The Unintended Effects of Medicaid Aging Waivers on Informal Caregiving*

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Abstract

This paper investigates the unintended effect of Medicaid Aging Waivers (MAWs) on the provision of informal care by adult children to their older parents. While MAWs subsidize formal home-based care to encourage seniors with long-term care (LTC) needs to age at home, the overall impact of this policy on informal care is ambiguous and may vary depending on family preferences and financial constraints. The paper presents a theoretical framework to understand the substitutable/complementary relationship between formal in-home care and informal care and empirically estimates how MAW expenditures affects the probability of informal caregiving using the Health and Retirement Study (HRS) respondents in the 1998-2014 period. The findings suggest that a 10 percent increase in MAW expenditures increases the likelihood of adult children becoming informal caregivers by 0.1 percentage points, representing a 0.3 percent relative to the outcome mean. However, the effect of MAWs on informal care is heterogeneous: Families with higher chances of using nursing home care or families with limited help are more likely to see formal home care and informal care as complements and the expansion of MAWs increases their informal care provision; families with constrained financial resources involving a parent who need LTC see these two care options as substitutes and an increase in MAW spending reduces their probability of informal caregiving.

Keywords: Medicaid Aging Waiver, Long-Term Care, HRS, Informal Care

JEL classification: I180, J140, J180

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1 Introduction

As the population of the United States ages, the demand for long-term care (LTC) services will undoubtedly continue to rise.[1] More than 50 percent of adults aged 65 and above are projected to need LTC at some point towards the end of their life cycle (Kemper et al., 2005; Brown and Finkelstein, 2008; Houser et al., 2012; Favreault and Dey, 2015; Johnson, 2017; Mommaerts and Truskinovsky, 2020). For older people who require care, market-based formal care options are expensive (Mommaerts, 2018; Hado and Komisar, 2019).[2] However, many older adults have low-incomes, and relatively few Americans have private LTC insurance (Cohen, 2014; Johnson, 2016; Costa-Font et al., 2019). Hence, many older Americans rely on Medicaid to pay for LTC. Even as the demand for and the costs of institutional LTC services are rising, policymakers face mounting pressure to limit public LTC spending. Medicaid aging waiver (MAW) programs are among the policy options that state governments have used to alleviate public financial burdens while still ensuring that the LTC needs of older people are met. As the main programs offering home- and community-based services (HCBS), these 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, as well as round-the-clock nursing services. By encouraging older people to age in place while relying on lower-cost home-based services, these waivers should help to relieve the financial burdens of state governments, as home-based services tend to be less expensive.

However, little is known about whether MAW programs relieve or exacerbate the care burdens of informal caregivers. In 2014, the value of unpaid caregiving nationwide was estimated at $522 billion (Chari et al., 2015; Weber-Raley and Smith, 2015). Given the importance of informal caregiving, any policy that could change the patterns of informal caregiving merits further examination. In this paper, we estimate the causal effects of the MAW programs on informal caregiving. In particular, we focus on near-elderly caregivers. In 2020, there were around 24 million informal caregivers aged 50 and above, with this group accounting for 57 percent of all

[1] LTC is care provided by paid or unpaid assistants to people with a limited capacity to live independently over a long period of time. The typical services include help with personal care such as bathing, dressing, eating, or toileting; as well as help with errands care like preparing meals, shopping for groceries, or managing medications.

[2] In 2018 dollars, living in a nursing home with 24-hour supervision costs $100,400 per year, while receiving in-home help from a personal care worker costs $34,000 per year.

caregivers of older adults. In this paper, we first develop a theoretical framework, following Mommaerts and Truskinovsky (2020), to illustrate how families have responded to MAW programs, considering both price effects and preference effects. We then use plausibly exogenous variation in state-level MAW expenditures in the 1998-2014 period to estimate the effects of MAW programs on informal care.

Specifically, we first provide a theoretical framework for exploring how MAW programs might affect the use of informal care by considering the optimization problem among families. Our framework yields three main predictions. First, MAW programs encourage the provision of informal care for families who would otherwise rely on institutional care. This is because MAW programs subsidize in-home formal care, leading to a lower price of home-based formal care relative to facility-based formal care. Moreover, MAW programs enable states to offer customized services that cater to seniors' preferences, which may further boost demand for home-based LTC services. As a result, this may increase the care burden on informal caregivers. Additionally, as MAW programs provide greater coverage of home-based personal care services and less coverage of errands assistance, the price effects and preference effects for personal care should be stronger than for errands care.

Second, the effect of MAWs on the use of informal care by older adults who would otherwise rely on family care depends on the value of the substitution elasticity between informal care and formal home-based care. If the substitution elasticity approaches one, meaning that formal home-based care is a close substitute for informal care, then MAW programs may reduce demand for informal care. In contrast, if the substitution elasticity approaches negative, indicating that formal home-based care and informal care are complementary, MAW programs may increase demand for informal care. Therefore, the overall impact of MAW programs on informal caregiving for these families is ambiguous.

Third, our theoretical model suggests that the value of the substitution elasticity may be influenced by factors such as financial constraints and the availability of family support. We argue that families with LTC needs and limited financial resources may significantly benefit from MAWs by mitigating their reliance on informal care, while families with limited help support may increase their demand for informal care in response to the availability of formal care.

We next employ a two-way fixed effects strategy to identify the causal effects of MAW programs on informal caregiving, and empirically demonstrate the presence of heterogeneous

effects for different types of families. By utilizing state-level variations and restricted Health and Retirement Study (HRS) data, we find that overall, an increase in MAW expenditures is associated with an increase in informal caregiving. Specifically, a 10 percent increase in annual MAW expenditures (approximately $32 million) is associated with a 0.1 percentage point increase in the likelihood of becoming an informal caregiver, representing a 0.3 percent effect relative to the sample mean of 0.36. Additionally, our findings suggest a shift in the type of care provided, as the increase in MAW expenditures is associated with a 0.15 percentage point (0.4 percent) increase in the probability of providing errands assistance, but has no impact on the likelihood of providing personal care. These results suggest that while the MAW does induce adult children to help their parents, the help they provided is primarily in the form of less intensive tasks that may have lower implicit costs, and that are not directly subsidized by MAWs.[3] Although MAW programs have overall positive effects, further investigation into the impacts on different types of families reveals heterogeneous results. Specifically, we first examine whether varying degree of reliance on institutional care results in different responses. For families with parents aged over 85 years old who are more likely to use institutional care or families with incomes between the mean and the 80th percentile who could possibly afford institutional care and qualify for MAWs,[4] an increase of $10 million in MAW expenditures is associated with a 0.04 or 0.05 percentage point increase, respectively, in the likelihood of adult children providing informal care. For families with younger parents who are less likely to be institutionalized or very rich families with incomes above the 95th percentile,[5] the MAWs expansion has little impact. These results are consistent with our model prediction: families that would otherwise rely on institutional care shift their LTC demand to home-base care subsidized by the MAW program.

Second, we explore the heterogeneous impacts of MAW programs on a subset of people who

[3]It is interesting to note that compared to the results in other nations with similar contexts, the magnitude of our estimates are similar, but go in the opposite direction. For example, Stabile et al. (2006) employ variation in the generosity of home care programs across provinces in Canada, and estimate that an increase of a similar scale in spending on home care benefits decreases the chances of providing care by 0.3 percentage points. Viitanen (2007) shows that a similar spending on formal care subsidized by public programs for the older population in the European context decreases informal caregiving by 0.15 percentage points. We believe that our results differ from these studies for two reasons. First, our paper focuses on near-elderly caregivers, whose opportunity costs could be lower than those of the younger cohorts analyzed in these studies. Second, as indicated in our theoretical model, different types of families may respond differently to policy. Therefore, the overall effect may depend on the distribution of various family groups in the population.

[4]In our working HRS sample, the annual income in the 50th percentile is $11,000 ($2014) and income in the 80th percentile is $48,000 ($2014). The %138 FPL for Medicaid eligibility in 2021 is around $27,500 ($2014).

[5]Income at the 95th percentile is about $100,000 ($2014) in our HRS working sample.

would otherwise only choose home-based care. Specifically, we focus on low-income families having a parent with dementia or personal care needs at home, who rely primarily on family care due to financial constraints,[6] We find that a $10 million increase in MAW spending leads to a 0.3 or 0.2 percentage point, respectively, decrease in the probability of informal caregiving among poor families. These effects stand in contrast to families having needy parents with better economic status, among whom a $10 million increase in MAW expenditures leads to a 0.01 or 0.03 percentage point increase in the likelihood of informal care provision. We attribute this divergence in results to the fact that families with financial constraints tend to perceive informal care and formal home-based care as substitutes, while families without such constraints view them as complements. Additionally, we observe that the availability of family support within a household can yield divergent outcomes. Families with unmarried parents or smaller sizes may perceive formal home-based care as a complement to their existing support systems, as evidenced by a 0.05 percentage point or 0.03 percentage point increase in informal care, respectively, in response to a $10 million increase in MAW expenditures.

Third, we provide evidence of a shift in living arrangements whereby families rely increasingly more on home-based care. Specifically, we find that MAWs reduce the likelihood of mothers living in nursing homes by 0.02 percentage points (0.22 percent relative to the outcome mean) and fathers by 0.01 percentage points (0.38 percent relative to the outcome mean). Furthermore, the MAW has a significant impact on the living arrangements between older parents and their adult children, whereby an increase in MAW spending raises the likelihood of mothers living with or residing closer to their adult children by 0.02 percentage points (0.38 percent relative to the outcome mean) or 0.11 percentage points (0.25 percent relative to the sample mean), respectively, and of fathers living with or closer to their adult children by close to null or 0.10 percentage points, representing a 0.26 percent relative to the mean. These findings corroborate previous studies on HCBS programs, which have demonstrated their effectiveness in enabling families to avoid institutionalization (Amaral, 2010).

This study makes several contributions to the existing literature. First, this 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 home care. Using North Carolina Medicaid waiver claims data for disabled and blind adults, Van Houtven and Domino

[6]Their annual incomes are below $11,000 ($2014).

(2005) find that the Medicaid waiver significantly reduces expenditures in institutions. Pande et al. (2007) show that the MAW in South Carolina helps frail old people stay at home longer. Other papers on Medicaid HCBS programs mainly focus on their cost-effectiveness and predictions of future expenditures at the state or the national level (Miller et al., 1999; LeBlanc et al., 2000; Van Houtven and Domino, 2005; Grabowski, 2006; Ng et al., 2011). This paper explores these issues from another angle, providing causal evidence of the impact of MAWs on informal care. Closely related to this paper, Muramatsu and Campbell (2002) use data from one wave of the Assets and Health Dynamics among the Oldest Old (AHEAD) data together with data on the state expenditures of the HCBS in 1992 and show that generous HCBS expenditures are associated with more personal formal care use and no reduction in informal personal care assistance. This study uses longitudinal data, taking advantage of changes in state-level funding for the Medicaid program, and controls for individual fixed effects. In addition, this paper investigates not only the effects of MAWs on overall care, but also the heterogeneous effects by families with different characteristics. We also examine the channels through which the Medicaid program affects the provision of informal care, which is not analyzed in Muramatsu and Campbell (2002).

Second, this study is related to the literature that estimates the effects of broad publicly financed policies on LTC choices.[7] The findings on the effects of these policies are mixed. Ettner (1994) and Stabile et al. (2006) show that the availability of publicly funded home care benefits leads to more formal in-home care use and less informal care use. Hoerger et al. (1996) find that generous Medicaid reimbursement of nursing home care is associated with increased use of such care. Grabowski and Gruber (2007) also report that generous Medicaid reimbursement of nursing home care increases nursing home use, while Hoerger et al. (1996) find that it increases the probability of entering a nursing homes. Grabowski et al. (2010) show that an increase in state Medicaid bed-hold funding – which funds nursing homes in order to reserve beds for hospitalized Medicaid residents – increases the hospitalization rate in skilled nursing facilities. Cutler and Sheiner (1994) estimate

[7]In the U.S., there are three main public policies related to LTC coverage: Medicaid, Medicare, and paid family leave. Medicare covers older people with acute conditions for no more than 100 days after they are discharged from a hospital. Paid family leave policies are relatively rare. As of 2018, only four states had such a policy: Washington, New Jersey, California and Rhode Island. In addition, paid family leave policies only cover six weeks of care for children and seriously ill family members. Therefore, the MAW program is therefore the primary program that offers LTC to the growing older population.

that a spend-down policy – which changes state Medicaid income eligibility rules by raising the income eligibility threshold – increases nursing home utilization. McKnight (2006) shows that the reduction in Medicare home visit payment levels in the 1990s decreased the reliance on home visits, but was not offset by increases in other forms of care. Orsini (2010) demonstrates that the reduction in Medicare home visit reimbursement levels also leads to more older people living in shared living arrangements. Pezzin et al. (1996) found little or no evidence of substitution between formal care and informal care using the largest home care demonstration experiment, the Long-Term Care Channeling Demonstration. In addition, Goda et al. (2011) look at how the social security benefit notch affects nursing home use, and find that an increase in the generosity of social security benefits increases the probability of using paid home health care among the low-educated population. Arora and Wolf (2018) show that the availability of paid family leave in California reduces nursing home utilization. The results present in this paper add to the literature reporting that public policy can also change care use by shifting the location where LTC services are received.

Third, the relationship between in-home formal care and informal care shown in this study has direct relevance to the LTC policy discussion. It has been documented that the involvement of informal caregivers in LTC reduces unmet needs and improves the quality of life for care recipients (Callahan et al., 2009; Samus et al., 2014; Griffin et al., 2017). However, policymakers have faced challenges in addressing the question of how informal caregivers should be integrated into the health care team, and of how the efforts of informal caregivers should be coordinated with those of formal care providers. For example, beginning in 2019, Medicare Advantage Plans expanded their supplemental benefits by increasing family caregiver support services such as adult daycare and counseling beginning in 2019. As the 2020 COVID-19 pandemic made in-home formal care less feasible and more risky, some state Medicaid programs temporarily allowed informal caregivers receive subsidies for providing care to beneficiaries (Fox-Grage and Spradlin, 2020). The findings presented in this paper combining these initiatives provide empirical evidence on these initiatives in order to inform the debate about how policymakers should subsidize LTC care to address the growing needs of a rapidly aging population.

The paper proceeds as follows. Section 2 describes the institutional background of MAWs. Section 3 outlines a theoretical model of how households make care choices and of the potential heterogeneous effects that MAWs might affect informal caregiving. Section 4 describes the data,

explains how the sample is selected, and presents descriptive statistics. Section 5 introduces the empirical model. Section 6 reports the results regarding the effects of MAWs on informal caregiving and heterogeneous findings by sub-populations, analyzes the channels through which MAWs affect informal care, and applies robustness checks to the estimates. Section 7 concludes.

2 Institutional Background

2.1 Medicaid Home and Community-Based Services

Historically, Medicaid has exclusively funded LTC in institutional settings, such as nursing homes. Over time, this practice has led to a substantial increase in Medicaid LTC expenditures due to the high costs of nursing home care. To lower these expenditures and to align Medicaid's LTC funding with the public's preference for receiving care in home- or community-based settings, Medicaid introduced the Home- and Community-Based Services (HCBS) program in the early 1980s. The program is designed to meet the specific and diverse needs of individuals requiring LTC services. By facilitating the provision of personalized care that aligns with individuals' needs and preferences, the program aims to promote their independence and enhance their quality of life.

Medicaid HCBS funds three main programs that comprise the majority of its enrollment and spending on in-home services: a mandatory home health state plan, an optional personal care state plan, and optional waivers.[8] Despite their similar aim of providing in-home care, Medicaid state plans and waivers differ in important ways. Medicaid state plans are standard Medicaid programs offered by states to their residents, covering a broad range of healthcare services, including in-home care.[9] In contrast, Medicaid waivers are programs that offer coverage beyond the standard state Medicaid plan, allowing access to a wide range of services that are not typically covered under traditional Medicaid programs.[10]

[8] Medicaid HCBS also includes other state plan programs such as Community First Choice, which provides personal care and support services to individuals with disabilities and older adults, enabling them to live in their own home and community and Section 1915(i), which assists individuals with intellectual or developmental disabilities. In 2018, Medicaid spent about $62.5 billion on waiver programs, accounting for 58 percent of its total expenditures, and $20.6 billion on state plans, accounting for 23 percent of its total expenditures. The remaining 9 percent of Medicaid spending in 2018 was on Community First Choice programs.

[9] To meet Medicaid eligibility criteria in 2021, the monthly income for a family of two had to be below $2,000 (%138 FPL) and their assets had to be limited to $2,000. The specifics of the services that are covered can vary by state.

[10] In 2018, approximately three million enrollees received Medicaid HCBS, and 2.5 million beneficiaries received these services through waivers.

The waiver program is termed a "waiver" because it allows states to "waive" certain requirements in traditional Medicaid and receive funding to provide services in a more flexible and cost-effective manner. For example, Medicaid waivers can select a particular population to serve, limit participants, and expand coverage through less restrictive financial requirements, which are not possible under state plans. Medicaid waivers are designed to meet the unique needs of certain populations, such as individuals with disabilities or elderly individuals who require in-home care services. These waivers often provide more extensive coverage for in-home care services than the standard state Medicaid plan, making them a useful resource for those individuals who need in-home LTC.

2.2 Medicaid Aging Waivers

In this paper, we focus on Medicaid Aging Waivers (MAWs), which are specifically designed to support older adults who would otherwise require nursing home care.[11] The aim of MAWs is to enable seniors to age in their own home or community, to enhance their independence and well-being, and to alleviate the pressure on LTC facilities.

