise.

4.4 Sample statistics

Table 2 shows the summary statistics of detailed care across the full sample. About 36 percent of the respondents are caregivers who provide some care hours to their parents over two years. Approximately 10 percent of these caregivers are providing personal care and 34 percent are offering errands assistance to their older parents. In general, caregivers provide more errands care than personal care. Non-intensive caregivers are more prevalent than intensive caregivers. Female caregivers provide more care than male caregivers and mothers receive more care than fathers. Caregivers are more likely to be intensive caregivers when caring for mothers than fathers regardless of the gender of caregivers.

Table 3 reports the statistics on care hours, demographics of respondents and their parents as well as policy across the full sample. Care hours are summed over personal and errands care

[26] Unlike previous literature, I do not directly employ the question surveyed in the HRS, whether respondents and their partners spent hours giving help to their parents or parents-in-law or not. In this question, I cannot distinguish the hours spent by respondents and their spouses. The hours' question asks the actual care hours provided by respondents themselves and their spouses, separately.

hours provided in the last two years. The mean for summed care hours is around 240 hours, with 150 hours separately for errands care and 90 hours for personal care. The distribution of these care hours is much diverse. Figure 5 shows the care distribution conditional on positive hours and Figure 6 plots the personal care and errands care hours, separately. The care hours are highly skewed.

The average age of HRS respondents is around 57. The typical HRS respondent has about 3 siblings. The average age of parent is around 80. Approximately 7 percent of parents are in nursing homes. Approximately 24% of parents need personal care. The average Medicaid aging waiver funding is about $200 million and the average change of funding since last wave is $2 million.

5 Estimation Strategy

To estimate the effect of Medicaid aging waivers on informal care, I utilize a two-way fixed effects strategy by employing the unique design of this program. The two-way fixed effects strategy is essentially an extended difference-in-differences framework with a continuous treatment variable. Conceptually, in any given year, treatment states are those with relatively large changes in their Medicaid aging waiver funding, while control states are those with relatively small or no change in funding. The identifying assumption is that, conditional on observable covariates, the timing and magnitude of funding changes at the state level are as good as random. Several institutional details support this assumption. First, CMS monitors the operation and execution of Medicaid aging waivers across states. Any operational problems detected by CMS and failure to meet certain requirements by CMS will cause amendments of Medicaid aging waiver funding. Second, states usually cap the number of participants, hours of services and the total expenditures for each year in the Medicaid aging waiver application to justify the cost-neutrality requirement. The caps on expenditures across covered years introduce another source of variation of the funding of Medicaid aging waivers. Third, the Medicaid HCBS resource allocation between different waivers across years creates another source of variation in the timing of Medicaid aging waiver funding change. The common people covered in Medicaid HCBS waivers are children with intellectual development disabilities and older people. In Section 8, I conduct tests to explore the exogeneity assumption.

The estimation model is as follows:

$$Y_{ist} = \alpha_i + \delta_{DD}\ \text{Funding}_{st} + \sum_{s=\text{Alaska}}^{\text{Wyoming}} \eta_s + \sum_{t=1998}^{2014} \text{Year}_t + \sum_{s=\text{Alaska}}^{\text{Wyoming}} \eta_s * t + \beta_x X_{ist} + \epsilon_{ist} \qquad (1)$$

where i indexes the individual adult child, s is the state where individual's parents live and t is year. Y_{ist} is the informal care outcomes provided to parents by individual i in state s where parents reside and year t. α_i is an individual fixed effect. It controls for the unobservable factors that are constant within individuals such as underlying preferences for caregiving, and preference of their parents. Funding_{st} is the Medicaid aging waiver funding in state s and year t, the common continuous treatment variable. η_s is a state fixed effect which equals one when individual's parents are from state s and zero otherwise. Year_t is a set of year dummies. They equal one if records in the data come from year t. $\eta_s * t$ is a state-specific linear time trend which controls for the heterogeneous trends in informal caregiving across states. X is a set of time-variant characteristics of individuals as well as their parents such as age, marital status, and number of living siblings. The standard errors are clustered at state level which is the level of policy variation.

6 Results

6.1 Effect of Medicaid aging waivers on caregiving

Table 4 shows the estimates on the full sample by care type; each of the five columns shows estimates from a different specification of equation 1. All specifications include individual fixed effects. The specification in column 1 includes state and year fixed effects; the second model adds in the state-specific linear time trend; the third model controls for demographics of individuals and of their parents such as age, number of living sibling, and marital status; the fourth model adds the control of the size of state older population and the fifth model includes further state characteristics, including the unemployment rate, education level, poverty level, racial/ethnicity percentage and political affiliation of state governors. I express the state-level Medicaid aging waiver funding in ten million dollars, since this is the average year-to-year funding change within states. Panels A to C display the estimates separately on overall care, errands care and personal care.

Table 4 shows that an increase in Medicaid aging waiver funding results in an overall increase

in the likelihood that a respondent becomes an informal caregiver. A ten million dollar increase in policy funding is associated with a 0.05 percentage points increase of the probability of being an informal caregiver (Panel A). This amounts to an 0.14 percent increase on a baseline caregiving probability of 0.36. The effect on providing help with errands is positive and larger in magnitude than that on the overall care shown in Panel A. The chance of providing errands care increases by 0.07 percentage points as a result of a ten million dollar increase in Medicaid aging waiver funding, about 0.21 percent (Panel B). The effect on being a personal caregiver, however, is significantly negative. An increase of ten million dollars in Medicaid aging waiver funding reduces the probability of being a personal caregiver by 0.03 percentage points, about 0.3 percent (Panel C). These estimates are consistent across different specifications. The estimates of Medicaid aging waivers on caregiving are statistically significant after adding state-specific linear time trends (Column 2). The controls for demographics of respondents, of parents, and the state level characteristics do not change the magnitude and statistical significance of these estimates as shown in Columns 3 to 5.

6.2 Effect of Medicaid aging waivers by gender of caregivers

Since females and males may face different implicit costs of giving care to their parents, I explore whether there are heterogeneous effects of Medicaid aging waivers on informal caregiving by gender of caregivers, I estimate the models on care not only on the female but also on the male caregivers. Table 5 reports the estimates on the full sample. Panel A shows the effect of Medicaid aging waivers on female caregivers. A ten million dollar increase in aging waiver funding increases the probability of becoming an informal caregiver for daughters by 0.05 percentage points (0.13 percent). The effect on errands care is larger: 0.08 percentage points (0.22 percent). Similar to the overall results, the effect on personal care is negative, with a with ten million dollar increase in the aging waiver funding reducing the probability of helping with personal care by 0.06 percentage points (0.5 percent). Panel B estimates the effect of Medicaid aging waivers on male caregivers. The coefficient of the effect of Medicaid aging waivers on overall care for sons is approximately 0.05 percentage points (0.16 percent) which is statistically insignificant because of large standard errors. The likelihood of providing errands care increases by 0.07 percentage points (0.23 percent) with a ten million dollar increase in Medicaid aging waivers funding. The estimated effect on personal care for males is indistinguishable from zero and statistically insignificant. The test on the differences

of effects of Medicaid aging waivers on overall care and errands care by female caregivers and male caregivers is statistically insignificant while the differences on personal care by gender of caregivers is statistically different from zero.

7 Channels of Medicaid Aging Waivers on Informal Caregiving

The estimates show that Medicaid aging waivers affect informal caregiving. To interpret and understand these findings, one needs to explore the channels through which the Medicaid aging waiver affects care behavior. First, I explore the effect of Medicaid aging waivers on choices between in-home care and nursing home care. Specifically, the HRS asks respondents with whom their parents live. From this question, I construct the nursing home indicator if parents are in institutions and living with respondents indicator if respondents live together with their parents. Table 6 shows that Medicaid aging waivers indeed help the older population avoid institutionalization and stay at home longer (Column 1 and 2). The generosity of Medicaid aging waivers decreases the chance that one's mother lives in a nursing facility by 0.04 percentage points (0.57 percent). Table 6 columns 3 to 6 also demonstrate that parents who have access to more generous aging waiver are more likely to live with their son or daughter. A ten million dollar increase of policy funding increases the likelihood that a mother lives with her adult child by 0.04 percentage points (0.67 percent), and that a father lives with his adult child by 0.01 percentage points (1 percent).

Second, I try to find evidence on the heterogeneous effect of Medicaid aging waivers by type of care. The Medicaid aging waiver is positively associated with errands assistance which is non-intensive and negatively with personal care which is relatively intensive. Following the literature that uses HRS data to study caregiving, I define intensive caregiving as providing at least 1,000 care hours over two years. Table 7 gives the results of Medicaid aging waivers on intensive and non-intensive caregivers. Columns 1 to 3 correspond to the intensive care outcomes and columns 4 to 6 refer to the non-intensive care outcomes. The effects are mainly driven by non-intensive caregivers. The effect on errands caregiver is statistically significant. Specifically, the policy generosity increases the likelihood of being an errands caregiver by 0.07 percentage points (0.23 percent). The findings show that the Medicaid aging waiver seem to shift personal care which involves more complicated tasks onto errands care which is less-intensive.

8 Robustness

The key assumption of the identification strategy is that the timing of state changes in the generosity of Medicaid aging waiver funding is exogenous and plausibly random. In the two-way fixed effects design, this means that there is no pre-trend for each state before its policy change. However, per the features of Medicaid waivers, states have flexibility to determine the size of Medicaid aging waivers, and hence the timing of funding change might be endogenous. I test whether the funding level of Medicaid aging waivers is plausibly random by predicting funding using observable state-level characteristics. Table 8 finds that state older population significantly predicts the funding level of Medicaid aging waivers without state and year fixed effect. State years with larger older populations are more likely to have generous resources available to serve the aging population when they implement this program at the very beginning. After controlling for state and year fixed effect, however, the timing of funding changes of Medicaid aging waivers is effectively random with no observable state characteristic correlated with this policy. As shown in Table 4, the results are robust to the inclusion of the control for the size of the older population.