To be eligible for MAWs, individuals must meet certain criteria, which typically include being 65 years of age or older, being a resident of the state, having income and assets below a certain limit, and demonstrating a need for LTC services that can be provided at home or in a community setting.[12] The specific eligibility requirements vary by state, with 79 percent of states using 300 percent Supplemental Security Income (SSI) ($27,000 for a single individual), 16 percent of states using 100 to 300 percent SSI ($9,000 to $27,000), and 5 percent of states using 100 percent SSI ($9,000) as their income thresholds in 2018. For the asset limit, 77 percent of states used $2,000, 11 percent of states used $0, 8 percent of states used $2,500 to $4,000, and 4 percent of states used $1,600 in 2018. While detailed eligibility information for each state for the 1998-2014 period is not available, it has been observed that before the expansion of the Affordable Care Act in 2014, the

[11] States have different names for the programs that provide HCBS for the older population. The most commonly used name is HCBS for the aged or elderly. For convenience and simplicity, we refer to these programs using a general name, the MAW. Other Medicaid waivers include waivers serving the blind or disabled, children with intellectual or developmental disabilities, children with mental illness, people with HIV/AIDS, and people with brain injury. In 2017, expenditures on MAWs came to approximately $40 billion, making up 65 percent of total Medicaid waiver expenditures.

[12] The functional criteria often involve assessments of the individual's ability to perform activities of daily living (ADLs) and instrumental activities of daily living (IADLs). The assessment is typically conducted to determine the level of care required and to ensure eligibility for MAWs.

eligibility requirements for MAWs in each state were stable and did not vary significantly from year to year. Our results are insensitive to restricting our study period in 1998-2012.[13]

There are several unique features of MAWs that we utilize to make causal estimates of their effect on informal care in section 6. First, the administration of MAWs by individual states enables each state to establish the set of services offered and the spending limits. The services covered under MAWs typically include personal care, home health care, day care, and home modifications, although the extent of coverage may vary among states.[14] The provision of customized services by each state addresses the distinct needs of their aging populations, thereby offering greater flexibility in the delivery of LTC services. Furthermore, MAWs encourage innovation, as they allow states to experiment with inventive approaches for delivering LTC.[15] As shown in Figure 1, the level of spending on each service covered by MAWs in 2014 varied widely between states. For example, Oregon spent only $826 per participant on home-based services, while New Jersey spent $43,066 per participant.

The second unique feature of MAWs is their cost-effectiveness design, which requires that the cost of providing LTC services to older people in home- and community-based settings is not greater than the cost of institutional care. Each state must conduct a cost-effectiveness analysis in its MAW application that compares the costs of providing services through the waiver program with the benefits derived from the services. The Centers for Medicare and Medicaid Services (CMS) then evaluates whether a MAW is cost-effective. The approval process often requires multiple revisions, with the areas commonly identified as needing improvement including enrollment caps, service coverage, and units of services.[16] Consequently, due to the requirement for cost-effectiveness, a considerable number of individuals remain on waiting lists each year. As depicted in Figure 2, the expansion of MAWs allows more eligible older adults to be enrolled and to receive covered LTC services.

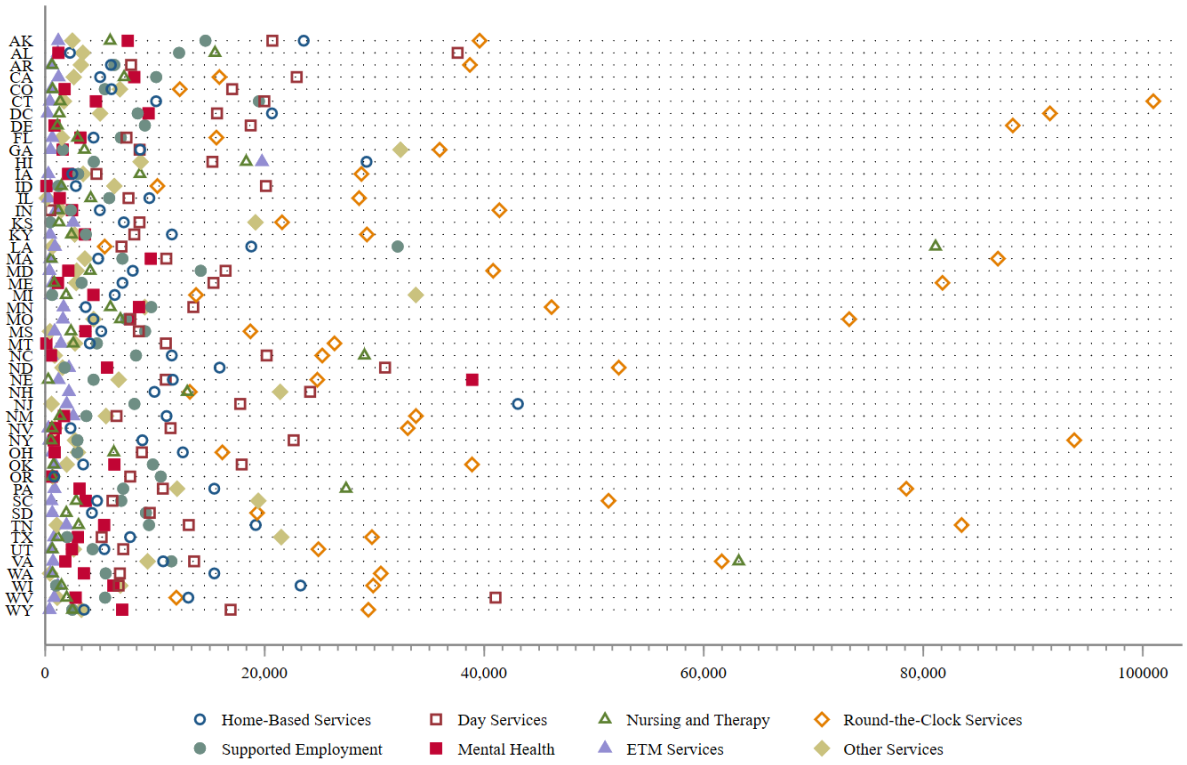
[13]Since our treatment variable of MAW spending is averaged between two years, we restrict the sample to the year 2012, given that the ACA was not expanded in 2014. See section 5 for details on our estimation design. The results are available upon request.

[14]In 2018, 85 percent of states provided home-based services, 70 percent offered nursing or therapy services, 78 percent covered equipment and technology modifications (ETM), 40 percent provided round-the-clock services, 61 percent offered day services, and 62 percent had case management services.

[15]Some new approaches for delivering LTC services in MAWs include Integrated Care Models, Technology-Enabled Care, Person-Centered Care, and Dementia Care. Details of each model are provided on the CMS website https://www.medicaid.gov/medicaid/waivers/index.html.

[16]For example, the number of users who utilize adult daycare, the average units per user, etc. The modification details of each revision are not publicly available.

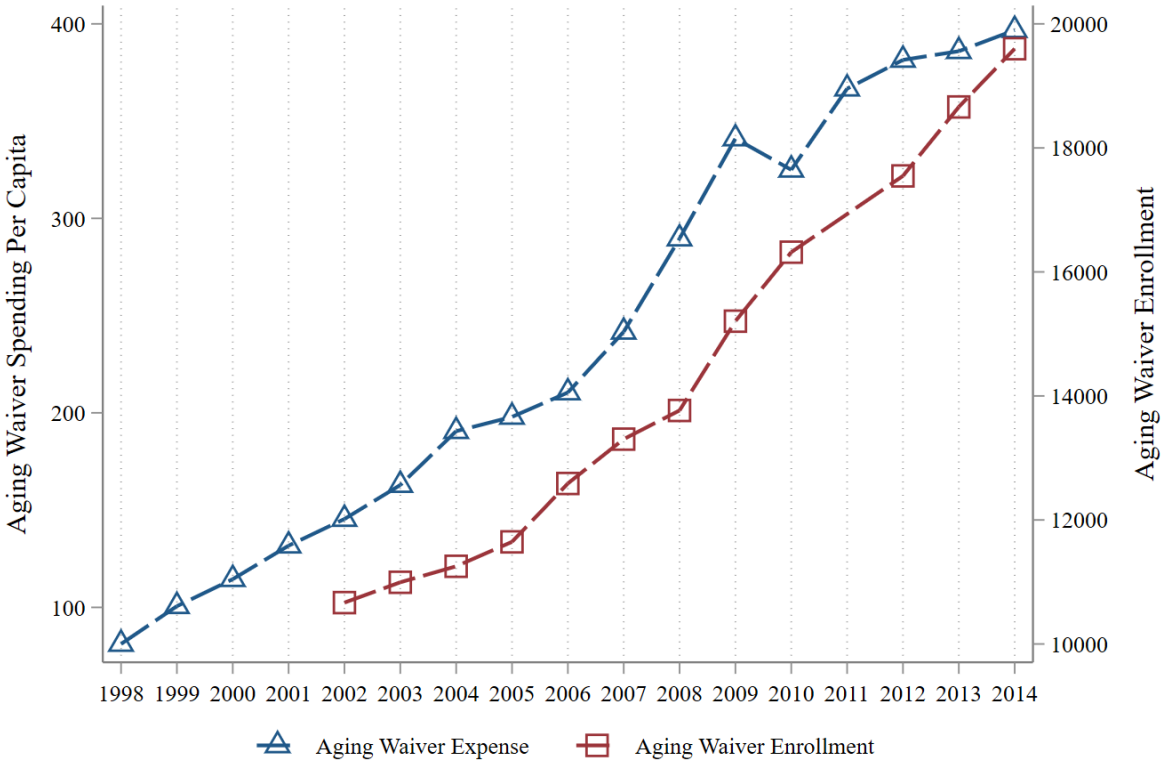
Figure 1: Variation in Spending per Enrollee for Each Service Covered Under MAWs in 2014



Notes: The plot displays the variation in spending per enrollee for each service covered under MAWs across states. The x-axis is the dollars spent per participant. The y-axis is the abbreviation of each state.

The MAWs are operationalized through a collaborative effort among state governments, healthcare providers, and community organizations. The state government initiates the process by submitting a MAW application to CMS, detailing the proposed program's scope of services, eligibility requirements, caps of participants, and associated costs. CMS assesses the application based on several criteria, including the program's financial feasibility, cost-effectiveness, and quality of the care. Upon the MAW program's approval, its implementation process typically involves enrolling participants, evaluating their needs, creating personalized care plans, and delivering home-based services and support. The state health agency is responsible for enrolling eligible older adults, while healthcare providers like home health agencies and adult day care centers provide LTC services to participants. Community organizations such as non-profit agencies and advocacy groups may also offer support and resources to participants and their families. In addition, CMS monitors the MAW program regularly to ensure its compliance with

Figure 2: MAW Spending ($2014) and Enrollment in 1998-2014

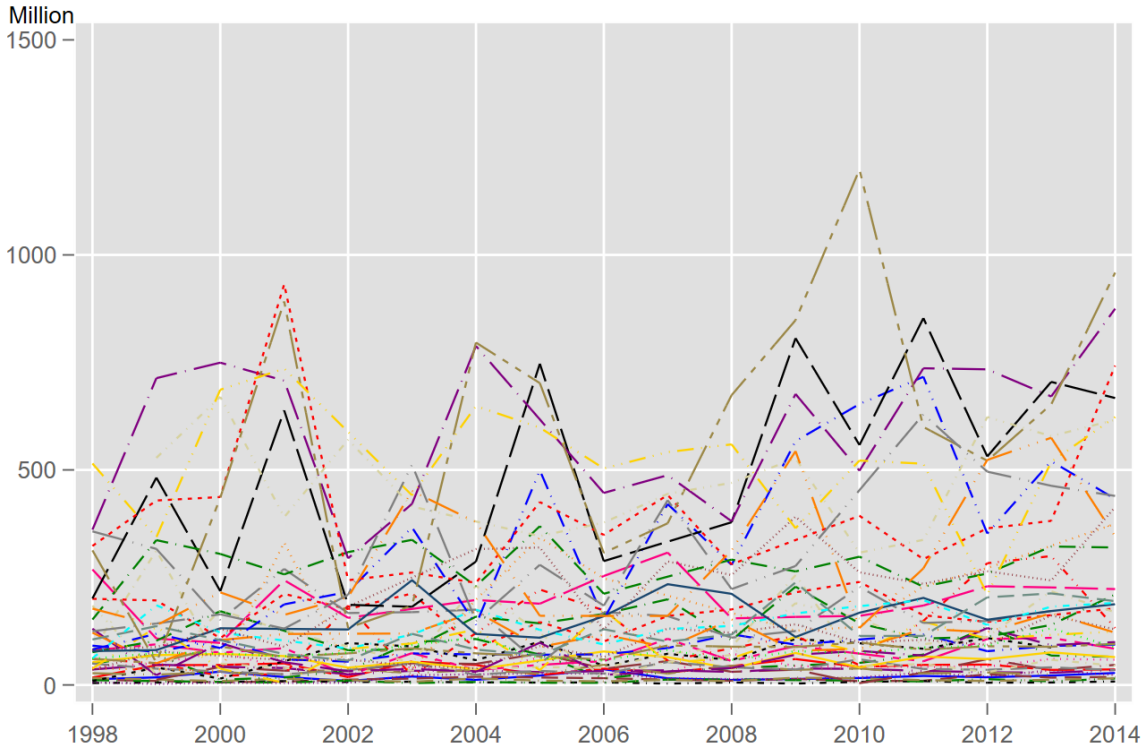


Notes: The data used are drawn from CMS data on enrollment in the MAW programs. The plot shows the spending per capita ($2014) on and the enrollment in MAWs over the 1998-2014 period. The left y-axis corresponds to spending and the right y-axis corresponds to enrollment.

the waiver agreement's terms. The state must provide regular reports on the program's performance and quality of care.

Due to the unique features of MAWs and their implementation process, states have flexibility to design their MAW programs to fit the needs of their aging populations. The resulting variation in MAW programs across states includes differences in the services offered, eligibility criteria, delivery and payment methods, and quality monitoring practices, as demonstrated in Figure 3. The 1998-2014 period data for all 50 states in the United States show significant variation in MAW expenditures ($2014) due to policy design. Appendix Figure A1 provides a clearer picture of the differences in spending between states with higher and lower MAW expenditures, dividing the MAWs into four sub-graphs. The variation in MAW spending in each state over the 1998-2014 period is further illustrated in Appendix Figures A2-A6.

Figure 3: Variation in MAW Expenditures ($2014) by State in 1998-2014



Notes: The plot displays the MAWs expenditures in million ($2014) across 50 states from 1998 to 2014. Each line corresponds to one state.

3 Theoretical Framework

In order to understand how families respond to the MAW program, we have developed a simple static model. This model is based on the work of Mommaerts and Truskinovsky (2020) and is specifically designed to distinguish between informal care, formal home-based care, and formal facility-based care. Like Mommaerts and Truskinovsky (2020), we consider a two-generation family as consisting of an older parent and a potential caregiver. Our model allows us to make precise and testable predictions about the behavior of such families.

3.1 Model set-up

In this model, the utility of a two-generation family is derived from total consumption, C, and the health status of the parent, H, according to the equation:

$$U = U(C, H) \tag{1}$$

As suggested by the Grossman model (Grossman, 1972), individuals' health is "produced" from the consumption of healthcare services. That is, a health production function determines an individual's state of health. We assume that the health of the elderly is produced by the following equation:

$$H = \tilde{H}(L; \boldsymbol{\theta}) \tag{2}$$

where L represents the total amount of LTC services received,[17] and $\boldsymbol{\theta}$ is an exogenous vector that includes stochastic individual shocks, such as the individual's preference regarding each health input. It is important to note that our model is static, meaning that the health status of the elderly in prior periods is taken as given. However, the health condition of the elderly person in each period is still influenced by current medical consumption.

We further assume that the utilities from consumption and health are independent and additive, as is commonly assumed in the health literature (Hall and Jones, 2007; Finkelstein et al., 2019). Plugging equation (2) into equation (1) with an additive function gives the following utility function:

$$U(C, L) = V(C) + W(L) \tag{3}$$

The family maximizes utility by choosing the optimal levels of non-LTC consumption, C, and LTC services, L. V and W are assumed to be increasing and concave functions.[18]

[17] In our model, LTC services are distinguished from other medical expenses. As such, C represents all non-LTC-related consumption. This assumption is reasonable given the distinct characteristics of LTC services, which are financed and delivered differently from other medical expenses. For example, LTC services are often based on specific needs and requirements, such as the need for long-term support and assistance with daily activities, which sets them apart from other medical expenses. Given these differences, it is more practical to consider LTC services separately from other forms of healthcare decision-making (De Nardi et al., 2010; Goda et al., 2013; Kopecky and Koreshkova, 2014).

[18] One way to think about the representation of LTC consumption in the utility function is that the marginal benefit of LTC services decreases as the amount of LTC services consumed increases. This means that as the older parent's physical condition becomes increasingly weak, the improving effect of LTC services on her health will decrease.

In our model, the parent receives LTC services from three different sources: informal care provided by her child, formal home-based care provided by trained professionals, and nursing home care provided in a residential facility. The overall level of LTC care is produced by the quality-adjusted duration of care received from each source, weighted by the relative importance of each source.

To better reflect real-world conditions, we have made two assumptions in our model. First, we use the Constant Elasticity of Substitution (CES) function to capture the possible complementary or substitutable relationship between informal care and formal home-based care. Second, we include nursing home care as a separate term in the LTC production function. This assumption implies that while families are fully substitutable for the decision to age at home or in a nursing home, the elasticity of substitution for the two forms of home care, informal care and formal home-based care, varies from person to person.

The overall level of LTC can be expressed as follows:

$$L = \left\{ [Q_c \cdot f(h_c)]^{\sigma} + (Q_m \cdot h_m)^{\sigma} \right\}^{\frac{1}{\sigma}} + h_n \tag{4}$$

where h_c, h_m, and h_n represent the quality-adjusted duration of LTC received through informal care, formal home-based care, and nursing home care, respectively. Q_c and Q_m represent the relative importance of informal care and formal home-based care to the overall production of LTC compared to nursing home care.[19] The elasticity of substitution, represented by σ, captures the degree to which formal home-based care can be substituted for informal care as the quantity of formal home-based care changes.

It is worth noting that in our two-generation family model, informal care is provided by one child. As a result, the provision of quality-adjusted care may be constrained by factors such as fatigue and stress as the duration of care increases. To reflect this, the production function for

[19] Equation (4) is a modified form of the standard CES function. The general expression is $Y = \eta[\delta_1 f(h_c)^{\sigma} + \delta_2 h_m^{\sigma}]^{\frac{1}{\sigma}}$, where η represents the relative efficiency compared to nursing home care, and δ_1 and δ_2 are known as allocation parameters representing the contribution of the production factors in the produced output. If η is larger than one, this suggests that an increase in the use of home-based care (either informal or formal) has a greater impact on the overall level of LTC than an equivalent increase in the use of nursing home care. It is worth noting that equation (4) modifies the traditional CES equation by setting the values of Q_c and Q_m in terms of the parameters η, σ, δ_1 and δ_2 to make sure that as long as the preference for informal care or home-based care increases, the total level of LTC rises. Specifically, the equation defines $Q_c = \eta\delta_1^{\frac{1}{\sigma}}$ and $Q_m = \eta\delta_2^{\frac{1}{\sigma}}$.

informal care is assumed to be a concave increasing function, denoted by f. On the other hand, formal care is generally provided by a larger number of trained professionals, so the quantity of care is typically more stable. Therefore, the production function for formal care is assumed to be constant, meaning that the same number of hours of care can be provided regardless of the duration of care.[20]

The family in our model faces two types of resource constraints. The first is a time constraint, which is represented by the equation:

$$h_w + h_c \leq T \tag{5}$$

This equation states that the total non-leisure time available to the child, denoted by T, is divided between market work, h_w, and informal care, h_c. The family is also faced with a budget constraint, which limits their ability to pay for non-LTC consumption and LTC services. They have a certain amount of resources, R, and labor income earned by the child, which can be used to cover these expenses. Formal home-based care and nursing home care have fixed prices in the market, represented by p_m and p_n, respectively.[21] This budget constraint can be expressed as:

$$C + p_m \cdot h_m + p_n \cdot h_n \leq R + w \cdot h_w \tag{6}$$

The family chooses consumption and health spending to maximize the joint utility in equation (3) subject to the production function for the total level of LTC services (4) and resource constraints (5)- (6). That is, the optimal allocation solves:

$$\begin{aligned} \max_{C,h_c,h_m,h_n,h_w} \quad & V(C) + W(L) \\ \text{s.t.} \quad & L = \left\{ \left[Q_c \cdot f(h_c) \right]^\sigma + (Q_m \cdot h_m)^\sigma \right\}^{\frac{1}{\sigma}} + h_n \\ & h_w + h_c \leq T \\ & C + p_m \cdot h_m + p_n \cdot h_n \leq R + w \cdot h_w \end{aligned} \tag{7}$$

[20] The preference-weighted L is similar in spirit to Blau and Robins (1988) and Mommaerts and Truskinovsky (2020). It is important to note that this assumption of a concave and increasing production function for informal care can be extended to situations where there is more than one informal caregiver. Even with additional informal caregivers, the total number of informal caregivers is likely to be smaller than the number of formal carers. As a result, the amount of informal care provided may still be subject to limitations depending on the informal caregiver's levels of fatigue and stress as the duration of the need for care services increases.

[21] We assume that prices for formal care in the market are homogeneous, meaning that individuals base their decisions on the average price of the service in the market when choosing a type of service.

This simple framework allows us to analyze the basic trade-offs inherent in LTC decisions. It is worth noting that because home care and nursing home care are fully substitutable relationships in our model, when the expansion of the MAW policy leads to cheaper home care, the optimal solution of equation (7) has two possible cases: an interior solution, which means that $h_n \neq 0$; or a corner point solution, which means that $h_n = 0$. We will analyze the effects of the MAW policy on the provision of informal care under both scenarios.

Proposition 1. *For older adults who would otherwise rely on institutional care, the expansion of the MAW policy leads to an increase in the supply of informal caregiving.*

Proof. For older adults who would otherwise choose nursing home care, this means that an interior solution of equation (7) exists. By analyzing the first-order conditions of equation (7), we can determine the optimal solution given by the following:

$$f'(h_c) = \left[\frac{\left(\frac{w}{p_n \cdot Q_c^{\sigma}}\right)^{\frac{\sigma}{1-\sigma}} - Q_m^{\frac{-\sigma}{\sigma-1}} \cdot p_m^{\frac{\sigma}{\sigma-1}} \left(\frac{Q_c^{\sigma}}{w}\right)^{\frac{\sigma}{\sigma-1}}}{Q_c^{\sigma}} \right]^{\frac{1-\sigma}{\sigma}} \tag{8}$$

The equation (8) helps us understand the effects of the MAW policy on the provision of informal care when an older adult requires some nursing home care services. As shown in equation (9), the total impact of the MAW policy on informal care is due to two factors.

$$\frac{dh_c^*}{d\text{MAW}} = \frac{\partial h_c^*}{\partial p_m} \cdot \frac{dp_m}{d\text{MAW}} + \frac{\partial h_c^*}{\partial Q_m} \cdot \frac{dQ_m}{d\text{MAW}} \tag{9}$$

First, the MAW policy reduces the costs of LTC for older adults who opt for home-based care by subsidizing professional providers and making in-home formal care more affordable for eligible families. This results in a decrease in the price of formal home-based care, p_m, such that $\frac{dp_m}{d\text{MAW}} < 0$. The impact of this change on the provision on informal care is described by the following:

$$\frac{\partial h_c^*}{\partial p_m} = \frac{1}{f''(h_c^*)} \cdot [f'(h_c)]^{\frac{1-2\sigma}{1-\sigma}} \cdot Q_m^{\frac{-\sigma}{\sigma-1}} \cdot \left(\frac{Q_c^{\sigma}}{w}\right)^{\frac{\sigma}{\sigma-1}} \cdot p_m^{\frac{1}{\sigma-1}} \tag{10}$$

Second, the MAW policy increases the attractiveness of home-based care by providing the older adult with more convenient, comfortable, and personalized care options that allow her to remain

in her own home and community.[22] This leads to an increase in the quantity of formal home-based care, Q_m, such that $\frac{dQ_m}{d\text{MAW}} > 0$. This change on informal care gives:

$$\frac{\partial h_c^*}{\partial Q_m} = -\frac{1}{f''(h_c^*)} \cdot [f'(h_c)]^{\frac{1-2\sigma}{1-\sigma}} \cdot Q_m^{\frac{1-2\sigma}{\sigma-1}} \cdot \left(\frac{Q_c^\sigma}{w}\right)^{\frac{\sigma}{\sigma-1}} \cdot p_m^{\frac{\sigma}{\sigma-1}} \tag{11}$$

Since f is an increasing and concave function, it follows that $f''(h_c^*) < 0$ and $f'(h_c^*) > 0$, meaning the sign of $\frac{dh_c^*}{dp_m}$ is negative and the sign of $\frac{dh_c^*}{dQ_m}$ is positive. This suggests that, with the MAW policy reducing p_m and increasing Q_m, the provision of informal care is expected to increase. □

Proposition 2. *For older adults who would otherwise rely on family care only, the effect of the MAW policy on the provision of informal care is dependent on the value of the substitution elasticity parameter, σ.*

(1) If σ is in the range of $(-\infty, 0)$, the expansion of the MAW policy leads to an increase in informal care.

(2) If σ is in the range of $(0, 1)$, the effect of the MAW policy on informal care is uncertain.

(3) If σ approaches 1, the expansion of the MAW policy results in a decrease in informal care.

Proof. If older adults would have otherwise received care only from family members, then a corner solution would be reached where $h_n = 0$. This results in a slightly altered optimization problem, as outlined below:

$$\begin{aligned} \max_{C,h_c,h_m,h_n,h_w} \quad & V(C) + W(L) \\ \text{s.t.} \quad & L = \left\{ [Q_c \cdot f(h_c)]^\sigma + (Q_m \cdot h_m)^\sigma \right\}^{\frac{1}{\sigma}} \\ & h_w + h_c \leq T \\ & C + p_m \cdot h_m \leq R + w \cdot h_w \end{aligned} \tag{12}$$

The relationship between h_c^* and p_m is determined as follows, with the detailed solution process

[22] MAWs allow states to offer a wide range of services that are tailored to the needs and preferences of seniors and individuals with disabilities, allowing them to receive the care and support they need in a way that meets their individual needs and preferences. This can be particularly important for individuals who have complex care needs or who require specialized services.

displayed in the Appendix A.1:

$$\frac{dh_c^*}{dp_m} = -\frac{\frac{\sigma}{\sigma-1}\cdot A\cdot B\cdot\frac{1}{Q_m}+\left[-\left(\frac{\sigma}{1-\sigma}\right)^2\right]\cdot\frac{C}{B}\cdot V''\cdot\left[f\cdot f'^{\frac{1}{\sigma-1}}\cdot\left(\frac{B}{Q_m^\sigma}\right)^{\frac{1}{\sigma-1}}\cdot p_m^{\frac{1}{\sigma-1}}\right]}{\frac{\sigma}{1-\sigma}\cdot\left\{Q_c^\sigma\cdot f'^{\frac{2\sigma-1}{1-\sigma}}\cdot f''+\frac{C}{B}\cdot V''\cdot\left[w+\frac{p_m}{Q_m}\cdot A\cdot\left(f'^{\frac{\sigma}{\sigma-1}}+\frac{1}{\sigma-1}\cdot f\cdot f'^{\frac{2-\sigma}{\sigma-1}}\cdot f''\right)\right]\right\}} \tag{13}$$

The sign of the variables A, B, and C are all positive, where $A = \left(\frac{p_m Q_c^\sigma}{wQ_m}\right)^{\frac{1}{\sigma-1}}$, $B = \frac{Q_c^\sigma}{w}$, $C = \left[\frac{w\cdot V'}{Q_c^\sigma}\right]^{\frac{2\sigma-1}{1-\sigma}}$.

Similarly, the relationship between h_c^* and Q_m is as follows:

$$\frac{dh_c^*}{dQ_m} = -\frac{-\frac{\sigma}{\sigma-1}\cdot A\cdot B\cdot\frac{p_m}{Q_m^2}+\left[\left(\frac{\sigma}{1-\sigma}\right)^2\right]\cdot\frac{C}{B}\cdot V''\cdot\left[f\cdot f'^{\frac{1}{\sigma-1}}\cdot(p_m^\sigma B)^{\frac{1}{\sigma-1}}\cdot Q_m^{\frac{1-2\sigma}{\sigma-1}}\right]}{\frac{\sigma}{1-\sigma}\cdot\left\{Q_c^\sigma\cdot f'^{\frac{2\sigma-1}{1-\sigma}}\cdot f''+\frac{C}{B}\cdot V''\cdot\left[w+\frac{p_m}{Q_m}\cdot A\cdot\left(f'^{\frac{\sigma}{\sigma-1}}+\frac{1}{\sigma-1}\cdot f\cdot f'^{\frac{2-\sigma}{\sigma-1}}\cdot f''\right)\right]\right\}} \tag{14}$$

As we can see from equations (13) and (14), the signs of $\frac{dh_c^*}{dp_m}$ and $\frac{dh_c^*}{dQ_m}$ depend on the value of σ:

(1) For the case when $\sigma \in (-\infty, 0)$, the derivative $\frac{dh_c^*}{dp_m}$ is negative and the derivative $\frac{dh_c^*}{dQ_m}$ is positive. This indicates that when the MAW policy makes formal home-based care more accessible by reducing the cost of care and increasing the preference for it, the provision of informal care will need to increase for older adults who would otherwise rely solely on in-home care, and who perceive a strong complementary relationship between informal and formal care.

(2) For the case when $\sigma \in (0, 1)$, the signs of both $\frac{dh_c^*}{dp_m}$ and $\frac{dh_c^*}{dQ_m}$ are indeterminate. This means that for older adults who perceive a relatively weak complementary/substitutable relationship between informal and formal home-based care, the impact of the MAW policy on the provision of informal care is unclear.

(3) For the case where σ approaches 1, as explained in the Appendix, $\frac{dh_c^*}{dp_m}$ is positive and $\frac{dh_c^*}{dQ_m}$ is negative. This indicates that when older adults view informal care and formal home-based care as perfect substitutes, the expansion of the MAW policy will encourage them to choose the more cost-effective formal home-based care, and to reduce their reliance on informal care.

□

3.2 Testable predictions

To generate testable implications of the theory, this section derives two hypotheses based on Proposition 1 and Proposition 2.

Proposition 1 describes the scenario in which older adults are likely to use nursing home care. According to National Center for Health Statistics, nursing home residents are, on average older and wealthier (Ness et al., 2004; Sengupta et al., 2022),[23] leading to the following hypothesis:

Hypothesis 1. *Among older adults who are advanced in age and have a relatively high income, the demand for informal care may increase in response to the promotion of the MAW policy. This could be due to their decreased use of nursing home care and increased use of home care.*

The crucial distinction between Propositions 1 and 2 lies in whether an older adult does or does not utilize nursing home services. As was stated in Hypothesis 1, when focusing on the subgroup of older adults who are prone to utilizing nursing homes, the expansion of the MAW policy results in an increase in informal care. This hypothesis focuses on older individuals who are relatively wealthy in the sense that they can afford nursing home care, but may still become eligible for MAWs if they deplete their assets.[24]

Proposition 2 pertains to older adults with LTC needs who are inclined to use home care. These individuals are generally younger and have lower incomes, and Proposition 2 suggests that the impact of the policy on informal care depends on the value of the substitution elasticity parameter, σ. A positive impact is expected when σ is less than 0, indicating a strong complementarity between informal care and formal home-based care. Conversely, when σ approaches 1, indicating a strong substitutability between the two forms of care, the effect of the MAW policy on informal care is expected to be negative.

Hypothesis 2. *The value of σ may be influenced by factors such as financial constraints and the availability of family support. Hence, we formulate the following hypotheses:*

[23] For example, in 2018, about 84 percent of nursing home residents were aged 65 and above. People who are 85 and above accounted for approximately 40 percentage of total nursing home residents, and the majority of these residents were women. In addition, about 60 percent of nursing home residents used Medicaid as the main payer source, while 40 percent primarily paid out of pocket. More details about the demographics of nursing home residents can be found at the website: https://www.cdc.gov/nchs/nnhs/index.htm.

[24] The aim of Hypothesis 1 is to identify the marginal individuals who can use nursing home services and who might be able to take advantage of MAWs. However, it is important to note that the very wealthy would not be eligible for MAWs and serve as the comparison group in our empirical analysis in section 6.2.

(1) Financial constraints: Older adults with limited financial resources mainly use informal care from family members, as they are often unable to afford professional care on their own. In this scenario, informal care and formal home-based care are more likely to be substitutes. As a result, the expansion of the MAW policy would decrease the provision of informal care in poor households.

(2) Limited support system: Older adults with limited support from family may benefit from the provision of both informal care and formal care services. For these individuals, these two care options are more likely to be complements that ensure that they receive adequate care and support (Chappell and Blandford, 1991; Bolin et al., 2008). Therefore, the impact of the MAW policy on the provision of informal care is positive.

4 Data

4.1 Medicaid HCBS and HRS data

The first data source for this study provides Medicaid policy information on MAWs for each state in the 1996-2014 period. The CMS website publicly provides state applications and annual reports on MAWs,[25] containing comprehensive details on covered services, service definitions, and MAW expenditures. These annual reports serve as the foundation for evaluating the cost-effectiveness of MAW applications by the CMS.

The second data source is the Health and Retirement Study (HRS), a longitudinal survey that began in 1992, administered every two years to a representative sample of Americans aged 51 and above. The HRS includes multiple cohorts, such as the HRS cohort (the core cohort followed since 1992), the Study of Assets and Health Dynamics Among the Oldest Old (AHEAD) cohort born before 1924, the Children of the Depression Age (CODA) cohort born between 1924 and 1930, and the War Babies cohort (WB) born between 1942 and 1947. The Early Baby Boomers (EBB) cohort born between 1948 and 1953 was added to the sample in 2004, and the Mid-Baby Boomers cohort born between 1954 and 1959 was added to the sample in 2010.[26]

The HRS survey collects detailed information from respondents through on-site or telephone-based questionnaires, including their demographic characteristics, health outcomes, employment

[25] See more details at https://www.medicaid.gov/

[26] Appendix Table A2 (Panel A) describes details on how respondents from different cohorts entered the HRS survey and indicates the number of unique individuals who participated in each of the interview type.

status, financial situation, year of death (if any), and intergenerational transfers. Additionally, the survey asks information on the family members of respondents, such as on their parents.[27] The HRS data used for this study covers the period 1998 to 2014.

The HRS restricted data further contain information on the state of residence of both the respondents and their parents, which we merge with the first data source on MAWs.[28] The resulting data form an individual-year panel from 1998-2014, with MAW spending adjusted for inflation at the state level.

To address potential concerns regarding the validity of our identification assumption stemming from the possibility of correlation between changes in states' MAW expenditures and state-level characteristics, we supplement our primary data sources with the following sources of data. The Bureau of Labor Statistics (BLS) provides state-level information on unemployment/employment rates for the years 1999-2014, while the Bureau of Economic Analysis (BEA) Regional Economic Accounts furnishes data on state-level GDP, personal income (PI), and personal consumption expenditure (PCE) per capita for the 1998-2014 period. Moreover, the Census Bureau supplies information on demographic characteristics of states, such as percentage of population below the poverty level, percentage married, percentage female, education level, percentage white, as well as the size of the total population and population aged 65+. Information on the political affiliation of state governors is obtained from the MIT Election Lab.[29] Additionally, we utilize public data from the CMS on the characteristics of nursing homes, such as the number of nursing homes, the number of nursing home beds, and the number of nursing home residents in each state to check the robustness of our results in section 6.4.