It might still be possible that the timing of policy change is driven by some unobservable shock which may also affect the informal care outcomes. For example, if states experience unexpected economic hardships like the pandemic in 2020, states could cut Medicaid aging waiver funding and adult children might also find it difficult to provide informal care to their parents. To address this concern, different specifications with state characteristics are estimated on the full sample as shown in Table 4. The results are robust, and the coefficients do not change across specifications.

There are some states that eliminate their Medicaid aging waivers. For example, Vermont stops offering Medicaid aging waivers in 2006 and Rhode Island stops in 2010. The adoption decision of Medicaid aging waivers might be endogenous. To probe this concern, I exclude observations from states that remove Medicaid aging waivers between 1998 and 2014. Appendix Table A4 shows the estimates of the effect of Medicaid aging waivers on informal care after excluding these states. The results are robust and similar to the results shown in Table 4.

Another potential threat to my identification comes from the fact that aging waiver policy changes year-over-year, but HRS observations are only collected every other year. This creates a

potential timing mismatch between the policy variable and HRS survey responses. To address this, I average waiver funding over the past two year and use this average amount as the policy variable.[27] The results shown in Appendix Table A5 are similar to those in Table 4.

Other Medicaid HCBS programs which also offer in-home services may ameliorate the power of Medicaid aging waivers. For example, home health state plans and personal care state plans cover overlapping services such as home health aides, assistance with self-care and household activities that are also provided under Medicaid aging waivers (Appendix Table A1). However, these programs are state-wide Medicaid programs that target every Medicaid eligible resident ranging from intellectually-disabled children to adults with disabilities. Even so, I re-estimate my model after including a control for overall HCBS funding to ensure that the results are not being driven by funding to the larger program. The results of this exercise are reported in Appendix Table A6 on the full sample. All results remain unchanged by the addition of the HCBS funding variable.

Finally, my results may be biased if parents migrate across states in response to aging waiver funding. To alleviate this threat, I re-estimate my model after dropping observations for respondents whose parents move across state-lines during the HRS data collection period (about 800 respondents). Results are shown in Appendix Table A7. In general, the adjustment reduces the magnitude of my estimates slightly. The effect on errands care remains statistically significant and positive, while the effect on personal care (negative) and overall care (positive) become insignificant.

9 Conclusion

The effect of Medicaid aging waivers on informal care is theoretically ambiguous. On the one hand, in-home formal care might be a substitute for informal care because Medicaid aging waivers subsidize formal care at home for eligible older people. The relative lower price of formal care allows older parents to rely more on publicly funded formal care, and decrease informal caregiving by adult children. On the other hand, in-home formal care might be a complement for informal care because the increase of real income generated by Medicaid subsidy could cushion budgets,

[27] The HRS is biannual. For example, the 2004 survey asks the informal care recalled in year 2003 and 2004. The expenditures of Medicaid aging waiver are in 2013. The mean of expenditures are averaged in year 2003 and 2004.

allowing for more time spent giving informal care. Informal caregiving can also increase if Medicaid aging waivers successfully encourage more older parents stay at home longer. This paper provides empirical evidence on how Medicaid aging waivers affect informal care at home setting. The results show that the Medicaid aging waiver increases overall informal caregiving for parents by older Americans. A 10 percent increase in Medicaid aging waiver funding increases the probability of becoming an informal caregiver by 0.1 percentage points, about a 0.3 percent effect. I also find that the increase is predominately on caregivers with errands help. A 10 percent increase Medicaid aging waiver funding increases the probability of being an errands caregiver by around 0.4 percent. By contrast, a 10 percent increase in aging waiver funding decreases the probability of being a personal caregiver by 0.6 percent.

Why do I find different results for errands and personal caregiving? One possibility is the fact that the funding of Medicaid aging waivers usually covers more services similar to personal care. Thus, the waivers act as a subsidy for personal care. Families respond by shifting their caregiving to take advantage of the subsidized services. I also find evidence that the main channel through which Medicaid aging waivers affect informal care is by helping parent avoid institutionalization. This appear to lead to an increase in the number of informal caregivers. However, it is also clear that it leads to a shift in type of care children help parents. It is likely that different types of caregiving have differential implicit costs, and thus caregivers optimize their response to the subsidy to reduce their burden.

Informal care is part of the social network to help older adults age with quality. The importance of family members in caring for their frail and old loved ones is less explored and discussed in the literature. One reason is that such informal care is unpaid and there is no explicit market to value the benefits of care provided by family members. Another reason might be the stereotype of caregiving. Anecdotally, when people think of caregivers, people picture the care given by daughters to their mothers. The role of males in the caregiving world is less studied by the literature. My results add to this discussion. I find that while both sons and daughters increase overall and errands caregiving to their parents in response to the policy, only daughters reduce personal caregiving. This is likely due in part to the fact that male caregivers have very low levels of personal caregiving hours to begin with. Regardless, my results suggest that the Medicaid aging waiver program relives some burdens on female informal caregivers.

How big are these estimates and how can we understand the value of the Medicaid aging waiver in context? The elasticity estimate of Medicaid aging waiver funding on informal caregiving is around 0.03 calculated at the mean, implying that a one percent increase in Medicaid aging waiver funding leads to a 0.03 percent increase in the probability of becoming an informal caregiver. Suppose now we have 10 percent increase in Medicaid aging waiver funding – which equals on average about a $20 million increase. We should therefore expect the likelihood of caregivers to increase by 0.3 percent. In 2014, the total number of informal caregivers was around 50 million. Therefore, the number of informal caregivers might increase by 150,000 with a 10 percent increase in policy funding. I also estimate the care hours for individuals who provide some care. A $20 million increase in Medicaid aging waiver funding increases the care hours for informal caregivers by 30 hours over two years. If we assume the average hourly wage for a typical person is $20, the total value of these additional care hours for 150,000 informal caregivers is $90 million. Additionally, the Medicaid aging waiver successfully helps families avoid costly nursing facilities. The elasticity on nursing home use is - 0.07, such that a 10 percent funding increase in Medicaid aging waiver funding results in 0.7 percent decrease in Medicaid spending in institutional settings. The total nursing facility expenses paid by Medicaid in 2014 was approximately $55 billion. The Medicaid HCBS savings on nursing homes then would be $390 million. Thus, Medicaid aging waivers achieve the program goals of reducing Medicaid expenditures on nursing homes, but the goals are achieved by shifting some burden onto informal caregivers. However, it is still possible that families prefer this arrangement over having their loved one in institutional care.

What are the policy implications of the findings? First, theoretically and empirically, individuals respond differently to Medicaid aging waivers. This public program subsidizes in-home formal personal care more than errands care and shifts more care burden on errands caregivers. If Medicaid aging waiver expansion allows more older adults to stay at home longer, the policy could exacerbate informal care burdens. Government can use different tools to balance off formal care and informal care. Second, Medicaid aging waivers affect female caregivers more than male caregivers. Public policy with intention to equalize the care burden by gender could design the scope of services to participants heterogeneously by gender of informal caregivers.

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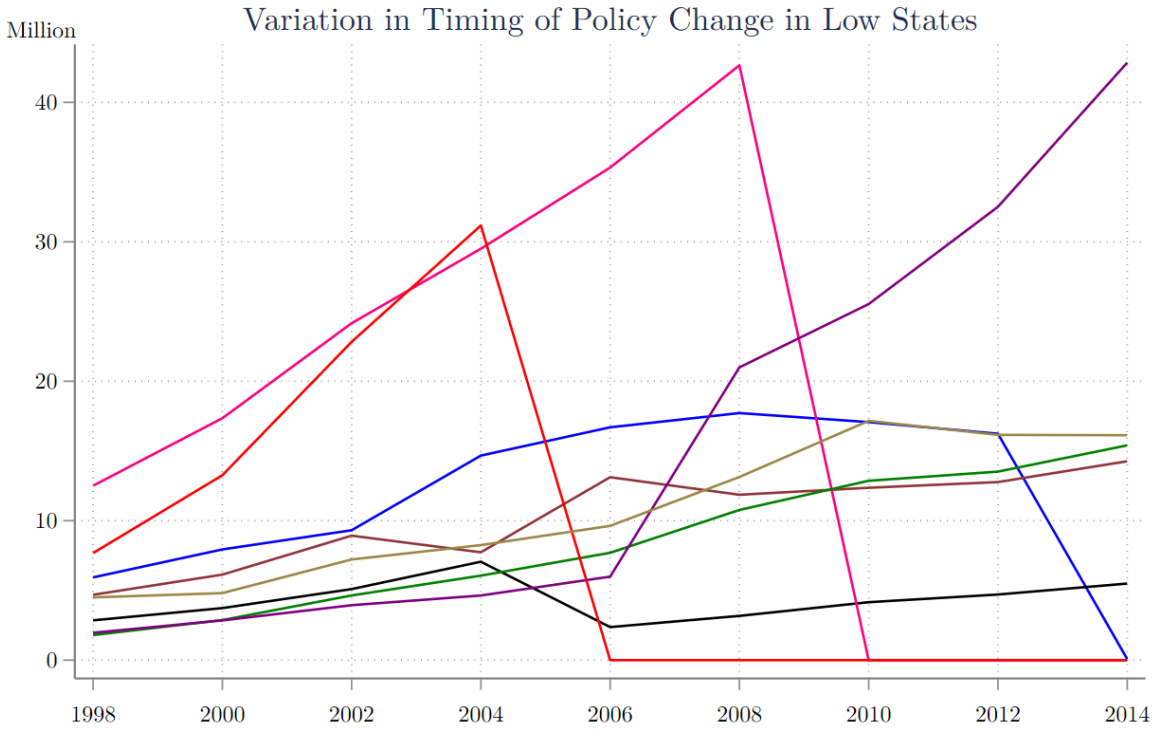
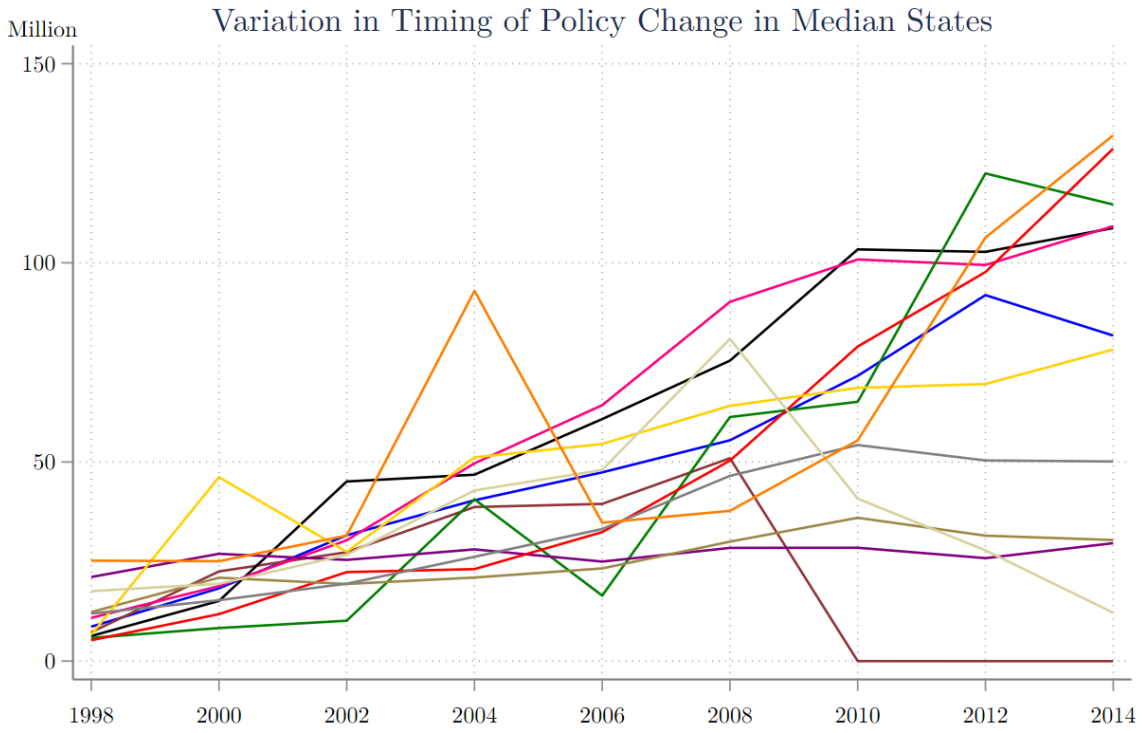
Figure 1: Variation in Timing of Medicaid Aging Waiver Funding Change in Low Tier States



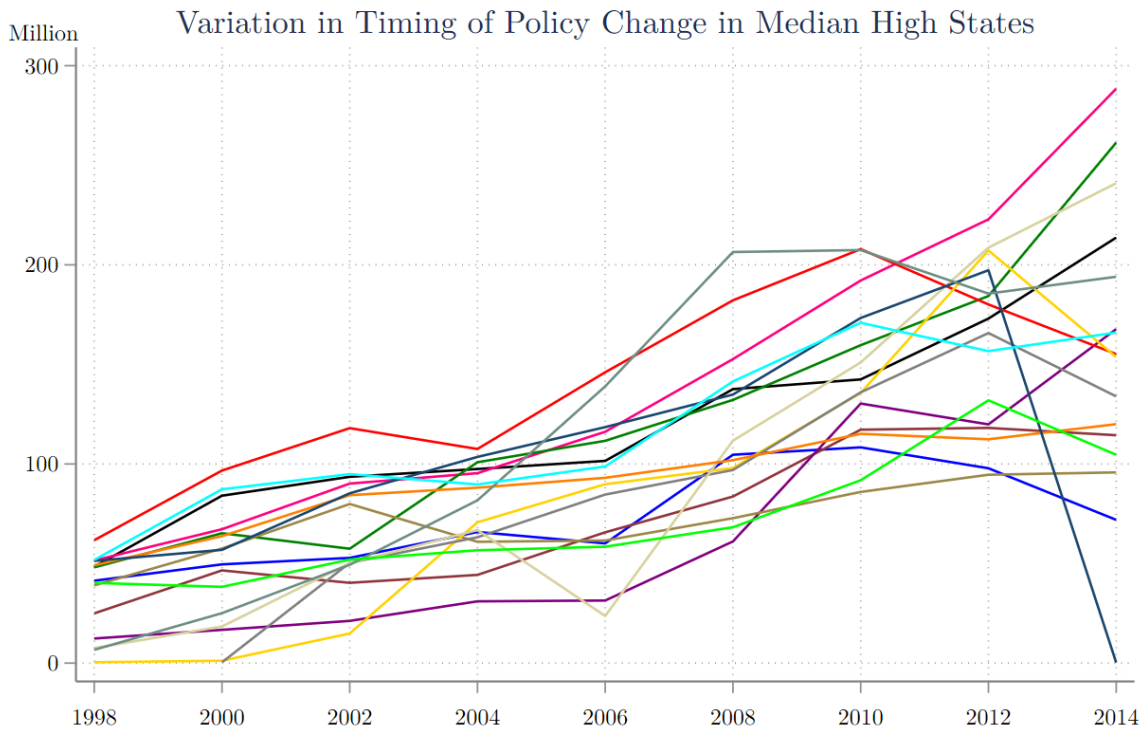
Notes: The plot draws the expenditures of Medicaid aging waivers across years and across states. Each line corresponds to one state. The low tier state indicates the state of which mean expenditures of Medicaid aging waivers is below 25 percentiles of that in the United States: Delaware, Nevada, North Dakota, Rhode Island, South Dakota, Tennessee, Utah, Vermont and Wyoming.

Figure 2: Variation in Timing of Medicaid Aging Waiver Funding Change in Median Tier States



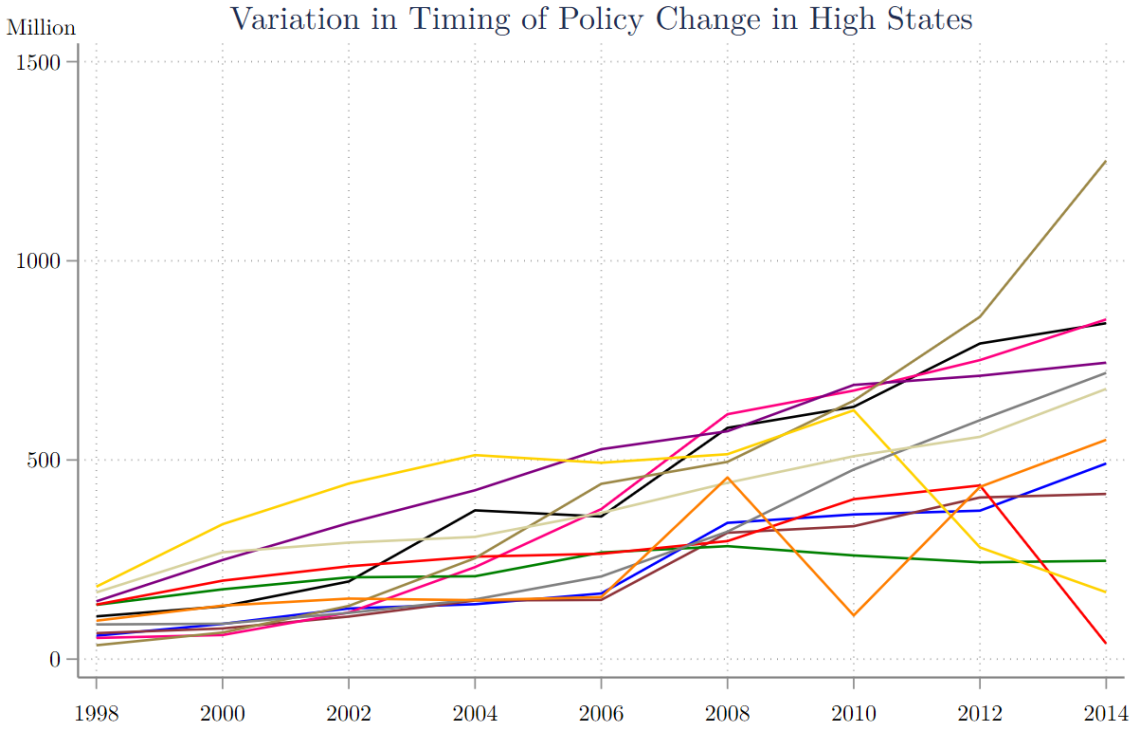
Notes: The plot draws the expenditures of Medicaid aging waivers across years and across states. Each line corresponds to one state. The median tier state indicates the state of which mean expenditures of Medicaid aging waivers is 25 to 50 percentiles of that in the United States: Alaska, Hawaii, Idaho, Iowa, Louisiana, Maine, Massachusetts, Montana, Nebraska, New Hampshire, New Mexico and New York.