4.2 Sample selection

To investigate the impact of MAWs on informal care provided by respondents in the HRS, we begin by restricting our sample to respondents who had at least one living parent at the time they entered

[27]Since the HRS respondents are older themselves, the parents of these older respondents are more likely to be dead in the study years. Panel B of Appendix Table A2 reports the number of respondents who did not have a living parent in 1998-2014.

[28]The MAW expenditures are averaged between HRS survey years and lagged by one year to enable them to be merged with the HRS data. For example, data on individuals in the 1998 HRS wave is merged with the MAW expenditures averaged in 1998 and in 1997.

[29]See details at https://electionlab.mit.edu/data.

the HRS between 1998 and 2014.[30] We then 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 we call the *working sample*, consists of 36,904 observations and 10,893 unique individuals from the HRS spanning 1998 to 2014. Panel A of Appendix Table A3 displays the number of individuals who had at least one living parent when they were first surveyed from 1998 to 2014, and Panel B shows the number of respondents were followed into the next survey year.

4.3 Dependent variables

The most relevant variables for the current study come from responses to questions on the informal care that HRS respondents provided to their elderly parents. Specifically, the HRS survey includes questions asking whether respondents provided any care to their parents in the past two years, and if so, the number of hours of personal care (such as assistance with dressing, eating, bathing, or toileting) or errands assistance (such as help with household chores, medication management, transportation, or running errands) they provided. The total number of informal care hours is calculated by summing the hours spent on personal care and errands assistance. Respondents who reported providing any informal care are categorized as informal caregivers, as indexed by an any care indicator.[31] The same approach is applied to the personal care and errands care indicators.[32]

To investigate the mechanisms underlying the relationship between MAWs and informal care, we construct two key indicators: a nursing home indicator and a living-with-respondent indicator. These indicators are derived from a question in the HRS survey that asks respondents about the living arrangements of their parents. The living-with-respondent indicator takes a value of 1 if the respondent cohabits with their parent and 0 otherwise. The nursing home indicator takes a value of 1 if the parent resides in a nursing home and 0 otherwise. Other possible living arrangements

[30] Since the HRS is representative of people aged 51 and above, the parents of many of the HRS respondents had died before they entered the survey. See Appendix Table A2 (Panel B) for details in each survey year.

[31] Unlike the previous literature, we do not directly employ the question surveyed in the HRS: namely, whether the respondents and her partner did or did not spend hours helping his or her parents or parents-in-law. In this question, we cannot distinguish between the hours spent on care by the respondent and by the spouses. The hours' question asks the respondent to recall the actual number of hours of care provided by respondent herself and by her spouse, separately. In section 6.4, several cutoffs are used to test the sensitivity of our main results.

[32] The care hours reported in the HRS do not distinguish between the care hours provided to the mother or the father if both parents of the respondent are alive. Since the majority of living parents are mothers, more care hours are provided to mothers than to fathers.

include living alone, living with other children, living with relatives, living in a retirement center, and living with others. Additionally, we explore the proximity of the respondent to their parent by constructing a dummy variable that takes a value of 1 if the parent lives within 10 miles of the respondent and 0 otherwise.

4.4 Sample statistics

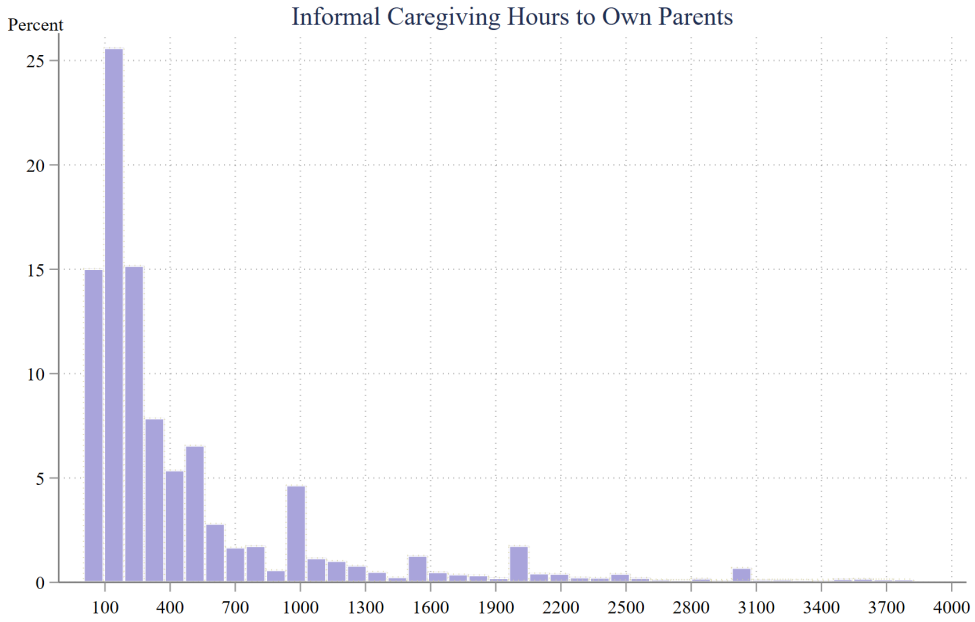
Of our working sample of HRS respondents, about 36 percent are informal caregivers who provided some care to their parents in the last two years. Approximately 26 percent of these caregivers provided only errands care and 2 percent provided only personal help to their older parents. Among all caregivers, about 29 percent provided less than 1,000 hours of non-intensive care in the last two years, while 7 percent provided at least 1,000 hours of intensive care in the last two years.[33] The majority of caregivers mainly provide errands care to their parents. Non-intensive caregivers are more prevalent than intensive caregivers. Female caregivers usually provide more care than male caregivers. See Appendix Table A4 for details.

The average duration of the informal care provided by the HRS respondents during the last two years is around 240 hours (2.4 hours a week): 150 hours (1.5 hours a week) for errands care and 90 hours (about 1 hour a week) for personal care. The distribution of care hours is highly skewed, as shown in Figures 4-5. The average age of the HRS respondents' parents is about 80, with 43 percent of them being married. Of the parents, approximately 24 percent need personal care, and 12 percent suffer from memory-related disease and cannot be left alone for at least one hour. Around 43 percent of parents live close to their adult children. Across states, the mean of MAW expenditures is approximately $320 million, with an average year-to-year change of $20 million over the 1998-2014 period.[34] We use the scale of $10 million as our unit of MAW spending unless otherwise specified.

[33]The 1,000 number is common used in the literature to distinguish between intensive and non-intensive caregivers (Van Houtven et al., 2013).

[34]Appendix Table A5 reports more details about the summary statistics of our working sample.

Figure 4: Distribution of Informal Care Hours in HRS 1998-2014

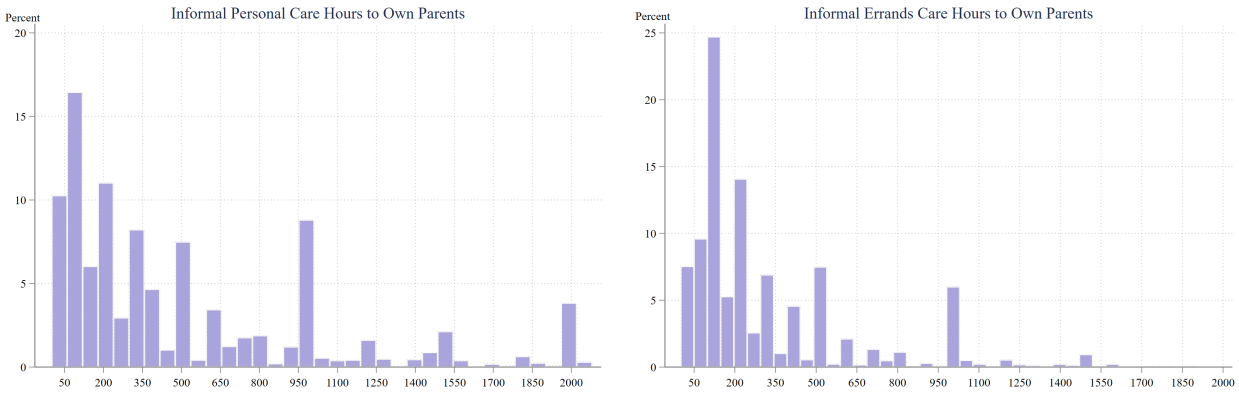


Notes: This graphs displays the distribution of the hours of informal care provided to their parents by the HRS respondents in the past two years conditional on positive hours. The care hours sum personal care hours and errands assistance hours. Personal care hours are the number of hours in the past two years that the HRS respondent helped his or her own father, mother, or both with personal needs on dressing, eating, bathing, or 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, or transportation. The vertical axis shows the percent of positive hours spent on care. The data used are our working sample of HRS individuals who had at least one living parent in the 1998-2014 period and who provided positive care hours.

5 Estimation Strategy

To estimate the impact of MAWs on informal care provided by older caregivers, we adopt a two-way fixed effects (TWFE) approach, in which state-level MAW spending are used as the continuous treatment variable in constant dollars adjusted for inflation ($2014). Our analysis relies on two sources of variation: cross-state variation in MAW expenditures in a particular year and within-state temporal changes in MAW expenditures over time. We use state-level MAW spending as our treatment variable for several reasons. Firstly, state-level MAW spending is likely to affect the availability and affordability of MAWs in a given state, which in turn could influence the chances of informal care provided by older caregivers. Thus, there is a plausible causal relationship between state-level MAW spending and individual-level decisions on informal care. Secondly, the variation of MAWs at the state level is exogenous to the specific individual within states. Changes in state-level

Figure 5: Distribution of Care Hours by Type in HRS 1998-2014



(a) (b)

Notes: The x-axis in panel (a) indicates the total hours of help with personal care the HRS respondents provided to their parent in the past two years. Personal care includes help with dressing, eating, bathing, or toileting. The x-axis in the panel (b) indicates the total hours of help with household chores, errands, or transportation the HRS respondents provided to their parent in the past two years. The y-axis is the percent of hours spent on care. The data used are our working sample of HRS individuals who had at least one living parent in the 1998-2014 period and who provided positive care hours.

MAW spending are subject to higher levels of institutional oversight, such as CMS, as introduced in section 2. Therefore, state-level variation in MAW expenditures might be attributed to exogenous factors beyond the state itself. Finally, a TWFE approach enables us to control for unobserved heterogeneity at both the year and individual levels. This helps to address potential sources of bias, such as omitted variable bias, which could arise if we only examined the relationship between MAW spending and informal care provision at the state or individual level.

However, it is still possible that the MAW spending is endogenous and could bias our results. We address these issues in the next section. We assume for now that, after controlling for observable individual-level and state-level time-varying covariates, state-level MAW spending over time is exogenous to individuals' informal care outcomes. The estimation model is as follows:

$$Y_{ist} = \delta \text{MAW}_{s\bar{t}} + \alpha_i + \mu_t + \eta_s \times t + \beta_x X_{ist} + \epsilon_{ist} \tag{15}$$

where i indexes an individual, and s is the state where an individual's parents live in year t. The outcome variable of interest is denoted as Y_{ist}, which measures the informal care provided by an individual i whose parents reside in state s in year t. Our main treatment variable is the mean

of MAW expenditures in state s averaged over the years t and $t-1$, denoted as $\text{MAW}_{s\bar{t}}$.[35] The average MAW expenditures of the current years and the lagged years accounts for the fact that, per the HRS design, there is a time inconsistency between the survey years and the MAW policy years. For example, the informal care status of an HRS respondent surveyed in 2012 is a function of the average MAW expenditures over the years 2011-2012, consistent with the HRS design.[36] The individual fixed effects (FEs), denoted as α_i, control for the unobservable factors that are constant within individuals over time, such as preferences for care options and the location of aging for individuals and their parents. μ_t is a year dummy, which controls for common temporal shocks across states that could affect informal care outcomes. $\eta_s \times t$ is the state-specific linear time trend, which controls for the heterogeneous trends in MAW expenditures across states. X_{ist} is a vector of controls that include (1) time-varying demographics of individuals such as age, age squared, marital status, and number of siblings; (2) time-varying demographics of individuals' parents such as age and marital status; (3) state-level older population variables including the share of older people in the population (aged 65+) and the size of the total population in each state;[37] (4) state-level socioeconomic variables such as percentage below the poverty level, education level, percentage female, percentage white, percentage married, personal income per capita, employment rate, and political affiliation of the governor; (5) expenditures of other state policies such as standard Medicaid programs that might cover the older population at home or in community settings. For example, some Medicaid state plans can also cover the cost of home health services and personal care services as optional services for eligible residents in each state regardless of their age. Therefore, older people could be covered by both MAWs and state plans, even though they are separate programs under Medicaid.[38] Our main specification is the model (15) with all controls. ϵ_{ist} is the standard errors which are clustered at the state level.

[35] Unless stated otherwise, all MAW spending is adjusted for inflation to \$2014 dollars.

[36] Informal care information refers to an individual's informal caregiving status in the past two years (2011 and 2012) depending on when the survey is administered.

[37] The control for the share of older population in each state takes into account that some states are aging at faster rates, even when the size of the total population is considered. The growing share of older people in the population might impact both informal care and the MAW expansion.

[38] Medicaid state plans are the standard Medicaid programs offered by each state to its residents. These plans generally cover a wide range of healthcare services such as inpatient and outpatient hospital services, doctor visits, prescription drugs, rehabilitation services, and LTC services, which may be provided in various settings, such as nursing homes and hospitals, and optional home- and community-based services. See Appendix Table A1 for a detailed description of the services covered in home- or community-based settings for each Medicaid program.

5.1 Identification threats

Our main identification assumption is that, by controlling for individual and year FEs, the state-level variation in MAW spending over time is uncorrelated with other unobservable confounders that may influence an individual's decision to provide informal care. To test this assumption, we employ several strategies.

First, we estimate the association between lagged state characteristics and MAW spending using a state-year panel spanning from 1998 to 2014. Following the approach used in Bailey and Goodman-Bacon (2015), we examine whether the state characteristics in earlier periods predict the generosity of MAW spending. Specifically, we test whether economic and demographic factors in each state in lagged 10 to lagged 4 years are predictive of MAW expenditures during the working period. As shown in Table 1, most factors in these lagged periods do not significantly correlate with MAW expenditures, which supports the validity of our assumption that state-level MAW spending is exogenous.[39] In addition, Appendix Table A6 shows that in our HRS working sample for the 1998-2014 period, MAW spending is uncorrelated with most of states' attributes except for the employment rate and the political affiliation of the governors. Nonetheless, we check the sensitivity of our results after controlling for state-level factors in section 6.

Second, despite our previous tests showing that the economic and demographic characteristics of states do not predict the level of MAW spending, there are still potential concerns that states expanded MAW programs during the 1990s based on the health conditions of their older residents. This could potentially bias our informal care outcomes. For instance, if the health outcomes of older adults were worse, or if states believed that home- or the community-based setting had greater health benefits for older adults, they would have selectively affected the provision of informal care by expanding their MAW programs. To address these concerns, we examine whether health-related outcomes of older HRS respondents during the 1992-1998 period are predictive of the level of MAW spending in 1998, using our estimation equation (15).[40] Table 2 shows little evidence that the health status (columns 1-6) or the healthcare utilization (columns 7-10) of older individuals in each state

[39] The results of each lagged period are available upon request.

[40] We use age 60 as the age cutoff in selecting the older population to do the balance test in order to increase the sample size and increase the accuracy of the estimates. The results using other age cutoffs, such as age 65, are similar (available upon request).

Table 1: The Determinants of MAW Spending in 1998-2014

VARIABLES	(1) Lagged 10 Periods	(2) Lagged 8 Periods	(3) Lagged 6 Periods	(4) Lagged 4 Periods
Unemployment rate	-19.073	-8.567	2.106	-5.286
	(17.697)	(12.960)	(6.154)	(4.651)
Share of older individuals (65+)	-5,212.655	5,086.403	993.056	3,147.744
	(7,700.362)	(5,475.204)	(2,684.011)	(2,079.121)
Total population	-0.000	-0.000	-0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Birth rate	24.384	-39.191	-14.245	41.603
	(32.352)	(32.085)	(29.385)	(25.540)
Fertility rate	-3.594	11.805*	3.133	-5.405
	(5.383)	(6.765)	(4.845)	(3.940)
Marriage rate	0.714	-0.043	-1.910	-0.853
	(1.103)	(0.879)	(1.896)	(1.326)
Divorce rate	-1.500	0.481	3.627	1.156
	(2.226)	(1.736)	(3.602)	(2.464)
PI per capita	-0.017	-0.008	0.008	-0.003
	(0.012)	(0.008)	(0.006)	(0.004)
PCE per capita	0.045	0.009	-0.022	0.002
	(0.047)	(0.029)	(0.019)	(0.014)
GDP per capita	745.470	-2,984.836	-370.050	112.131
	(7,914.942)	(4,168.478)	(1,629.503)	(2,013.531)
Poverty level (below 100% FPL)	-5.901	11.095	-7.767	0.509
	(8.354)	(7.848)	(5.296)	(3.546)
Poverty level (below 125% FPL)	7.342	-10.925*	3.974	-1.406
	(7.324)	(6.512)	(3.431)	(2.668)
Percentage of high school degrees	1.972	0.909	-0.572	-3.769
	(4.115)	(2.510)	(2.124)	(2.550)
Percentage of bachelor degrees	0.488	0.173	0.114	2.974
	(3.508)	(3.108)	(2.649)	(2.507)
Observations	332	422	512	602

Notes: The data used are from an annual state-year panel for the 1998 to 2014. The unemployment level, poverty level, and education data are from BLS; the state population data are from the Census Bureau; and the GDP, personal income (PI), and personal consumption expenditure (PCE) data are from the Bureau of Economic Analysis Regional Analysis Accounts. The dependent variable is MAW spending in millions in 2014 real dollars of each state in the years 1998-2014. Each cell reports estimates from a separate specification using the model $y_{st} = \beta_0 + \beta_1 X_{st-j} + \epsilon_{st}$ where j corresponds to the lagged period in each column. All regressions include state, year fixed effects, and state-specific time trends. Standard errors are clustered at the state level and shown in parentheses. *** p<0.01, ** p<0.05, * p<0.10.