Figure 3: Variation in Timing of Medicaid Aging Waiver Funding Change in Median High States



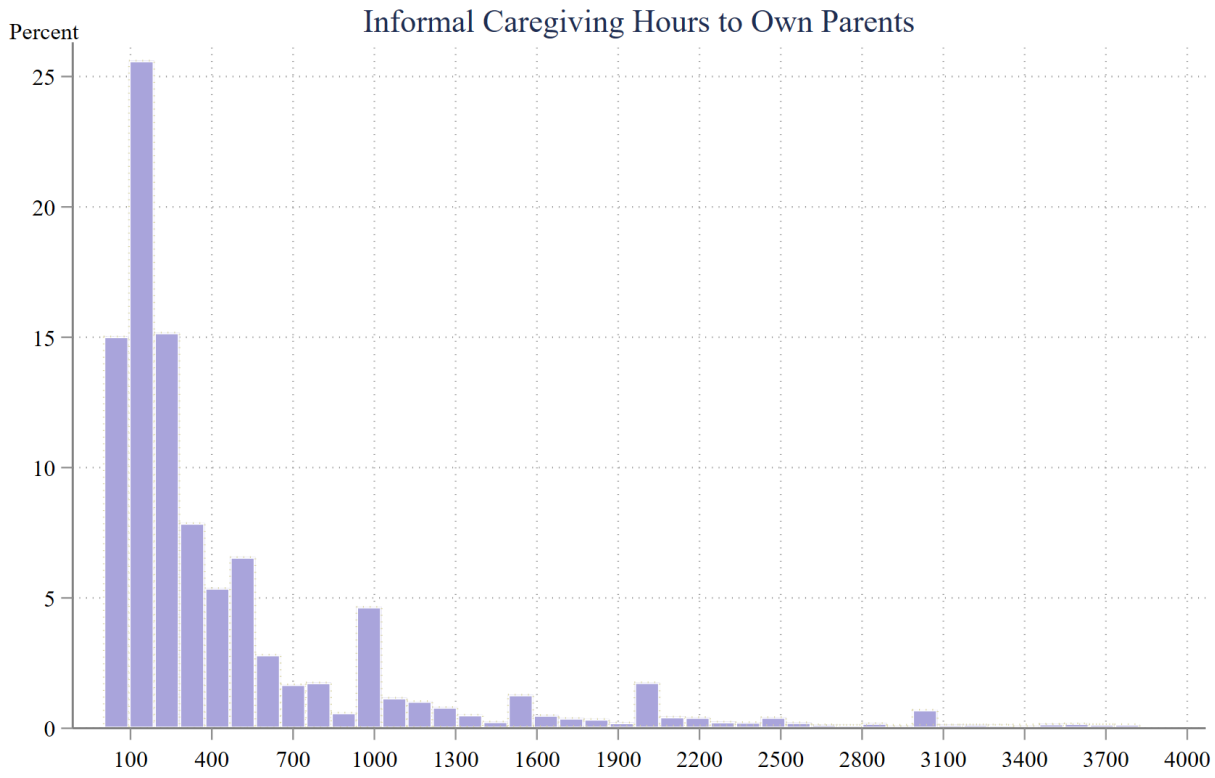
Notes: The plot draws the expenditures of Medicaid aging waivers across years and across states. Each line corresponds to one state. The median high tier state indicates that of which mean expenditures of Medicaid aging waivers is 50 to 75 percentiles of that in the United States: Alabama, Arkansas, California, Colorado, Connecticut, Indiana, Kansas, Kentucky, Maryland, Michigan, Mississippi, Missouri, New Jersey, Oklahoma, South Carolina and West Virginia.

Figure 4: Variation in Timing of Medicaid Aging Waiver Funding Change in High Tier States



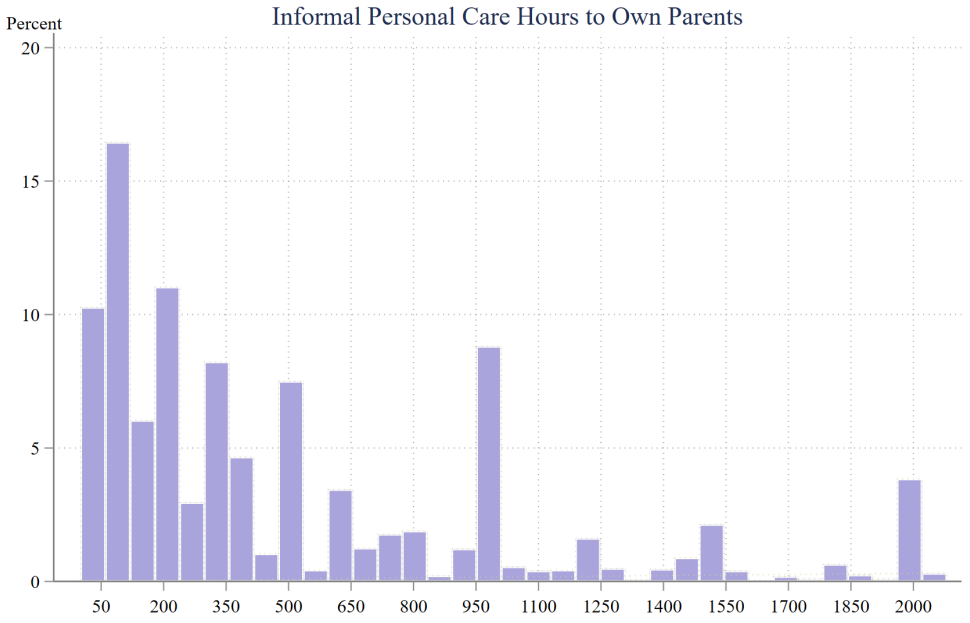
Notes: The plot draws the expenditures of Medicaid aging waivers across years and across states. Each line corresponds to one state. The high tier states indicates the state of which mean expenditures of Medicaid aging waivers is above 75 percentiles of that in the United States: Florida, Georgia, Illinois, Minnesota, North Carolina, Ohio, Oregon, Pennsylvania, Texas, Virginia, Washington, and Wisconsin.

Figure 5: Distribution of Informal Care Hours

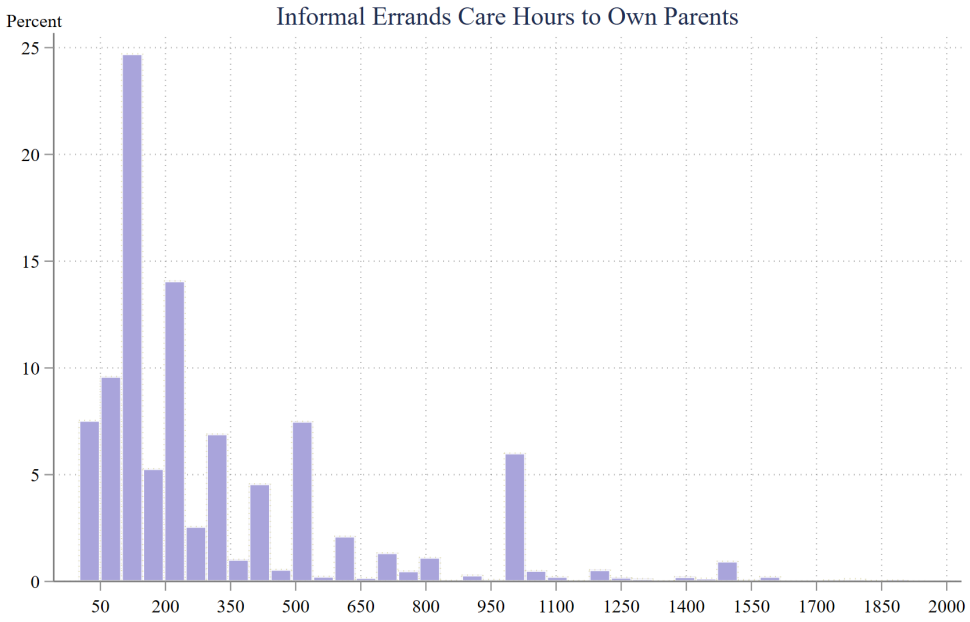


Notes: This graphs draws the distribution of caregiving hours to parents by HRS respondents in the past two years conditional on some hours. The care hours include personal care hours and errands assistance hours. Personal care hours are the number of hours in the past two years that the HRS respondent helped his or her own father, mother or both with personal needs on dressing, eating, bathing, and toileting. Errands assistance hours are the number of hours in the past two years that the HRS respondent helped his or her own father, mother or both with errands, household chores, and transportation. Data is HRS 1998-2014. The vertical axis shows the percent of positive care hours.

Figure 6: Distribution of Care Hours by Type



(a) Personal Care



(b) Errands Assistance

Notes: The graphs are drawn using HRS 1998-2014 conditional on providing any care. The x-axis in Panel (a) indicates the total hours of help on personal care to parents provided by HRS respondents in the past two years. Personal care includes dressing, eating, bathing, and toileting. The x-axis in Panel (b) indicates the total hours of help on household chores, errands and transportation to parents by HRS respondents in the past two years. The y-axis is the percent of hours on care.

Table 1: Variation in Timing of Medicaid Aging Waiver Funding Change

State	1998	2000	2002	2004	2006	2008	2010	2012	2014
AK		X	X				X		X
AL	X	X				X			X
AR		X			X	X	X		
AZ									
CA		X	X					X	
CO				X					X
CT			X	X					X
DE				X					X
FL			X			X			X
GA				X		X		X	
HI		X		X			X		
IA						X			
ID		X	X						
IL			X	X		X		X	
IN						X	X		
KS				X				X	X
KY				X					
LA	X			X	X	X		X	
MA			X						X
MD	X			X				X	X
ME									
MI			X				X		X
MN					X		X		
MO									
MS			X			X			
MT								X	
NC					X		X		
ND					X				
NE			X						
NH						X			
NJ							X		X
NM				X			X	X	X
NV					X				
NY				X	X			X	
OH		X							
OK				X				X	
OR							X		X
PA				X				X	X
RI							X		
SC						X		X	
SD									
TN							X		X
TX					X			X	
UT					X	X			
VA						X			
VT					X				
WA									
WI						X	X	X	
WV							X		
WY			X						

Notes: The table shows years when states change the funding of Medicaid aging waivers. The data is expenditures of Medicaid aging waivers from 1998 to 2014. X indexes for the year when states change the generosity of Medicaid aging waivers.

Table 2: Summary Statistics of Caregiving

	(1)	(2)	(3)
%	Caregivers (0+)	Non-intensive caregivers (0, 1000)	Intensive caregivers (1000+)
Panel A		All caregivers	
Total care	36.31	29.21	7.10
Personal care	10.17	7.21	2.96
Errands care	34.12	29.52	4.60
Panel B		Female caregivers	
Total care	38.92	30.26	8.66
Personal care	12.21	8.41	3.80
Errands care	36.31	30.75	5.56
Panel C		Male caregivers	
Total care	31.87	27.42	4.45
Personal care	6.67	5.16	1.51
Errands care	30.36	27.41	2.95

Notes: The data used is from HRS 1998 to 2014 full sample including individuals with at least one living parent. The caregiving indicator is constructed based on the care hours cutoff in parenthesis. Column 1 describes the statistics of caregivers who provide some care hours over two years. Column 2 indicates the statistics of caregivers who give care hours between 0 and 1,000 hours over two years. Column 3 is the statistics of intensive caregivers who provide at least 1,000 hours over two years. Panel A shows all caregivers. Panel B and Panel C represents female caregivers and male caregivers, respectively. Personal care includes help with basic personal needs such as dressing, eating and bathing. Errands care include household chores, running errand, managing medicine and transportation help.

Table 3: Summary Statistics

	Full	
	Mean	S.D.
Caregiving (since last wave)		
Care hours	240.43	841.61
Personal care hours	90.25	529.72
Errands care hours	150.52	508.84
Demographics of respondents		
Female	0.63	0.48
Age	57.27	6.94
Number of living siblings	3.16	2.37
Number of siblings living within 10 miles from parents	0.54	0.91
Demographics of parent		
Marital status	0.43	0.84
Education	10.77	3.40
Age current/at death	79.70	10.16
In nursing home	0.07	0.26
Need personal care	0.24	0.43
Memory-related disease	0.12	0.33
Be left alone for 1h+	0.88	0.32
Live within 10 miles of respondent	0.43	0.49
Frequency contact with respondent every month	16.39	54.98
Policy (ten millions)		
Aging waiver expenditures	19.73	19.95
Aging waiver funding change from last wave	2.19	7.35
HCBS expenditures	205.21	274.52
Unique individuals	10,613	
Observations	35,811	

Notes: The data used is from HRS 1998 to 2014 full sample including individuals with at least one living parent. Personal care includes basic personal needs such as dressing, eating and bathing. Errands care include household chores, running errand, managing medicine and transportation help. The care hours are care provided from the last two years. The expenditures of policy is in ten millions, the scale of wave to wave policy change. The change of Medicaid aging waiver funding is the difference between the funding of current wave (2006) and that of last wave (2004). The way to construct the difference is to be consistent with the HRS design.

Table 4: Results of Medicaid Aging Waivers on Care for Full Sample

	Full Sample				
	(1)	(2)	(3)	(4)	(5)
	Panel A Dependent variable: care indicator [.36]				
Aging waiver expenditures					
(ten millions)	0.00034	0.00047*	0.00047*	0.00044*	0.00048*
	(0.00029)	(0.00025)	(0.00024)	(0.00023)	(0.00024)
	Panel B Dependent variable: errands care indicator [.34]				
Aging waiver expenditures					
(ten millions)	0.00054*	0.00075***	0.00073***	0.00072***	0.00076***
	(0.00029)	(0.00022)	(0.00021)	(0.00020)	(0.00021)
	Panel C Dependent variable: personal care indicator [.10]				
Aging waiver expenditures					
(ten millions)	-0.00014	-0.00031**	-0.00034**	-0.00034**	-0.00032**
	(0.00018)	(0.00015)	(0.00014)	(0.00014)	(0.00015)
Unique individuals	10,613	10,613	10,519	10,519	10,519
Observations	35,811	35,811	35,526	35,526	35,526
State year trend	N	Y	Y	Y	Y
Demographics	N	N	Y	Y	Y
State older population	N	N	N	Y	Y
State characteristics	N	N	N	N	Y

Notes: This table shows estimates of policy on the full sample by care types. The full sample is that with individuals having at least one living parent. Panel A shows the results on overall care; panel B displays the results on errands care and panel C is the results on personal care. Demographics include characteristics of HRS respondents such as age, marital status, and number of living siblings and demographics of parents such as age, marital status, and health conditions varying across years. State characteristics are unemployment rate, poverty rate, percentage of education level, racial/ethnicity, and the political preference of state governor. All models control for individual and year fixed effect. The mean of dependent variable is in bracket. Robust standard errors are clustered at state level in parentheses *** p<0.01, ** p<0.05, * p<0.10

Table 5: Results of Medicaid Aging Waivers on Care by Gender of Caregiver

	Full Sample		
	(1)	(2)	(3)
	Care indicator	Errands care indicator	Personal care indicator
	Panel A: Female caregivers		
Aging waiver expenditures			
(ten millions)	0.00046*	0.00079***	-0.00061***
	(0.00027)	(0.00017)	(0.00025)
Mean	0.39	0.36	0.12
Unique individuals	6,306	6,306	6,306
Observations	22,470	22,470	22,470
	Panel B: Male caregivers		
Aging waiver expenditures			
(ten millions)	0.00052	0.00074**	0.00009
	(0.00036)	(0.00033)	(0.00036)
Mean	0.32	0.30	0.07
Unique individuals	4,213	4,213	4,213
Observations	13,056	13,056	13,056
State year trend	Y	Y	Y
Demographics	Y	Y	Y
State older population	Y	Y	Y
State characteristics	Y	Y	Y

Notes: This table shows estimates of policy on the full sample by gender of caregivers. The full sample includes individuals with at least one living parent. Panel A shows the results on female caregivers and panel B displays the results on male caregivers. The dependent variable in column 1 is overall care, personal care in column 2 and errands care in column 3. Demographics include characteristics of HRS respondents such as age, marital status, and number of living siblings and demographics of parents such as age, marital status, and health conditions varying across years. State characteristics are unemployment rate, poverty rate, percentage of education level, racial/ethnicity, and the political preference of state governor. All models control for individual, state-specific year trend, year fixed effect, controls of individuals and their parents as well as state characteristics. Robust standard errors are clustered at state level in parentheses *** p<0.01, ** p<0.05, * p<0.10

Table 6: Channels through which Medicaid Aging Waivers Affect Informal Care

	Nursing Home		Living with Respondent	
	(1)	(2)	(3)	(4)
	Mother	Father	Mother	Father
Aging waiver expenditures				
(ten millions)	-0.00037**	0.00009	0.00037*	0.00013*
	(0.00014)	(0.00009)	(0.00018)	(0.00008)
Mean	0.07	0.02	0.06	0.01
State year trend	Y	Y	Y	Y
Demographics	Y	Y	Y	Y
State older population	Y	Y	Y	Y
State characteristics	Y	Y	Y	Y

Notes: This table shows the channel of estimates through which Medicaid aging waivers affect informal care.The first two columns represent the channel of being in nursing homes for mothers and fathers, separately. Columns 3 and 4 refer to the outcome of living with respondents which is 1 if parents living together with respondents and 0, otherwise. Demographics include characteristics of HRS respondents such as age, marital status, and number of living siblings and demographics of parents such as age, marital status, and health conditions varying across years. State characteristics are unemployment rate, poverty rate, percentage of education level, racial/ethnicity, and the political preference of state governor. All models control for individual, year fixed effect, demographics of respondents and their parents, and state characteristics. Robust standard errors are clustered at state level in parentheses *** p<0.01, ** p<0.05, * p<0.10

Table 7: Results of Medicaid Aging Waivers by Care Intensity

	(1)	(2)	(3)	(4)	(5)	(6)
	Intensive Care			Non-intensive Care		
	Care	Personal care	Errands care	Care	Personal care	Errands care
Aging waiver expenditures						
(ten millions)	0.00003	-0.00014	-0.00001	0.00009	-0.00025	0.00073***
	(0.00016)	(0.00012)	(0.000086)	(0.00039)	(0.00018)	(0.00022)
Mean	0.07	0.03	0.05	0.29	0.07	0.30
Unique individuals	10,519	10,519	10519	10,519	10,519	10,519
Observations	35,526	35,526	35,526	35,526	35,526	35,526
State year trend	Y	Y	Y	Y	Y	Y
Demographics	Y	Y	Y	Y	Y	Y
State older population	Y	Y	Y	Y	Y	Y
State characteristics	Y	Y	Y	Y	Y	Y

Notes: This table shows estimates of policy by care intensity on the full sample including individuals with at least one living parent in Panel A. The first three columns show the results on intensive care indicators which equal 1 if care hours are no less than 1,000 and 0, otherwise. The dependent variable in column 1 is care indicator, personal care indicator in column 2 and errands care indicator in column 3 on mom sample. Column 4 to 6 show the estimates on non-intensive care dummies which equal 1 if care hours are less than 1,000 and 0, otherwise. All models control for individual, state-specific year trend, year fixed effect, controls of individuals and their parents as well as state characteristics. Robust standard errors are clustered at state level in parentheses *** $p<0.01$, ** $p<0.05$, * $p<0.10$

Table 8: Funding Level Predicted by State Characteristics

	(1)	(2)
	Funding (ten millions)	Funding
Older population (65+ million)	12.653***	13.456
	(3.947)	(20.579)
Political governor (D/R)	-2.433	2.152
	(2.503)	(3.211)
125% of poverty	75.060	152.029
	(238.661)	(201.525)
Married couple families	6713.038	4558.212
	(12,578.670)	(8,421.728)
Unemployed	215.368*	176.819
	(124.411)	(270.909)
Less than high school diploma	-28.409	89.948
	(53.740)	(90.308)
White	-15.033	-30.116
	(15.836)	(159.556)
Black or African American	68.614*	15.225
	(34.946)	(200.065)
Spanish/Hispanic/Latino descent	-33.968	-419.053
	(41.196)	(306.019)
Males	-235.647	64.067
	(197.208)	(113.760)
State FE	N	Y
Year FE	N	Y
Observations	300	300

Notes: Funding level is in ten millions and older population is in millions. State and year fixed effect are included in column 2. The state characteristics are from the American Community Survey 2004 to 2014 with every two years for 50 states.