Table 2: Relationship Between Initial MAW Spending in 1998 and Health Variables in HRS 1992-1998

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Health status	Mobility	ADL	IADL	Mental CESD	Cognition	Hospital stays	Medication	Doctor visit	Nurse home stay
MAW spending ($2014)	-0.0004	0.0048	0.0012	0.0024	-0.0076	0.037	-0.0043**	0.0008	0.0003	-0.0006
	(0.0036)	(0.0039)	(0.0039)	(0.0054)	(0.0048)	(0.0254)	(0.0016)	(0.0014)	(0.0014)	(0.0009)
Mean	3.03	1.16	0.45	0.41	1.64	21.52	0.30	0.78	0.94	0.05
Observations	35,505	24,358	32,778	28,979	28,812	14,560	35,467	32,758	34,534	35,486

Notes: The data used are from the HRS 1992-1998 data for individuals who aged 60 and older. Each cell reports estimates using equation (15) for each dependent variable. Health status is an respondent's self-reported general health status, one for excellent, two for very good, three for good, four for fair, and five for poor.. Mobility/ADL/IADL/CESD is an index of having mobility/ADL/IADL/mental limitation. Cognitive score is an integer value from 0 to 35. The mean row reports the mean of each dependent variable in each column. All models control for individual and year fixed effects and state-specific time trends. Standard errors are clustered at the state level. The detailed definition of each of these outcome variables can be found in Appendix Table A7. *** p<0.01, ** p<0.05, * p<0.10.

has any significant predictive power on MAW spending.[41]

Table 3: Effects of State Economic Conditions on MAW Expenditures

	Dependent Variable: MAW Expenditures in Millions ($2014)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Unemployment rate	-24.088	-655.905			-665.964	-554.591	-646.628	-444.372
	(41.432)	(664.676)			(673.339)	(610.216)	(652.331)	(538.049)
Unemployment rate^2		124.679			126.248	117.396	119.702	100.146
		(116.672)			(117.522)	(111.868)	(112.538)	(100.093)
Unemployment rate^3		-6.430			-6.569	-6.275	-6.290	-5.627
		(5.815)			(5.896)	(5.683)	(5.693)	(5.205)
Employment rate			4.766	-1,805.237	-3,518.965	-2,161.813	-5,523.443	-4,637.753
			(20.693)	(2,290.286)	(3,484.399)	(2,764.805)	(4,907.733)	(4,134.785)
Employment rate^2				30.949	54.751	32.346	87.018	71.775
				(38.535)	(54.661)	(43.360)	(77.363)	(64.593)
Employment rate^3				-0.175	-0.283	-0.161	-0.454	-0.367
				(0.214)	(0.285)	(0.226)	(0.404)	(0.335)
GDP per capita					-11,863.195			-37,929.810
					(20,762.496)			(35,634.248)
PI per capita						0.076		0.192
						(0.076)		(0.151)
PCE per capita							-0.177	-0.316
							(0.148)	(0.240)
State + Year FEs	Y	Y	Y	Y	Y	Y	Y	Y
Observations	816	816	816	816	816	816	816	816
Adjusted R-squared	0.613	0.645	0.613	0.612	0.645	0.650	0.651	0.668

Notes: The data used are from a state-year panel for the 1998-2014 period. The unemployment and employment level data are from BLS; the state population data are from the Census Bureau; the GDP, personal income (PI), and personal consumption expenditure (PCE) data are from the Bureau of Economic Analysis Regional Analysis Accounts. The dependent variable is MAW spending in millions in 2014 real dollars for each state in the years 1999-2014. Each cell reports estimates from a separate specification. All regressions include state and year fixed effects and are weighted using the state population. Standard errors are clustered at the state level and are shown in parentheses. *** p<0.01, ** p<0.05, * p<0.10.

Third, there may be concerns that the insignificance of the association between economic status and MAW expenditure is due to the functional form used in the analysis. To address

[41] We use the raw health variables in the HRS to test the relationship between health outcomes and MAW spending in 1998. Detailed definitions for each health outcome can be found in Appendix Table A7. We also estimate this correlation using dichotomous health indicators, and find no significance. Results are available upon request.

this issue, we estimate the relationship between MAW spending and economic variables using a more flexible functional form in a state-year panel. Specifically, we use quadratic and cubic functions of the unemployment rate and the employment rate for the first four columns of Table 3, and then include different income and consumption variables in columns 5-8. As expected, the unemployment rate displays a negative association (column 1 of Table 3) and the employment rate exhibits a positive association with MAW spending (column 3 of Table 3). However, these associations are not statistically significant in all specifications, including those employing flexible functional forms (columns 1-8). Overall, our findings indicate that state-specific economic variables are not correlated with MAW expenditures.[42]

6 Results

Based on the theoretical framework presented in section 3, we seek to answer two questions. First, we will investigate the extent to which the expansion of MAWs affects informal caregiving. Second, we will examine the role that demographic differences among parents, financial constraints within families, and limited family support play in determining the heterogeneous responses of families.

6.1 Impact of MAWs on informal care

Table 4 presents the estimation results for the first empirical question based on the working sample regarding different care types. The four columns of the table show estimates obtained from four different specifications of Equation (15). The first specification includes the state expenditures, individual and year fixed effects, and state-specific linear time trends. The second specification adds the demographic information of both older adults and their parents, such as age, number of living siblings, and marital status. The third specification further controls for the size of the older population in each state, and the fourth specification includes additional state-level variables, such as unemployment rate, education level, poverty rate, racial/ethnic composition, and political affiliation of the state governors. The MAW expenditures at the state level is adjusted for inflation and expressed in constant dollars with units of $10 million, which is the standard unit for average

[42]Concerns might also be raised that the MAW size could be correlated with lagged economic conditions. For example, if states have high unemployment rates and their fiscal resources are constrained, spending on MAW programs for the older population could be reduced. Appendix Table A8 shows that there is little evidence of any correlations between lagged economic conditions and MAW spending.

yearly expenditures change across states. Panels A to C present the results for any care, errands care, and personal care, respectively.

Table 4: Effects of MAWs on Informal Caregiving

	(1)	(2)	(3)	(4)
	Panel A Dependent Variable: Any Care			
MAW expenditures in 10 millions ($2014)	0.00032*	0.00036**	0.00036**	0.00032**
	(0.00016)	(0.00015)	(0.00014)	(0.00015)
Mean of dependent variables	0.362	0.363	0.363	0.362
Number of individuals	10,892	10,795	10,795	10,754
Number of observations	36,901	36,605	36,605	36,218
	Panel B Dependent Variable: Errands Care			
MAW expenditures in 10 millions ($2014)	0.00046**	0.00050***	0.00051***	0.00055***
	(0.00017)	(0.00016)	(0.00015)	(0.00016)
Mean of dependent variables	0.341	0.342	0.342	0.341
Number of individuals	10,892	10,795	10,795	10,754
Number of observations	36,901	36,605	36,605	36,218
	Panel C Dependent Variable: Personal Care			
MAW expenditures in 10 millions ($2014)	0.00009	0.00009	0.00008	-0.0001
	(0.00013)	(0.00013)	(0.00011)	(0.00013)
Mean of dependent variables	0.098	0.099	0.099	0.099
Number of individuals	10,892	10,795	10,795	10,754
Number of observations	36,901	36,605	36,605	36,218
Demographics	N	Y	Y	Y
State older population	N	N	Y	Y
State characteristics	N	N	N	Y

Notes: This table shows estimates of MAW expenditures on informal caregiving using the working sample of HRS individuals who had at least one living parent in the period 1998-2014. Panel A reports the results for individuals who provided any care to their parents in the last two years: i.e., either errands care or personal care or both. Panel B reports the results for individuals who specifically provided errands care to their parents in the last two years such as helping with household chores, running errands, managing medications, or assisting with transportation. Panel C reports the results for individuals who specifically provided personal care to their parents in the last two years such as help with dressing, eating, bathing, or toileting. Each column corresponds to one model and all models control for individual FEs, year FEs, state-specific linear time trends, and expenditures of other state plans that might cover services similar to those services covered in MAWs. Column 2 adds the demographics of individuals, such as age, age squared, marital status, and number of siblings as well as the demographics of their parents, such as age and marital status. Column 3 adds controls for the share of older population (aged 65+) and the size of the total population in each state. Column 4 adds characteristics of macroeconomic conditions in each state including percentage below poverty level, education level, percentage females, percentage white, percentage married, personal income per capita, employment rate, and political affiliation of the governors. The mean row summarizes the mean of dependent variables in each column. Standard errors in parentheses are clustered at the state level. *** p<0.01, ** p<0.05, * p<0.10

As shown in Table 4 Panel A, a $10 million increase in MAW expenditures leads to a 0.03 percentage point rise in the likelihood of an individual becoming an informal caregiver, which translates to a 0.08 percent increase based on a baseline caregiving probability of 0.36. In Panel B, the effect of errands care provision is larger in magnitude than that the effect of any care provision shown in Panel A. A $10 million increase in MAW expenditures leads to a 0.05 percentage points increase in the likelihood of providing errands care, equivalent to a 0.15 percent increase. However, the effect on personal care provision in Panel C is statistically insignificant from zero. These estimates are consistent across different specifications. Controlling for the demographic characteristics of respondents and their parents, or for state-level characteristics, do not alter the magnitude and the statistical significance of these estimates. These findings are consistent with our expectations, as MAW programs offer more coverage of home-based personal care services and less coverage of errands assistance. Therefore, the price effects and preference effects for personal care are expected to be stronger than those for errands care.

The empirical results confirm that, overall, the impact of MAWs on informal care is positive. However, the theoretical framework presented in section 3 suggests that the expansion of MAW spending may have opposite effects on informal care depending on the families' institutional care reliance and the elasticity of substitution between informal care and formal home-based care. We examine this potential heterogeneous effects of MAWs in the following section.

6.2 Heterogeneous effects of MAWs on informal care

According to our model predictions, the average policy effect detected in section 6.1 is an integration of heterogeneous impacts from multiple dimensions. First, we anticipate that there will be differences in the likelihood of elderly parents using institutional care based on factors such as their age and economic status. Therefore, the expansion of MAWs may cause their demand for informal care to change in different directions, as suggested in Hypothesis 1.[43]

By Likelihood of Choosing Institutional Care: Table 5 presents the heterogeneous effects of MAWs on informal care by characteristics that affect the probability of older parents using nursing home care such as age of parents and family income. The first two columns report the results by

[43]The dependent variable in the following estimates is any care indicator. The patterns of our predictions on any care provision are quite similar to that on errands care indicator. The heterogeneous results of MAWs on errands care are available upon request.

the age of parents. Column 1 demonstrates that a $10 million increase in MAW expenditures leads to a 0.04 percentage point increase in the likelihood of children providing informal care for their parents who are over 85 years old. In contrast, as shown in column 2, the increase in MAW expenditures has no significant effect on the probability of children providing informal care for their parents who are relatively younger. This suggests that older parents who would otherwise typically be in a nursing home are now more likely to stay at home due to the support of MAWs, which results in an increased demand for informal care provided by their children. Columns 3-4

Table 5: Heterogeneous Effects of MAWs on Informal Care in Hypothesis 1

	By Age of Parents		By Income of Individuals	
	(1)	(2)	(3)	(4)
	Older (85+)	Younger	Between Mean and 80 Percentile	Above 95 Percentile
MAW expenditures ($2014)	0.00042**	0.00002	0.00053**	0.00028
	(0.00020)	(0.00034)	(0.00024)	(0.00079)
Mean of dependent variables	0.407	0.308	0.393	0.291
Number of individuals	7,070	6,078	7,769	1,122
Number of observations	19,955	16,263	23,567	2,066

Notes: This table shows heterogeneous estimates of the effects of MAWs on informal care using the working sample of HRS respondents who had at least one living parent in the period 1998-2014. Columns 1-2 report heterogeneous estimates by age of the HRS respondents' parents. The older parents group consists of individuals with a mother over age 85 and a father over age 80, while the younger parents group is made up of individuals who have a mother below age 85 and a father below age 80. Columns 3-4 report heterogeneous estimates by income of the HRS respondents. Column 3 estimates the effect of MAWs for individuals whose income ($2014) falls between the mean and the 80 percentile of the income distribution. Column 4 reports estimates for individuals whose income is above the 95 percentile. The dependent variable is any care indicator of individuals who provided any care to their parents in the last two years: i.e., either errands care or personal care or both. All models control for individual FEs, year FEs, state-specific linear time trends, and expenditures of state plans that might cover services similar to those services covered in MAWs as well as all controls listed in column 4 of Table 4 such as demographics of the respondents and their parents, growth of the older population, and state characteristics. Details of each control can be found in footnotes in Table 4. The mean row summarizes the mean of dependent variables in each column. Standard errors in parentheses are clustered at the state level. *** p<0.01, ** p<0.05, * p<0.10

report the heterogeneous effects of MAWs on informal care by the economic status of families.[44] Families with an income between the mean and the 80th percentile, a $10 million increase in MAWs expenditures results in a 0.05 percentage point increase in the informal care provided by children, while for families in the top 5% income bracket, the expansion of MAWs has little impact. These

[44]Note that we use the income of adult children as a proxy for the family's economic status for two reasons. First, in our two-generation model, we assume that the family's income is derived from the labor market outcomes of the children. Second, as information on the parents' income in HRS is unavailable, we use the children's income to represent the economic status of the entire family.

results are consistent with the predictions outlined in Hypothesis 1 in section 3. For families in column 3, nursing home expenses can be afforded but are not comfortably affordable out of pocket. As a result, the expansion of MAWs has a more pronounced impact on their budgets and on the informal care provided by their children. On the other hand, for the wealthiest families, nursing home costs are not a hindrance, and the expansion of MAWs does not significantly affect their budgets. Thus, there are no observable changes in informal caregiving among these families. For detailed distribution of income, see Appendix Figure A7 for reference.

Our second model prediction, as outlined in Hypothesis 2, explores the different impacts of the expansion of MAW on a subset of people who only choose home-based care. This heterogeneity comes from the recipients' varying perceptions about informal and formal home-based care; i.e., whether they treat the two care types as complements or close to perfect substitutes. Although the issue of these differing perspectives was not directly asked in the HRS questionnaire, we consider the characteristics that may contribute to inconsistent views.

By Financial Constraint: We posit that financial constraints in families with LTC needs can result in various types of substitution. As very poor families are often unable to hire a formal caregiver when the parents require more intensive care at home, the adult children in these families tend to provide informal care for their parents themselves. In these families, informal care and formal home-based care are more likely to be seen as substitutes. By contrast, as families who are not extremely poor may have the resources to hire formal home-based aides, the adult children in these families tend to provide informal care that is less substitutable by formal caregivers. Thus, these families are more likely to view informal care and formal home-based care as complementary to each other. This prediction is supported by the results in Table 6. Among families having a parent with dementia (column 1) or families having a parent who needs personal care (column 3), a low-income status (income of individuals is less than the sample mean) leads to a 0.3 or 0.2 percent points, respectively, decrease in the probability of informal caregiving with a $10 million increase in MAW expenditures, consistent with our prediction that these families view the two care types as substitutes. In contrast, among families with a better economic status having needy parents (columns 2 and 4), the expansion of MAWs leads to a 0.1 or 0.3 percentage point increase in informal caregiving, suggesting that these families view the two care types as complements.

By Availability of Family Support: We argue that the level of support available within a

Table 6: Heterogeneous Effects of MAWs on Informal Care in Hypothesis 2

	Parents With Dementia		Parents With Personal Care Needs	
	(1)	(2)	(3)	(4)
	Poor	Not Poor	Poor	Not Poor
MAW expenditures ($2014)	-0.00262*	0.00121	-0.00213***	0.00291***
	(0.00150)	(0.00110)	(0.00064)	(0.00073)
Mean of dependent variables	0.507	0.501	0.487	0.486
Number of individuals	911	632	1,489	888
Number of observations	3,562	2,562	5,736	3,717

Notes: This table shows heterogeneous estimates of the effects of MAWs on informal care using the sub-samples of HRS respondents who had living parents with dementia or with personal care needs in the 1998-2014 period. Columns 1-2 report heterogeneous estimates by income status of the HRS respondents among the sub-sample of their parents with dementia. Column 1 refers to the group of individuals who have income less than %138 FPL (around $27,500 in 2021 adjusted for inflation ($2014)) and who have a parent (either a mother or a father) with memory diseases. Column 2 shows the group of individuals who have income otherwise and who have a parent (either a mother or a father) with memory diseases. Columns 3-4 report heterogeneous estimates by the income of the HRS respondents among the sub-sample of their parents with personal care needs. Column 3 estimates the effects of MAWs for individuals whose income ($2014) is lower than $27,500 ($2014) and whose parents need personal care. Column 4 shows the group of individuals who have income otherwise and whose parents need personal care. The dependent variable is any care indicator of individuals who provided any care to their parents in the last two years: i.e., either errands care or personal care or both. All models control for individual FEs, year FEs, state-specific linear time trends, and expenditures of state plans that might cover services similar to those covered in MAWs, as well as all controls listed in column 4 of Table 4 such as demographics of the respondents and their parents, growth of the older population, and state characteristics. Details of each control can be found in footnotes in Table 4. The mean row summarizes the mean of dependent variables in each column. Standard errors in parentheses are clustered at the state level. *** p<0.01, ** p<0.05, * p<0.10

family also leads to divergent views on the substitution between informal care and formal home-based care. Families with inadequate support may face difficulties in fulfilling the LTC needs of an elderly parent, even if the adult children are willing to provide care. Consequently, in these families, the involvement of formal care providers is necessary, creating a complementary relationship between informal and formal home-based care. Our hypothesis is substantiated by the empirical findings presented in Table 7. Specifically, column 1 shows that for a parent who lives alone without a partner, and therefore lacks additional support, a $10 million increase in MAW expenditures leads to a 0.05 percentage point increase in the informal care provided by adult children. Conversely, if a parent lives with a partner, the impact of MAWs becomes much smaller and is not statistically significant (column 2). In terms of family size, column 3 indicates

Table 7: Heterogeneous Effects of MAWs on Informal Care in Hypothesis 2

	By Marital Status of Parents		By Siblings of Respondents	
	(1)	(2)	(3)	(4)
	Not Married	Married	Only Child	Have Siblings
MAW expenditures ($2014)	0.00048**	0.0003	0.00033	0.00008
	(0.00020)	(0.00035)	(0.00105)	(0.00027)
Mean of dependent variables	0.403	0.253	0.457	0.382
Number of individuals	8,609	3,725	849	4,531
Number of observations	25,740	10,478	2,444	14,707

Notes: This table shows heterogeneous estimates of the effects of MAWs on informal care using the working sample of HRS respondents who had at least one living parent in the 1998-2014 period. Columns 1-2 report heterogeneous estimates by marital status of the HRS respondents' parents. Column 1 refers to the group of individuals whose parents are divorced or widowed. Column 2 shows the group of individuals whose parents are married. Columns 3-4 report heterogeneous estimates by the number of siblings of the HRS respondents. Column 3 estimates the effects of MAWs for individuals who are only children. Column 4 shows the group of individuals who have at least one sibling. The dependent variable is any care indicator of individuals who provided any care to their parents in the last two years: i.e., either errands care or personal care or both. All models control for individual FEs, year FEs, state-specific linear time trends, and expenditures of state plans that might cover services similar to those covered in MAWs, as well as all controls listed in column 4 of Table Table 4 such as demographics of the respondents and their parents, growth of the older population, and state characteristics. Details for each control can be found in the footnotes in Table 4. The mean row summarizes the mean of dependent variables in each column. Standard errors in parentheses are clustered at the state level. *** p<0.01, ** p<0.05, * p<0.10

a larger positive effect of MAWs on informal care provision for smaller families, while the effect is much smaller for larger families (column 4), albeit not statistically significant. These findings provide support to our hypothesis that the availability of family support, as measured by the presence of a partner and the number of siblings of adult children, influences the substitutable/complementary relationship between in-home formal and informal care.

6.3 Living arrangement change in response to MAWs

So far, we examine the interior and corner solutions of our theory separately in the section 6.2. As suggested by our model, MAWs lower the cost of home-based formal care such that older parents could end up in the corner solution in which they completely opt out of nursing home services and turn to home-based care. In this section, we analyze this switching effect in detail. Specifically, we check whether the MAW affects the likelihood of entering a nursing home by estimating its effect

on choices between in-home care and nursing home care. To do so, we utilize the question in HRS, which asks respondents about the living arrangements of their parents. Based on this information, we construct a nursing home indicator and a living with the respondent indicator to determine whether the respondent is living with their parent(s). In addition, we use information on whether the parent is living within 10 miles of the respondent to construct a living within 10 miles indicator.

Table 8 presents estimates of the impact of MAWs on the likelihood of nursing home placement and living arrangements for older parents. Specifically, columns 1 and 2 report results for the respondents' mothers and fathers, respectively, showing that MAWs can help older individuals avoid institutionalization. Our results indicate that a $10 million increase in MAW spending decreases the likelihood of living in a nursing facility by 0.02 percentage points (0.22 percent relative to the outcome mean) for mothers and 0.01 percentage points (0.38 percent relative to the outcome mean) for fathers , consistent with the predictions in section 3 although the estimates are not statistically significant. Moreover, columns 3 and 4 demonstrate that parents who have access to more generous MAWs are more likely to live with their adult children. A $10 million increase in MAW expenditures increases the likelihood that a mother is living with her adult child by 0.02 percentage points (0.38 percent relative to the outcome mean), while the effect for fathers is close to zero. In columns 5 and 6, we estimate the probability of parents living within 10 miles of their adult children. The estimates for both mothers and fathers are positive and statistically significant. Specifically, for mothers, the likelihood of living close to their children increases by 0.11 percentage points, which is 0.25 percent relative to the sample mean, while for fathers, the effect size is similar, at 0.10 percentage points, representing a 0.26 percent relative to the mean. Overall, our findings suggest that as the expansion of MAWs allow more older individuals to opt out of the nursing home setting and choose more home-based care.

6.4 Robustness

The key assumption of our identification strategy is that the within-individual variation in MAW spending over the years is plausibly exogenous, and that individuals are less likely to anticipate their treatment status and to change their informal caregiving behavior in response. However, there several factors that could bias our results. First, concerns may be raised that the variation in MAW spending could be driven by some unobservable shocks that could also affect informal

Table 8: Channels Through Which MAWs Affect Informal Care

	Nursing Home		Living With Respondents		Living Within 10 Miles of Respondents	
	(1)	(2)	(3)	(4)	(5)	(6)
	Mother	Father	Mother	Father	Mother	Father
MAW expenditures ($2014)	-0.00015	-0.00006	0.00023*	0.00000	0.00105***	0.00090**
	(0.00010)	(0.00007)	(0.00013)	(0.00006)	(0.00038)	(0.00037)
Mean of dependent variables	0.067	0.016	0.060	0.011	0.426	0.342
Number of individuals	10,754	10,754	10,754	10,754	8,785	4,374
Number of observations	36,218	36,218	36,218	36,218	28,989	12,962

Notes: This table shows the channels through which MAWs affect informal care for HRS respondents who had at least one living parent in the 1998-2014 period. The first two columns represent the effect of MAWs on being in a nursing home for the respondents' mothers and fathers, respectively. Columns 3 and 4 refer to the indicator of living with the HRS respondent, which is 1 if the parent is living with the respondent and is 0 otherwise. Columns 5 and 6 refer to the indicator of living within 10 miles of the respondent, which is 1 if the parent is living nearby and is 0 otherwise. All models control for individual FEs, year FEs, state-specific linear time trends, and expenditures of other state plans that might cover services similar to those covered in MAWs, as well as all controls listed in column 4 of Table 4 such as demographics of the respondents and their parents, growth of the older population, and state characteristics. Details for each control can be found in the footnotes in Table 4. The mean row summarizes the mean of dependent variables in each column. Standard errors in parentheses are clustered at the state level. *** p<0.01, ** p<0.05, * p<0.10

care outcomes. For example, during the Covid-19 pandemic in 2020, a state government may have reduced MAW spending at the same time as adult children were finding it difficult to provide informal care to their parents. To alleviate this concern, column 4 in Table 4 controls for detailed state-level demographic and economic factors, and the results of the effects MAW spending on informal care are quite robust.

Second, one goal of the implementation of MAWs is to reduce Medicaid spending in higher-cost settings such as nursing homes. Concerns might be raised that the increase in informal care could come from the decrease in Medicaid spending on nursing homes. To address this concern, Appendix Table A9 directly regresses Medicaid nursing home spending on informal care outcomes. Column 1 reports the estimates using our main specification (15), and columns 2-5 add controls for nursing home capacity, such as the number of facilities, the number of nursing home beds, and the number of nursing home residents. All of these estimates are small in magnitude and are statistically insignificant. In addition, Appendix Table A10 estimates the effects of MAW spending on informal care outcomes in specification (15), which further controls for nursing home variables. All of our main estimates are quite stable and robust across specifications.

Third, concerns could arise that the main results might be sensitive to the construction of our informal care outcome. Our main estimates of Table 4 use zero hours as the cutoff for creating informal care indicators. In the HRS, the care questions ask respondents to recall the total number of hours of care they provided in the two years prior to the interview date. Many papers have challenged the credibility of these recall numbers. To check the sensitivity of our estimates, Appendix Table A11 reports the effects of MAW spending on informal care using different cutoffs. Column 1 presents the main estimates and columns 2-5 show the results for informal care with all the potential cutoffs utilized in the literature. The magnitude of the coefficients in all specifications is quite robust across dependent variables and across panels.

7 Conclusion

Informal care is a critical component of the services that older adults receive from their social networks, which contribute to their ability to age with dignity. However, the importance of family members in caring for their frail and elderly loved ones has received less attention. This is partly

due to the fact that informal care is unpaid, and its benefits, provided by family members, are not explicitly valued in the market. Through an evaluation of the impact of government-subsidized formal in-home care by Medicaid MAWs on the provision of informal care, we may uncover the value of informal care through a revealed preference approach.

We first present a theoretical model with a two-generation family including an older parent and a potential caregiver and introduce the substitution elasticity between informal care and formal home-based care. In theory, the effect of MAWs on informal caregiving is ambiguous. Then we empirically investigate how the government-subsidized MAWs affect the provision of informal care. Overall, the results show that a 10 percent increase in MAW expenditures increases the likelihood of becoming an informal caregiver by 0.1 percentage points, or approximately a 0.3 percent effect relative to the outcome mean. The increase in caregiving is primarily in the form of errands assistance, with a 10 percent increase in MAW expenditures increasing the likelihood of providing errands care by about 0.4 percent.

Moreover, we find evidence that the effects of MAWs on informal care vary by family characteristics, such as likelihood of residing in nursing homes, financial constraints, and availability of family help. These factors determine the extent to which informal care can be substituted or complemented by formal home-based care, as predicted based on our theory. Specifically, our analysis reveals that the impact of MAWs on informal care provision is negative for older adults in financially constrained families with LTC needs. In these families, informal care and formal home-based care are seen as substitutes since the lower cost of formal home-based care covered by the program enables older parents to access LTC care more easily. Conversely, in families with older parents (aged 85+) who would otherwise have relied on institutional care, families with middle income, or families with limited help support, informal care and formal home-based care are more likely to function as complements such that the availability of MAWs has a positive impact on informal care provision.

How big are these estimates and how can we understand the value of the MAWs in context? The elasticity estimate of the impact of MAW expenditures on informal caregiving is around 0.03 calculated at the respective sample mean, implying that a one percent increase in MAW spending leads to a 0.03 percent increase in the probability of becoming an informal caregiver. Now suppose there is a 10 percent increase in MAW generosity – which is, on average, equal to about $32

million per annual year, the likelihood of becoming an informal caregiver is expected to increase by 0.3 percent. Thus, the number of informal caregivers will increase by 150,000 with a 10 percent expansion of MAWs using the number of informal caregivers at 50 million in 2014. Given the average hourly wage for a home health aide is $13 according to the Bureau of Labor Statistics and the annual care hours at 120 in our sample mean, the annual value for 150,000 informal caregivers is about $234 million. Therefore, the MAW program has contained Medicaid expenditures by encouraging old populations to use more in-home LTC services while shifting burdens onto informal caregivers. However, it is important to note that families with different characteristics respond heterogeneously to MAWs in terms of their informal care burden. In practice, our findings implicate the potential that policymakers can customize the individual needs based on their revealed preference for in-home formal care and informal care and improve overall welfare without extra costs.

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Appendix

A Theoretical Framework

A.1 Solution when $h_n = 0$

The optimization in equation (12) can be expressed by solving the value function such that:

$$\begin{aligned}\mathcal{L} = V(C) + W(L) + \lambda_1 \left\{ L - \left[Q_c^\sigma \cdot f(h_c)^\sigma + Q_m^\sigma \cdot h_m^\sigma \right]^{\frac{1}{\sigma}} \right\} \\ + \lambda_2 \left\{ R + wT - wh_c - C - p_m h_m \right\}\end{aligned} \tag{16}$$

Taking the partial derivatives with respect to h_c and h_m, we can show that:

$$h_m = f(h_c) \cdot f'(h_c)^{\frac{1}{\sigma-1}} \cdot \left(\frac{p_m \cdot Q_c^\sigma}{w \cdot Q_m^\sigma} \right)^{\frac{1}{\sigma-1}} \tag{17}$$

By assuming $W'(L) = 1$, we can obtain the following:

$$\begin{aligned}\left[Q_c^\sigma \cdot f(h_c)^\sigma + Q_m^\sigma \cdot h_m^\sigma \right]^{\frac{1-\sigma}{\sigma}} \cdot Q_c^\sigma \cdot f(h_c)^{\sigma-1} \cdot f'(h_c) = -\frac{\lambda_2}{\lambda_1} \cdot w = w \cdot V'(C) \\ = w \cdot V'(R + wT - wh_c - p_m h_m)\end{aligned} \tag{18}$$

By combining equation (17) with (18), we can show that:

$$Q_c^\sigma \cdot f'(h_c)^{\frac{\sigma}{1-\sigma}} + Q_m^\sigma \cdot \left(\frac{p_m Q_c^\sigma}{w Q_m^\sigma} \right)^{\frac{\sigma}{\sigma-1}} = \left[\frac{w \cdot V'(R + wT - wh_c - p_m h_m)}{Q_c^\sigma} \right]^{\frac{\sigma}{1-\sigma}} \tag{19}$$

Therefore, the optimization allocation is equivalent to solving the following:

$$\begin{aligned}Y &= Q_c^\sigma \cdot f'(h_c)^{\frac{\sigma}{1-\sigma}} + \left(\frac{p_m Q_c^\sigma}{w Q_m} \right)^{\frac{\sigma}{\sigma-1}} - \left[\frac{w \cdot V'(R + wT - wh_c - p_m h_m)}{Q_c^\sigma} \right]^{\frac{\sigma}{1-\sigma}} \\ &= Q_c^\sigma \cdot f'(h_c)^{\frac{\sigma}{1-\sigma}} + \left(\frac{p_m Q_c^\sigma}{w Q_m} \right)^{\frac{\sigma}{\sigma-1}} - \left\{ \frac{w \cdot V' \left[R + wT - wh_c - f(h_c) \cdot f'(h_c)^{\frac{1}{\sigma-1}} \cdot \left(\frac{p_m^\sigma \cdot Q_c^\sigma}{w \cdot Q_m^\sigma} \right)^{\frac{1}{\sigma-1}} \right]}{Q_c^\sigma} \right\}^{\frac{\sigma}{1-\sigma}}\end{aligned} \tag{20}$$

From equation (20), we can observe that Y is dependent on h_c, p_m, and Q_m. As a result, we

can calculate the partial derivatives of Y with respect to each of these variables.

$$\begin{aligned}
\frac{\partial Y}{\partial p_m} &= \frac{\sigma}{\sigma-1}\cdot\left(\frac{p_m Q_c^\sigma}{wQ_m}\right)^{\frac{1}{\sigma-1}}\cdot\frac{Q_c^\sigma}{wQ_m} \\
&\quad+\frac{\sigma}{1-\sigma}\cdot\left(\frac{w\cdot V'}{Q_c^\sigma}\right)^{\frac{2\sigma-1}{1-\sigma}}\cdot\frac{w}{Q_c^\sigma}\cdot V''\cdot\left[f(h_c)\cdot f'(h_c)^{\frac{1}{\sigma-1}}\left(\frac{Q_c^\sigma}{w\cdot Q_m^\sigma}\right)^{\frac{1}{\sigma-1}}\cdot\frac{\sigma}{\sigma-1}\cdot p_m^{\frac{1}{\sigma-1}}\right] \\
&= \frac{\sigma}{\sigma-1}\cdot\underbrace{\left(\frac{p_m Q_c^\sigma}{wQ_m}\right)^{\frac{1}{\sigma-1}}}_{>0}\cdot\underbrace{\frac{Q_c^\sigma}{wQ_m}}_{>0} \\
&\quad+\underbrace{\left[-\left(\frac{\sigma}{1-\sigma}\right)^2\right]}_{<0}\cdot\underbrace{\left[\frac{w\cdot V'}{Q_c^\sigma}\right]^{\frac{2\sigma-1}{1-\sigma}}}_{>0}\cdot\underbrace{\frac{w}{Q_c^\sigma}}_{>0}\cdot\underbrace{V''}_{<0}\cdot\underbrace{\left[f(h_c)\cdot f'(h_c)^{\frac{1}{\sigma-1}}\left(\frac{Q_c^\sigma}{w\cdot Q_m^\sigma}\right)^{\frac{1}{\sigma-1}}\cdot p_m^{\frac{1}{\sigma-1}}\right]}_{>0}
\end{aligned} \tag{21}$$