Appendix

A Empirical Strategy

A.1 Predicting Funding of Medicaid Aging Waivers

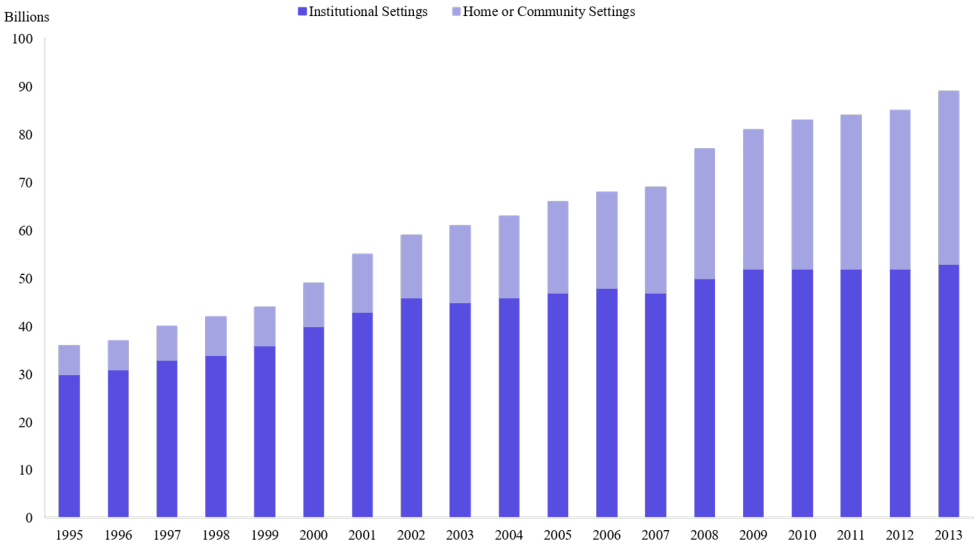
The key identifying assumption in the estimation strategy is that the timing of funding change of aging waivers is effectively random. As introduced in the main paper, CMS monitors the execution of aging waivers. Any operational problems and failure to meet CMS requirements will cause the amendments of aging waivers in effect. The randomness comes from any unexpected amendment requests from CMS on aging waivers. Besides, there are also some other factors that may threat the assumption. States have autonomy and flexibility to design aging waivers and alter aging waivers if they like. Therefore the resources available to aging waivers may be endogenous to the state economy which may also correlate with informal caregiving decisions. To probe the assumption, I use the state characteristics to predict the funding level and funding change of aging waivers. The state characteristics data is from ACS 2004 to 2014. The equation is as follows:

$$\begin{aligned} \text{Funding}_{st} = \alpha + \beta_1 \text{Education}_{st} + \beta_2 \text{Poverty}_s + \beta_3 \text{Married}_{st} + \beta_4 \text{Racial}_{st} \\ + \beta_5 \text{Gender}_{st} + \beta_6 \text{Old population}_{st} + \beta_7 \text{Political}_{st} + \epsilon \end{aligned} \tag{2}$$

where Funding_{st} is the funding level of aging waivers or the funding change of aging waivers in state s and year t. The state characteristics encompass education level, poverty level, married percentage, racial/ethnicity, older population and political environment.

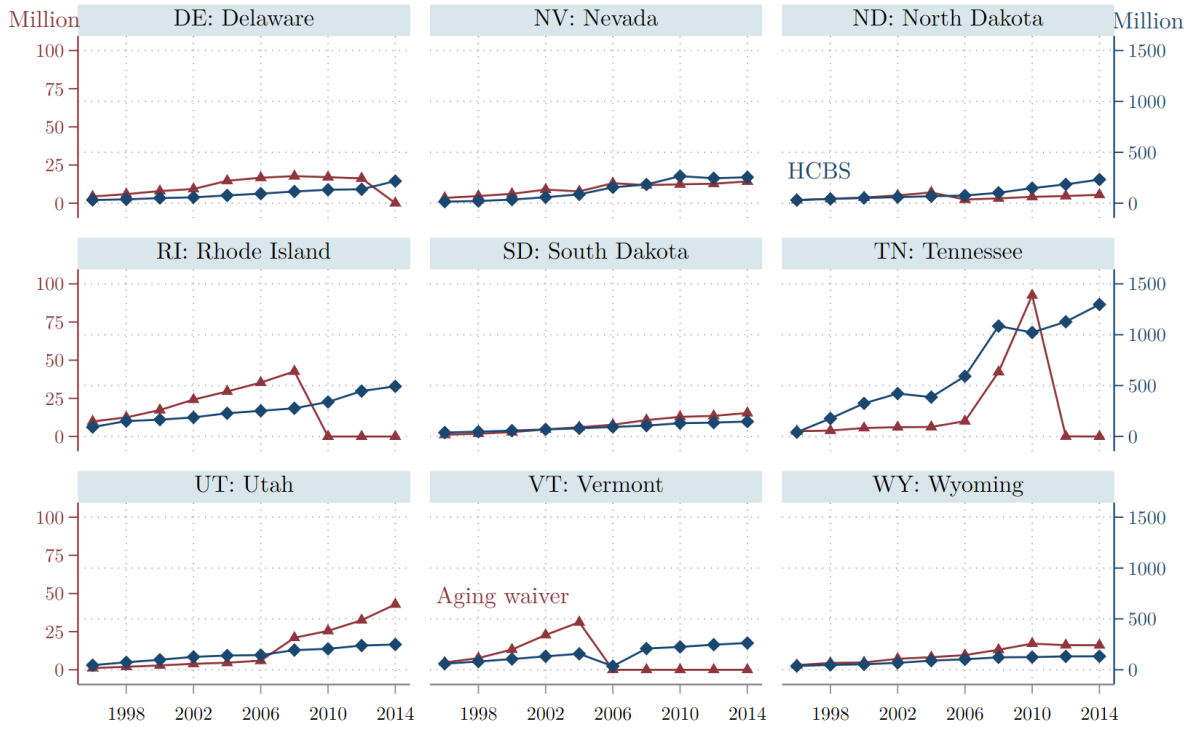
The results of the equation 2 are shown in Table 8. Column 1 and 3 show the estimates without controlling for year and state fixed effects. Older population is positively correlated with funding level while other observable characteristics play limited role in predicting the policy. After controlling for the state fixed effect, no observable state attribute is predicting the expenditures of aging waivers presented in column 2 and 4. As the design of aging waivers, each state has its own authority to determine the size of the aging waiver. States with more older adults might have more generous aging waiver when they first apply for the program. The funding change after the policy is approved is effectively random, however.

Figure A1: Medicaid LTC Spending by Service Settings



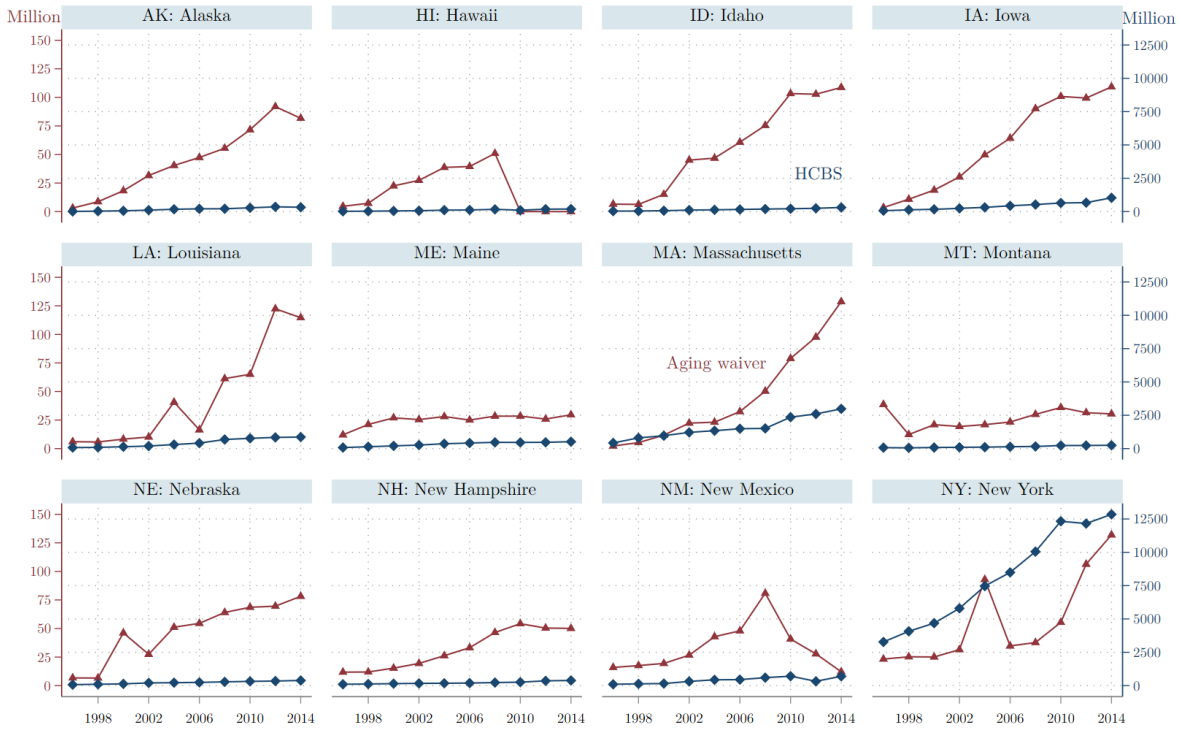
Notes: The graph shows the Medicaid LTC spending by service settings, institutional setting and home or community-based setting across years 1995 to 2013. Spending on institutional setting seems to dominate for years and that on home or community-based setting begins to rise dramatically for recent years. The data source is from annual CMS 64 form.