$$\begin{aligned}
\frac{\partial Y}{\partial Q_m} &= -\frac{\sigma}{\sigma-1}\cdot\left(\frac{p_m Q_c^\sigma}{wQ_m}\right)^{\frac{1}{\sigma-1}}\cdot\frac{p_m Q_c^\sigma}{w}\cdot\frac{1}{Q_m^2} \\
&\quad+\frac{\sigma}{1-\sigma}\cdot\left(\frac{w\cdot V'}{Q_c^\sigma}\right)^{\frac{2\sigma-1}{1-\sigma}}\cdot\frac{w}{Q_c^\sigma}\cdot V''\cdot\left[f(h_c)\cdot f'(h_c)^{\frac{1}{\sigma-1}}\left(\frac{p_m^\sigma Q_c^\sigma}{w}\right)^{\frac{1}{\sigma-1}}\cdot\frac{-\sigma}{\sigma-1}\cdot Q_m^{\frac{1-2\sigma}{\sigma-1}}\right] \\
&= \frac{-\sigma}{\sigma-1}\cdot\underbrace{\left(\frac{p_m Q_c^\sigma}{wQ_m}\right)^{\frac{1}{\sigma-1}}}_{>0}\cdot\underbrace{\frac{p_m Q_c^\sigma}{w}}_{>0}\cdot\underbrace{\frac{1}{Q_m^2}}_{>0} \\
&\quad+\underbrace{\left[\left(\frac{\sigma}{1-\sigma}\right)^2\right]}_{>0}\cdot\underbrace{\left(\frac{w\cdot V'}{Q_c^\sigma}\right)^{\frac{2\sigma-1}{1-\sigma}}}_{>0}\cdot\underbrace{\frac{w}{Q_c^\sigma}}_{>0}\cdot\underbrace{V''}_{<0}\cdot\underbrace{\left[f(h_c)\cdot f'(h_c)^{\frac{1}{\sigma-1}}\left(\frac{p_m^\sigma Q_c^\sigma}{w}\right)^{\frac{1}{\sigma-1}}\cdot Q_m^{\frac{1-2\sigma}{\sigma-1}}\right]}_{>0}
\end{aligned} \tag{22}$$

$$\begin{aligned}
\frac{\partial Y}{\partial h_c} &= Q_c^\sigma\cdot\frac{\sigma}{1-\sigma}\cdot f'(h_c)^{\frac{2\sigma-1}{1-\sigma}}\cdot f''(h_c) \\
&\quad+\left[\frac{w\cdot V'}{Q_c^\sigma}\right]^{\frac{2\sigma-1}{1-\sigma}}\cdot\frac{\sigma}{1-\sigma}\cdot\frac{w}{Q_c^\sigma}\cdot V''\cdot\left\{w+\left(\frac{p_m^\sigma Q_c^\sigma}{wQ_m^\sigma}\right)^{\frac{1}{\sigma-1}}\cdot\left[f'(h_c)^{\frac{\sigma}{\sigma-1}}+\frac{1}{\sigma-1}\cdot f(h_c)\cdot f'(h_c)^{\frac{2-\sigma}{\sigma-1}}\cdot f''(h_c)\right]\right\} \\
&= \frac{\sigma}{1-\sigma}\cdot\left\{\underbrace{Q_c^\sigma}_{>0}\cdot\underbrace{f'^{\frac{2\sigma-1}{1-\sigma}}}_{>0}\cdot\underbrace{f''}_{<0}+\underbrace{\left[\frac{w\cdot V'}{Q_c^\sigma}\right]^{\frac{2\sigma-1}{1-\sigma}}}_{>0}\cdot\underbrace{\frac{w}{Q_c^\sigma}\cdot V''}_{<0}\cdot\left[\underbrace{w}_{>0}+\underbrace{\left(\frac{p_m^\sigma Q_c^\sigma}{wQ_m^\sigma}\right)^{\frac{1}{\sigma-1}}}_{>0}\cdot\left(\underbrace{f'^{\frac{\sigma}{\sigma-1}}}_{>0}+\frac{1}{\sigma-1}\cdot\underbrace{f\cdot f'^{\frac{2-\sigma}{\sigma-1}}\cdot f''}_{<0}\right)\right.\right.
\end{aligned} \tag{23}$$

Further, from equations (21)-(23), we can get the following:

$$\begin{aligned}\frac{dh_c}{dp_m} &= -\frac{\frac{\partial Y}{\partial p_m}}{\frac{\partial Y}{\partial h_c}} \\ &= -\frac{\frac{\sigma}{\sigma-1}\cdot\left(\frac{p_m Q_c^\sigma}{wQ_m}\right)^{\frac{1}{\sigma-1}}\cdot\frac{Q_c^\sigma}{wQ_m}+\left[-\left(\frac{\sigma}{1-\sigma}\right)^2\right]\cdot\left[\frac{w\cdot V'}{Q_c^\sigma}\right]^{\frac{2\sigma-1}{1-\sigma}}\cdot\frac{w}{Q_c^\sigma}\cdot V''\cdot\left[f\cdot f'^{\frac{1}{\sigma-1}}\left(\frac{Q_c^\sigma}{w\cdot Q_m^\sigma}\right)^{\frac{1}{\sigma-1}}\cdot p_m^{\frac{1}{\sigma-1}}\right]}{\frac{\sigma}{1-\sigma}\cdot\left\{Q_c^\sigma\cdot f'^{\frac{2\sigma-1}{1-\sigma}}\cdot f''+\left[\frac{w\cdot V'}{Q_c^\sigma}\right]^{\frac{2\sigma-1}{1-\sigma}}\cdot\frac{w}{Q_c^\sigma}\cdot V''\cdot\left[w+\left(\frac{p_m^\sigma Q_c^\sigma}{wQ_m^\sigma}\right)^{\frac{1}{\sigma-1}}\cdot\left(f'^{\frac{\sigma}{\sigma-1}}+\frac{1}{\sigma-1}\cdot f\cdot f'^{\frac{2-\sigma}{\sigma-1}}\cdot f''\right)\right]\right\}}\end{aligned} \tag{24}$$

$$\begin{aligned}\frac{dh_c}{dQ_m} &= -\frac{\frac{\partial Y}{\partial Q_m}}{\frac{\partial Y}{\partial h_c}} \\ &= -\frac{-\frac{\sigma}{\sigma-1}\cdot\left(\frac{p_m Q_c^\sigma}{wQ_m}\right)^{\frac{1}{\sigma-1}}\cdot\frac{1}{Q_m^2}\cdot\frac{p_m Q_c^\sigma}{w}+\left[\left(\frac{\sigma}{1-\sigma}\right)^2\right]\cdot\left[\frac{w\cdot V'}{Q_c^\sigma}\right]^{\frac{2\sigma-1}{1-\sigma}}\cdot\frac{w}{Q_c^\sigma}\cdot V''\cdot\left[f\cdot f'^{\frac{1}{\sigma-1}}\left(\frac{p_m^\sigma Q_c^\sigma}{w}\right)^{\frac{1}{\sigma-1}}\cdot Q_m^{\frac{1-2\sigma}{\sigma-1}}\right]}{\frac{\sigma}{1-\sigma}\cdot\left\{Q_c^\sigma\cdot f'^{\frac{2\sigma-1}{1-\sigma}}\cdot f''+\left[\frac{w\cdot V'}{Q_c^\sigma}\right]^{\frac{2\sigma-1}{1-\sigma}}\cdot\frac{w}{Q_c^\sigma}\cdot V''\cdot\left[w+\left(\frac{p_m^\sigma Q_c^\sigma}{wQ_m^\sigma}\right)^{\frac{1}{\sigma-1}}\cdot\left(f'^{\frac{\sigma}{\sigma-1}}+\frac{1}{\sigma-1}\cdot f\cdot f'^{\frac{2-\sigma}{\sigma-1}}\cdot f''\right)\right]\right\}}\end{aligned} \tag{25}$$

The direction of $\frac{dh_c}{dp_m}$ thus depends on the value of σ

A.2 Discussion when σ approaches 1

When $\sigma = 1$ and $h_n = 0$, the optimization problem can be written as follows:

$$\begin{aligned}\max_{C,h_c,h_m,h_w}\quad & V(C)+W(L) \\ \text{s.t.}\quad & L = Q_c\cdot f(h_c)+Q_m\cdot h_m \\ & h_w+h_c\le T \\ & C+p_m\cdot h_m\le R+w\cdot h_w\end{aligned} \tag{26}$$

By solving for the optimal solution of equation (26), we obtain the following condition:

$$f'(h_c^*) = \frac{wQ_m}{Q_c p_m} \tag{27}$$

Therefore, the relationship between h_c^* and p_m is:

$$\frac{dh_c^*}{dp_m} = \frac{1}{f''(h_c)} \cdot \left(-\frac{wQ_m}{Q_c} \right) \frac{1}{p_m^2} > 0 \tag{28}$$

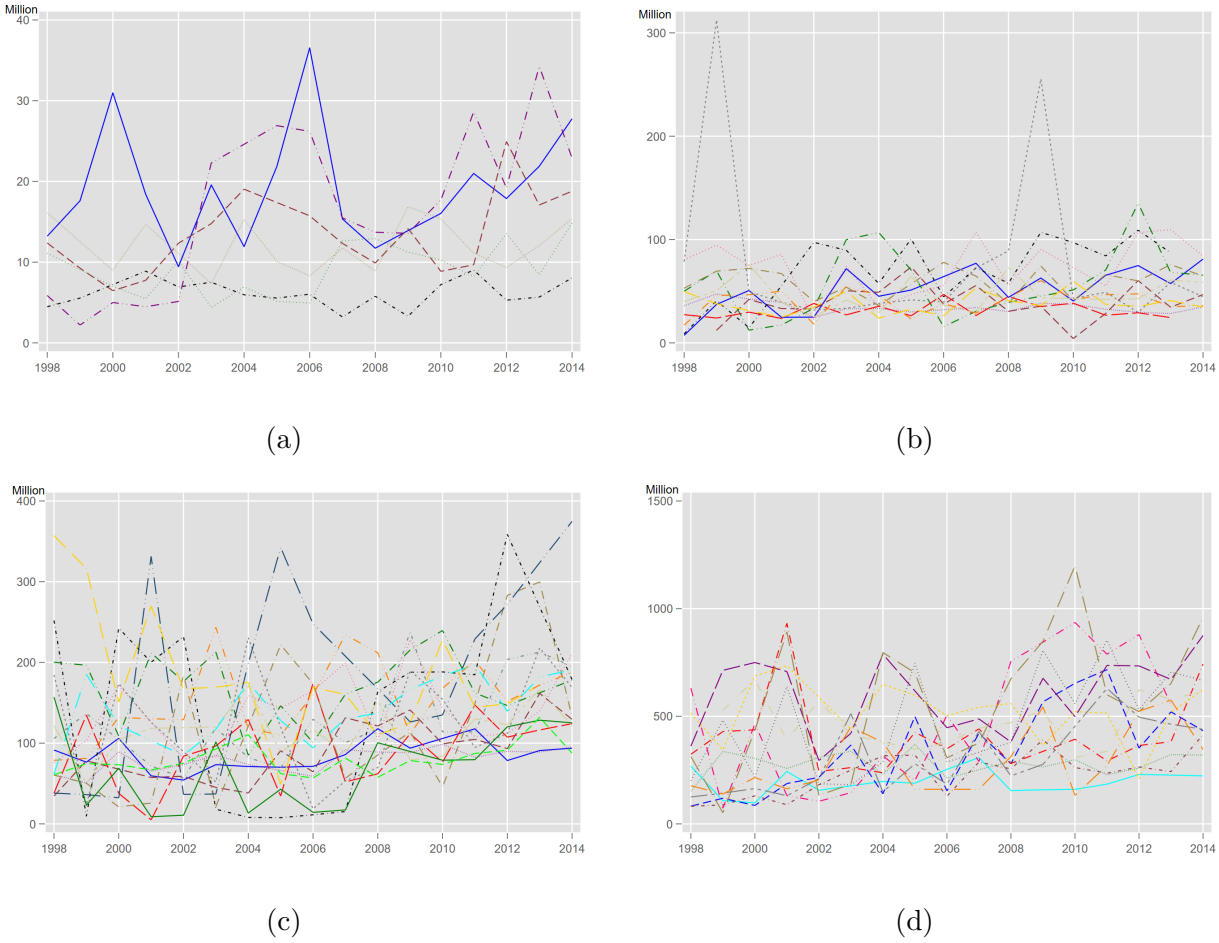
And the relationship between h_c^* and Q_m is:

$$\frac{dh_c^*}{dp_m} = \frac{1}{f''(h_c)} \cdot \left(\frac{wQ_m}{Q_c} \right) < 0 \tag{29}$$

Therefore, the expansion of the MAW policy will result in a decrease in p_m and an increase in Q_m, which will, in turn, lead to a reduction in the supply of informal care.

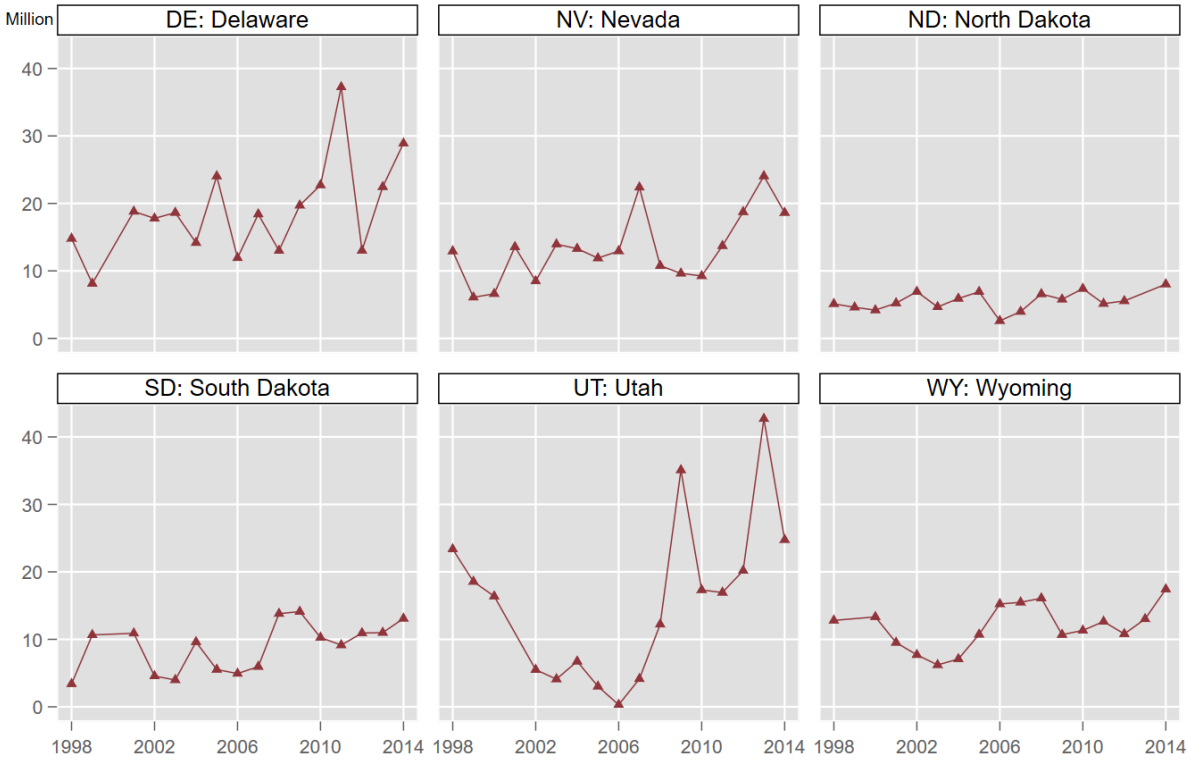
B Figures

Figure A1: Variation in MAW Expenditures ($2014) by State in 1998-2014



Notes: The four graphs display the MAW expenditures ($2014) from 1998 to 2014 across states. Each line of the sub-graph (a) corresponds to the states of Delaware, Nevada, North Dakota, South Dakota, Utah, and Wyoming; each line of sub-graph (b) corresponds to the states of Alaska, Hawaii, Idaho, Indiana, Iowa, Louisiana, Maine, Montana, Nebraska, New Hampshire, New Mexico, Rhode Island, and Vermont; each line of sub-graph (c) corresponds to the states of Alabama, Arizona, Arkansas, Connecticut, Kansas, Kentucky, Maryland, Massachusetts, Michigan, Mississippi, Missouri, New Jersey, New York, Oklahoma, South Carolina, Tennessee, and West Virginia; each line of sub-graph (d) corresponds to the states of California, Colorado, Florida, Georgia, Illinois, Minnesota, North Carolina, Ohio, Oregon, Pennsylvania, Texas, Virginia, Washington, and Wisconsin.

Figure A2: Variation in MAW Expenditures ($2014) Across States

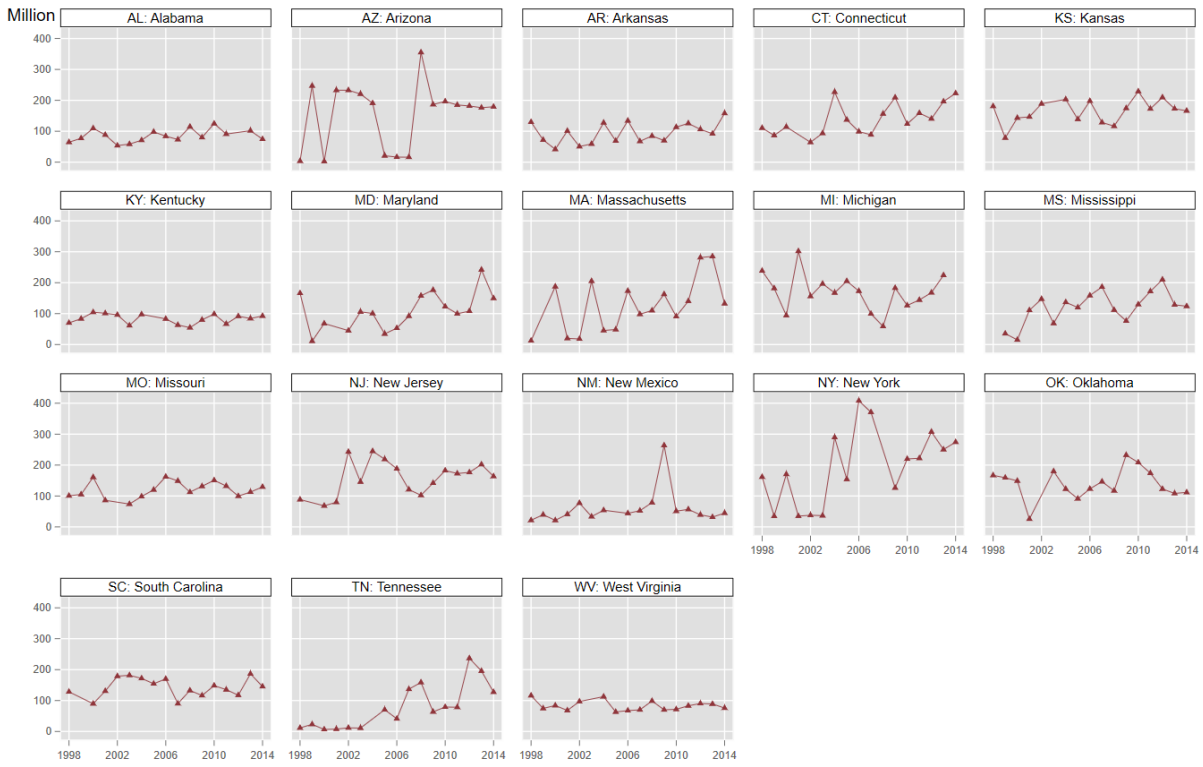


Notes: The plot displays the variation in MAW expenditures ($2014) by state for the years 1998-2014. Each sub-graph plots the MAW policy change for a specific state.