Figure A2: State Variation in Timing of Medicaid Aging Waiver Funding Change in Low Tier



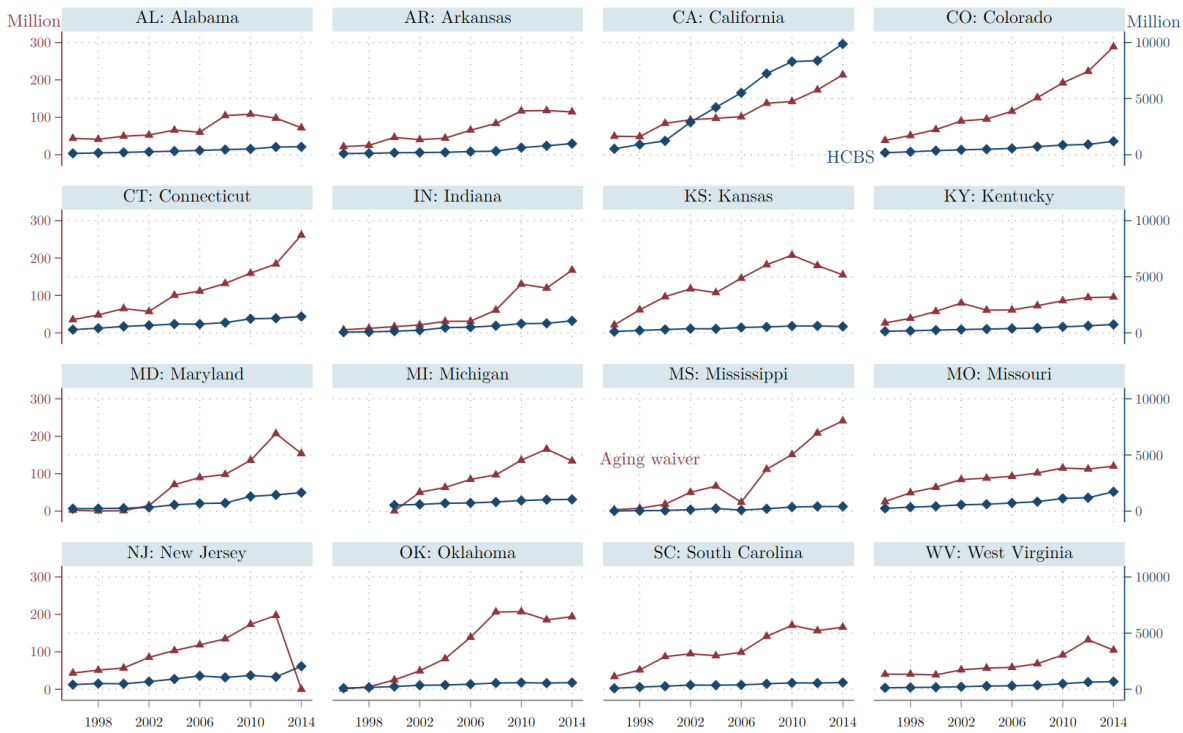
Notes: The plot draws the mean expenditures of Medicaid aging waivers and HCBS across years and across states. Blue line indicates the total HCBS expenditures and red line is the Medicaid aging waiver expenditures. Low tier state indicates the state of which mean expenditures of Medicaid aging waivers is below 25 percentiles of that in the United States: Delaware, Nevada, North Dakota, Rhode Island, South Dakota, Tennessee, Utah, Vermont and Wyoming.

Figure A3: State Variation in Timing of Medicaid Aging Waiver Funding Change in Median Tier



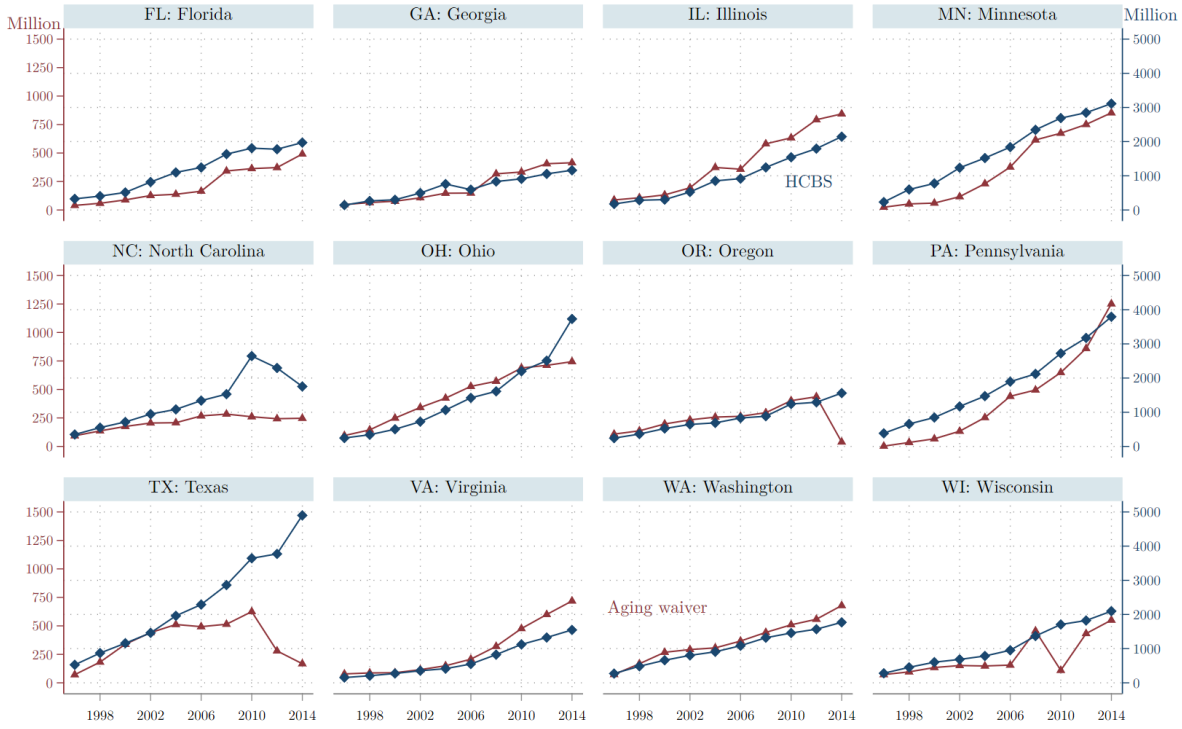
Notes: The plot draws the mean expenditures of Medicaid aging waivers and HCBS across years and across states. Blue line indicates the total HCBS expenditures and red line is the Medicaid aging waiver expenditures. Median tier state indicates the state of which mean expenditures of aging waivers is 25 to 50 percentiles of that in the United States: Alaska, Hawaii, Idaho, Iowa, Louisiana, Maine, Massachusetts, Montana, Nebraska, New Hampshire, New Mexico and New York.

Figure A4: State Variation in Timing of Medicaid Aging Waiver Funding Change in Median High



Notes: Median high tier state indicates that of which mean expenditures of Medicaid aging waivers is 50 to 75 percentiles of that in the United States: Alabama, Arkansas, California, Colorado, Connecticut, Indiana, Kansas, Kentucky, Maryland, Michigan, Mississippi, Missouri, New Jersey, Oklahoma, South Carolina and West Virginia. Blue line indicates the total HCBS expenditures and red line is the Medicaid aging waiver expenditures.

Figure A5: State Variation in Timing of Medicaid Aging Waiver Funding Change in High Tier



Notes: High tier states indicates the state of which mean expenditures of aging waivers is above 75 percentiles of that in the United States: Florida, Georgia, Illinois, Minnesota, North Carolina, Ohio, Oregon, Pennsylvania, Texas, Virginia, Washington, and Wisconsin. Blue line indicates the total HCBS expenditures and red line is the Medicaid aging waiver expenditures.

Table A1: Medicaid HCBS Programs

Home Health State Plan (Eligible for every resident)
Nursing services
Home health aide services
Medical supplies, equipment and appliances
Optional therapy services like physical, occupational and speech pathology
Personal Care State Plan (eligible for every resident)
Assistance with self-care (e.g., bathing, dressing)
Household activities (e.g., preparing meals)
Cueing or monitoring
Injections by nurses
Work sites, foster care or assisted living facilities
Medicaid Aging Waivers
Round-the-clock services (in-home residential habilitation)
Home-based services like personal care, chore/homemaker and respite care
Day services (day habilitation and adult day health services)
Case management service

Notes: The table shows detailed services covered under each Medicaid HCBS authority. Mandatory home health state plan mainly covers home-based aide services and professional services to all Medicaid qualified participants. Personal care state plan provides mostly ADL and IADL help to eligible people. Aging waiver helps with more round-the-clock services that are intensive as well as ADL and IADL assistance. The colored shows some overlapping coverage among HCBS programs. The information is adjusted from the annual Kaiser Family Foundation Waiver Program Survey.

Table A2: HRS 1998-2014

	Panel A: HRS Sample								
Interview year	1998	2000	2002	2004	2006	2008	2010	2012	2014
Cohorts	HRS	HRS	HRS	HRS	HRS	HRS	HRS	HRS	HRS
	AHEAD	AHEAD	AHEAD	AHEAD	AHEAD	AHEAD	AHEAD	AHEAD	AHEAD
	CODA (1924-1930)	CODA	CODA	CODA	CODA	CODA	CODA	CODA	CODA
	WB (1942-1947)	WB	WB	WB	WB	WB	WB	WB	WB
				EBB(1948-1953)	EBB	EBB	EBB	EBB	EBB
Interview type							MBB (1954-1959)	MBB	MBB
Core yes	21,383	19,572	18,165	20,127	18,468	17,217	22,034	20,554	18,747
Core no	2,158	2,462	2,238	2,321	2,195	2,144	2,223	2,240	2,513
Exit	1,416	1,935	2,239	1,824	1,641	1,591	1,833	1,565	1,691
Unique individuals	24,957	23,969	22,642	24,272	22,304	20,952	26,090	24,359	22,951
	Panel B: No Living Parent Sample								
Interview year	1998	2000	2002	2004	2006	2008	2010	2012	2014
Unique individuals	19,267	18,230	16,926	16,394	14,538	13,328	14,719	13,287	12,206

Notes: The HRS surveys respondents every two years. The sample is replenished every six years with the Asset and Health Dynamics Among the Oldest Old (AHEAD) cohort who are born before 1924; the Children of the Depression (CODA) cohort who are born 1924 to 1930; the Health and Retirement Study (HRS) cohort who are born 1931 to 1941; the War Babies (WB) cohort who are born 1942 to 1947; the Early Baby Boomers (EBB) cohort who are born 1948 to 1953; and the Mid-Baby Boomers (MBB) cohort who are born 1954 to 1959. Panel A shows how each HRS cohort is entered and exited from surveys and demonstrates records of unique individuals each year as well as total person-year observations. No living parent sample in panel B is the sample having no living parents in any survey year.

Table A3: Sample with Living Parents

	Panel A: Sample with living parents in at least one survey wave								
Interview year	1998	2000	2002	2004	2006	2008	2010	2012	2014
Unique individuals	5,690	5,655	5,587	7,756	7,579	7,426	11,100	10,765	10,398
Individuals with missing caregiving values	302	594	595	763	950	979	1,137	1,187	1,607
Individuals with deceased parents		21	705	1,373	1,887	2,476	2,948	3,299	3,697
Individuals with living parents and care values	5,388	5,040	4,287	5,620	4,742	3,971	7,015	6,279	5,094
Individuals with state of parent missing	1,686	1,825	960	1,058	1,054	922	1,408	1,484	1,228
	Panel B: Sample without any missing								
Unique individuals	3,702	3,215	3,327	4,562	3,688	3,049	5,607	4,795	3,866
Old individuals from pevious wave		2,818	2,425	2,485	3,496	2,874	2,320	4,510	3,634
New individuals			902	2,077	192	175	3,287	285	232

Notes: This table reports how the sample is selected from HRS 1998-2014. Panel A shows the sample where individuals have at least one living parent in at least one survey year. In this sample, it includes individuals with missing informal caregiving values, individuals whose parents died during the survey years and those that miss the state of residence information of their parents. Panel B demonstrates the individuals across years without any missing key values when they are first observed. Old individuals from previous wave indicates the number of individuals who also answer surveys in the last wave and new individuals are that who have information in the survey year but not previous year.

Table A4: Results of Medicaid Aging Waivers on Care Excluding Switch States

	Full Sample				
	(1)	(2)	(3)	(4)	(5)
	Panel A Dependent variable: care indicator [.34]				
Aging waiver expenditures					
(ten millions)	0.000377	0.00051*	0.00048*	0.00050*	0.00057*
	(0.00033)	(0.00027)	(0.00026)	(0.00026)	(0.00031)
	Panel B Dependent variable: errands care indicator [.32]				
Aging waiver expenditures					
(ten millions)	0.00056*	0.00078***	0.00074***	0.00076***	0.00077**
	(0.00033)	(0.00022)	(0.00021)	(0.00022)	(0.00034)
	Panel C Dependent variable: personal care indicator [.11]				
Aging waiver expenditures					
(ten millions)	-0.00011	-0.00027	-0.00028	-0.00028	-0.00028
	(0.00017)	(0.00026)	(0.00025)	(0.00026)	(0.00037)
Unique individuals	9,832	9,832	9,740	9,740	9,740
Observations	33,019	33,019	32,743	32,743	32,743
State year trend	N	Y	Y	Y	Y
Demographics	N	N	Y	Y	Y
State older population	N	N	N	Y	Y
State characteristics	N	N	N	N	Y

Notes: This table shows estimates of policy on the full sample by care types excluding the states which switch from having Medicaid aging waivers to stopping having one (Arizona, Rhode Island and Vermont). The full sample is that with individuals having at least one living parent. Panel A shows the results on overall care; panel B displays the results on errands care and panel C is the results on personal care. Demographics include characteristics of HRS respondents such as age, marital status, and number of living siblings and demographics of parents such as age, marital status, and health conditions varying across years. State characteristics are unemployment rate, poverty rate, percentage of education level, racial/ethnicity, and the political preference of state governor. All models control for individual and year fixed effect. The mean of dependent variable is in bracket. Robust standard errors are clustered at state level in parentheses *** p<0.01, ** p<0.05, * p<0.10

Table A5: Results of Medicaid Aging Waivers on Care with Mean Expenditures

	Full Sample				
	(1)	(2)	(3)	(4)	(5)
	Panel A Dependent variable: care indicator [.36]				
Aging waiver expenditures					
(ten millions)	0.00033	0.00046*	0.00044*	0.00046*	0.00043*
	(0.00029)	(0.00026)	(0.00024)	(0.00025)	(0.00025)
	Panel B Dependent variable: errands care indicator [.34]				
Aging waiver expenditures					
(ten millions)	0.00053*	0.00074***	0.00071***	0.00074***	0.00071**
	(0.00029)	(0.00023)	(0.00022)	(0.00022)	(0.00023)
	Panel C Dependent variable: personal care indicator [.10]				
Aging waiver expenditures					
(ten millions)	-0.00014	-0.00031**	-0.00033**	-0.00032**	-0.00033**
	(0.00018)	(0.00015)	(0.00014)	(0.00014)	(0.00014)
Unique individuals	10,613	10,613	10,519	10,519	10,519
Observations	35,811	35,811	35,526	35,526	35,526
State year trend	N	Y	Y	Y	Y
Demographics	N	N	Y	Y	Y
State older population	N	N	N	Y	Y
State characteristics	N	N	N	N	Y

Notes: This table shows estimates of policy on the full sample by care types using mean expenditures. The full sample is that with individuals having at least one living parent. Panel A shows the results on overall care; panel B displays the results on errands care and panel C is the results on personal care. Demographics include characteristics of HRS respondents such as age, marital status, and number of living siblings and demographics of parents such as age, marital status, and health conditions varying across years. State characteristics are unemployment rate, poverty rate, percentage of education level, racial/ethnicity, and the political preference of state governor. All models control for individual and year fixed effect. The mean of dependent variable is in bracket. Robust standard errors are clustered at state level in parentheses *** p<0.01, ** p<0.05, * p<0.10

Table A6: Results of Medicaid Aging Waivers on Care Controlling for Medicaid HCBS Programs

	Full Sample				
	(1)	(2)	(3)	(4)	(5)
	Panel A Dependent variable: care indicator [.36]				
Aging waiver expenditures					
(ten millions)	0.00034	0.00049*	0.00046*	0.00049*	0.00046*
	(0.00029)	(0.00025)	(0.00024)	(0.00023)	(0.00023)
Medicaid HCBS programs					
(ten millions)	0.00001	0.00004	0.00005	0.00003	0.00004
	(0.00025)	(0.00008)	(0.00008)	(0.00009)	(0.00009)
	Panel B Dependent variable: personal care indicator [.10]				
Aging waiver expenditures					
(ten millions)	-0.00014	-0.00031**	-0.00032**	-0.00032**	-0.00032**
	(0.00018)	(0.00015)	(0.00014)	(0.00014)	(0.00014)
Medicaid HCBS programs					
(ten millions)	-0.00001	0.00001	0.00001	0.00001	0.00001
	(0.00003)	(0.00007)	(0.00007)	(0.00006)	(0.00007)
	Panel C Dependent variable: errands care indicator [.34]				
Aging waiver expenditures					
(ten millions)	0.00055*	0.00077***	0.00075***	0.00076***	0.00072***
	(0.00029)	(0.00022)	(0.00021)	(0.00020)	(0.00021)
Medicaid HCBS programs					
(ten millions)	0.00003	0.00005	0.00006	0.00005	0.00007
	(0.00002)	(0.00009)	(0.00009)	(0.00009)	(0.00009)
Unique individuals	10,613	10,613	10,519	10,519	10,519
Observations	35,811	35,811	35,526	35,526	35,526
State year trend	N	Y	Y	Y	Y
Demographics	N	N	Y	Y	Y
State older population	N	N	N	Y	Y
State characteristics	N	N	N	N	Y

Notes: This table shows robustness check of estimates of policy on the full sample by care types. The full sample is that with individuals having at least one living parent. Medicaid other programs are home health, personal care state plan and other Medicaid HCBS programs. The expenditures are the total expenditures of these programs in ten millions. Panel A shows the results on care indicator; panel B displays the results on personal care indicator and panel C is the results on errands care indicator. All models control for individual and year fixed effect. The mean of dependent variable is in bracket. Robust standard errors are clustered at state level in parentheses *** p<0.01, ** p<0.05, * p<0.10

Table A7: Results of Medicaid Aging Waivers on Care Excluding Moving Parents

	Full sample excluding moving parents				
	(1)	(2)	(3)	(4)	(5)
	Panel A Dependent variable: care indicator				
Aging waiver expenditures					
(ten millions)	0.00040	0.00041	0.00034	0.00032	0.00037
	(0.00027)	(0.00024)	(0.00023)	(0.00022)	(0.00024)
	Panel B Dependent variable: personal care indicator				
Aging waiver expenditures					
(ten millions)	-0.00028	-0.00015	-0.00017	-0.00017	-0.00020
	(0.00018)	(0.00020)	(0.00019)	(0.00019)	(0.00019)
	Panel C Dependent variable: errands care indicator				
Aging waiver expenditures					
(ten millions)	0.00063**	0.00049**	0.00042*	0.00042**	0.00048*
	(0.00030)	(0.00024)	(0.00021)	(0.00021)	(0.00024)
Unique individuals	9,811	9,811	9,724	9,724	9,724
Observations	31,891	31,891	31,639	31,639	31,639
State year trend	N	Y	Y	Y	Y
Demographics	N	N	Y	Y	Y
State older population	N	N	N	Y	Y
State characteristics	N	N	N	N	Y

Notes: This table shows robustness check of estimates of policy removing parents who migrate across waves from the full sample. Panel A shows the results on care indicator; panel B displays the results on personal care indicator and panel C is the results on errands care indicator. Demographics include characteristics of HRS respondents such as age, marital status, and number of living siblings and demographics of parents such as age, marital status, and health conditions varying across years. State characteristics are unemployment rate, poverty rate, percentage of education level, racial/ethnicity, and the political preference of state governor. All models control for individual and year fixed effect. The mean of dependent variable is in bracket. Robust standard errors are clustered at state level in parentheses *** p<0.01, ** p<0.05, * p<0.10