Figure A3: Variation in MAW Expenditures ($2014) Across States

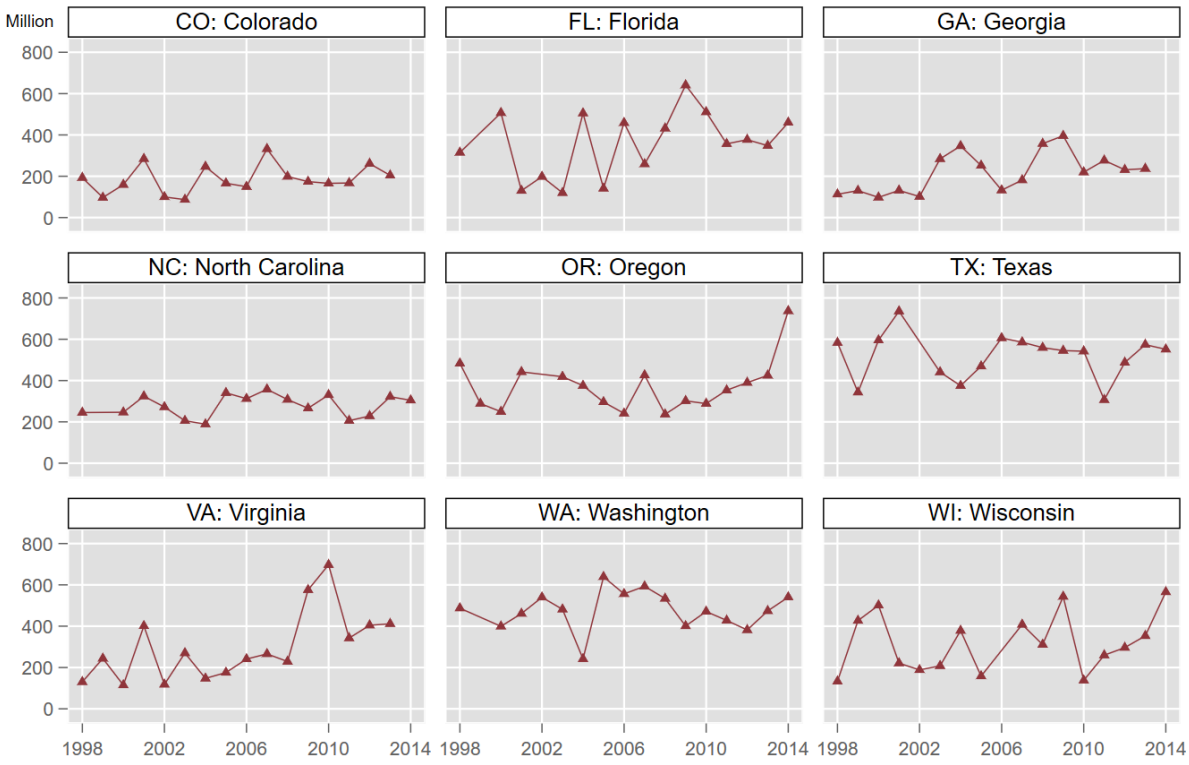
Notes: The plot displays the variation in MAW expenditures ($2014) by state for the years 1998-2014. Each sub-graph plots the MAW policy changes for a specific state.

Figure A4: Variation in MAW Expenditures ($2014) Across States



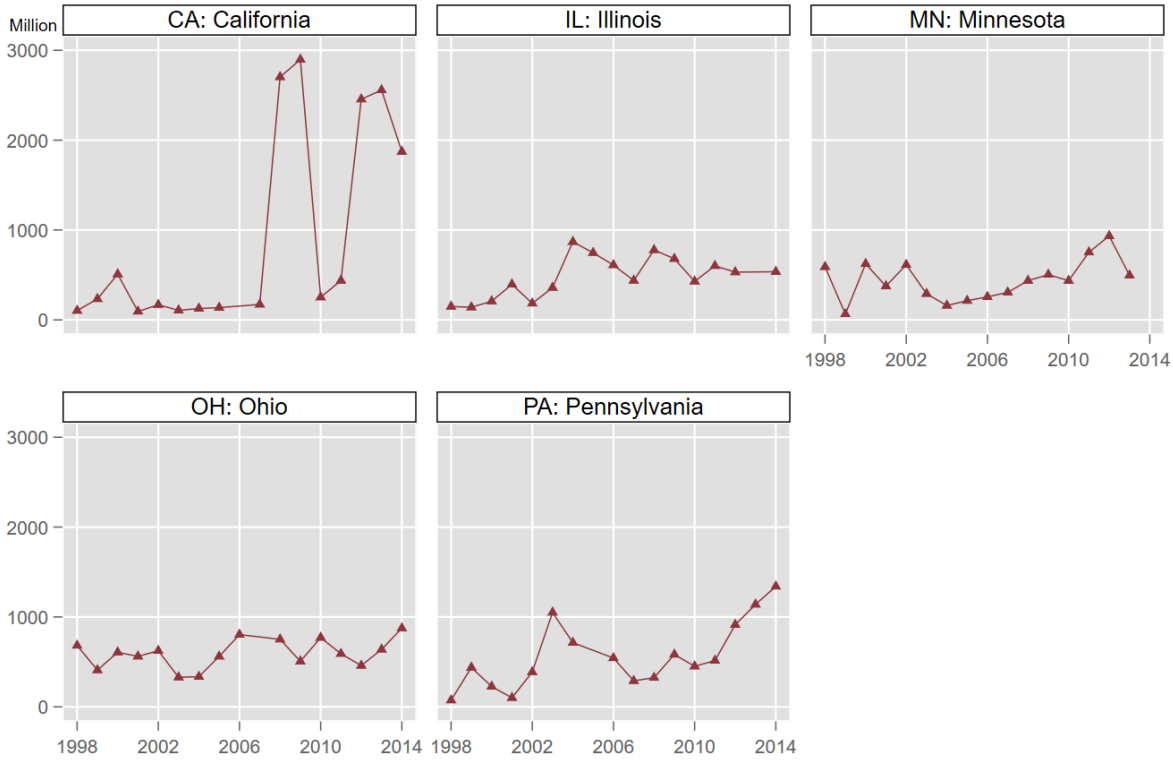
Notes: The plot displays the variation in MAW expenditures ($2014) by state for the years 1998-2014. Each sub-graph plots the MAW policy changes for a specific state.

Figure A5: Variation in MAW Expenditures ($2014) Across States



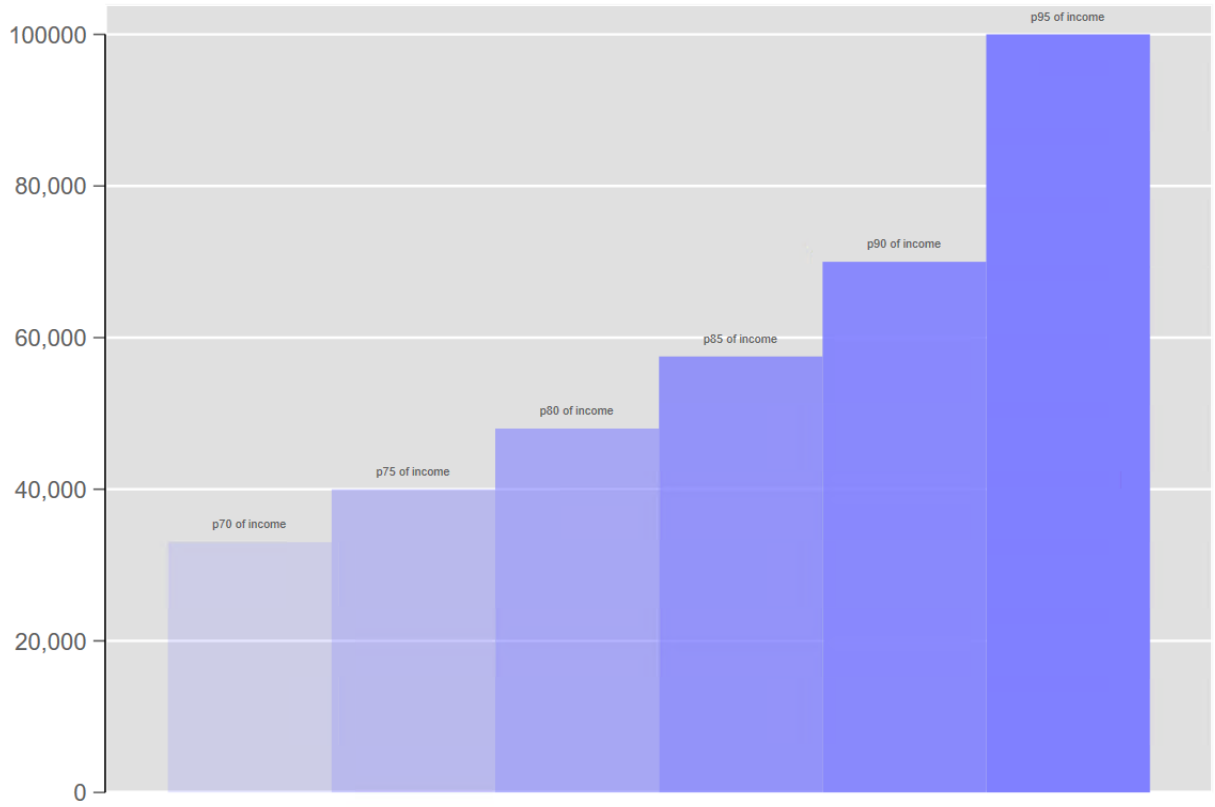
Notes: The plot displays the variation in MAW expenditures ($2014) by state for the years 1998-2014. Each sub-graph plots the MAW policy changes for a specific state.

Figure A6: Variation in MAW Expenditures ($2014) Across States



Notes: The plot displays the variation in MAW expenditures ($2014) by state for the years 1998-2014. Each sub-graph plots the MAW policy changes for a specific state.

Figure A7: Distribution of Income ($2014) of HRS Respondents



Notes: The plot displays the distribution of income ($2014) of HRS respondents using the working sample of individuals who had at least one living parent in the 1998-2014 period.

C Tables

Table A1: Services Covered in Medicaid HCBS Programs

Home Health State Plan (all residents are eligible)
Skilled nursing care
Medical social services such as home health aide, home care, counseling and support
Medical supplies, equipment, and appliances support
Optional therapy services like physical, occupational and speech pathology
Personal Care State Plan (all residents are eligible)
Assistance with self-care (e.g., bathing, dressing, grooming, and personal hygiene)
Household activities (e.g., preparing meals)
Assistance with mobility and ambulation
Work sites, foster care, or assisted living facilities
MAWs at Home and in the Community
Home and community-based services (assistance with daily living activities)
Long-term care (nursing home care, assisted living, and other types of long-term care services)
Home modifications (individuals with disabilities are eligible)

Notes: The table provides a detailed description of the services covered under each Medicaid HCBS program. The Medicaid Home Health State Plan refers to the provisions in a state's Medicaid State Plan that cover home health care services. Medicaid home health services are designed to provide medical and health-related services in the home, with the goal of helping individuals recover from an illness or injury or manage a chronic condition. The specific home health services covered under the Medicaid Home Health State Plan can vary by state. The Medicaid Personal Care State Plan refers to the provisions in a state's Medicaid State Plan that cover personal care services. Medicaid personal care services are designed to provide assistance with activities of daily living (ADLs) and instrumental activities of daily living (IADLs) for individuals who have difficulty performing these tasks on their own due to a physical, cognitive, or behavioral condition. The specific personal care services covered under the Medicaid personal care state plan are optional and can vary by state. MAWs are programs that allow states to offer Medicaid services in a way that deviates from traditional Medicaid coverage. The specific services that are covered under MAWs can vary depending on the state. It is important to note that home health services under the Medicaid state plans may be limited in scope and may not cover the full range of home and community-based services available through MAW programs. The services for MAW coverage can vary greatly from state to state. See the text for details. The information is adjusted from the annual Kaiser Family Foundation Waiver Program Survey.

Table A2: HRS 1998-2014

	Panel A: HRS Design								
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	22,033	20,553	18,746
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	26,089	24,358	22,950
	Panel B: Observations of Respondents Without Living Parents								
Interview year	1998	2000	2002	2004	2006	2008	2010	2012	2014
Unique individuals	13,977	12,517	11,262	11,278	10,104	9,134	10,465	9,522	8,436

Notes: The table summarizes the design of the sample of respondents who are interviewed every two years in the longitudinal HRS. Panel A reports the cohorts and the new cohorts (birth years in parentheses) added in each survey year. The initial HRS cohort born between 1931 and 1941 was first interviewed in 1992. The Asset and Health Dynamics Among the Oldest Old (AHEAD) cohort born before 1924 was added to the survey in 1993. The HRS is replenished every six years with younger cohorts: the Children of the Depression (CODA) cohort born between 1924 and 1930 and the War Babies (WB) cohort born between 1942 and 1947 were added in 1998; the Early Baby Boomers (EBB) cohort born between 1948 and 1953 was added in 2004; and the Mid-Baby Boomers (MBB) cohort born between 1954 and 1959 was added in 2010. The core survey is the main part of the HRS in which the respondents are interviewed from about one and a half to three hours. The core yes interview type indicates that a respondent was successfully interviewed and the core no indicates that a respondent refused to participate in the core survey. The exit interview is administered on a proxy family member of a deceased respondent who provides information about the final stages of the life of the deceased and information about the disposition of the deceased's assets after death. Panel B reports the number of unique individuals whose parents were deceased in the core surveys conducted during the 1998-2014 period. The observations with no living parents are excluded from our main regression sample in the paper.

Table A3: HRS Respondents Who Had Living Parents in 1998-2014

Interview year	1998	2000	2002	2004	2006	2008	2010	2012	2014
Unique individuals with living parents	7,406	7,055	6,903	8,849	8,364	8,083	11,586	11,031	10,310
Unique individuals excluded missing informal care values	6,024	5,065	4,302	5,623	4,742	3,973	7,014	6,279	5,093
Unique Individuals further excluded missing values on the state of parents	3,999	3,265	3,369	4,666	3,774	3,124	5,784	4,938	3,982
Repeated individuals in previous and current years		3,042	2,461	2,523	3,584	2,944	2,391	4,658	3,747

Notes: This table reports how the working sample of HRS respondents interviewed in 1998-2014 that we use in the paper has been selected. The second row summarizes the number of respondents who answered core surveys and who had living parents in any survey year in the 1998-2014 period. The third and fourth rows report the number of individuals who did not have values on informal care and who had no information about the state of residency of their parents, respectively. The last row reports the longitudinal feature of the HRS that respondents were interviewed in both the previous and the current survey years of 1998-2014.

Table A4: Summary Statistics of Informal Care in HRS 1998-2014

	(1)	(2)	(3)
%	Caregivers (0+)	Non-intensive caregivers (0, 1000)	Intensive caregivers (1000+)
		Panel A: All caregivers	
Total care	36.32	29.22	7.11
Only errands care	26.12	23.16	2.96
Only personal care	2.15	1.84	0.31
		Panel B: Female caregivers	
Total care	38.93	30.25	8.68
Only errands care	26.69	23.25	3.45
Only personal care	2.56	2.12	0.43
		Panel C: Male caregivers	
Total care	31.88	27.45	4.43
Only errands care	25.14	23.02	2.12
Only personal care	1.47	1.36	0.11

Notes: The data used are from our working sample of HRS respondents who had at least one living parent in the 1998-2014 period. The caregiving indicator is constructed based on the care hours cutoff in parentheses. Column 1 displays the statistics for caregivers who provided some care hours over the previous two years. Column 2 displays the statistics for caregivers who provided between 0 and 1,000 care hours over the previous two years. Column 3 displays the statistics for intensive caregivers who provided at least 1,000 care hours over the previous two years. Panel A shows all caregivers. Panel B and Panel C show female caregivers and male caregivers, respectively. The only personal care indicator includes help with personal care needs only. The only errands care indicator includes help with errands care needs only. Personal care includes help with basic personal needs such as dressing, eating, bathing, or toileting. Errands care includes help with household chores, errands, medication management, or transportation.

Table A5: Summary Statistics

	Mean	S.D.
Informal care (from last wave)		
Care hours	240.74	842.70
Errands care hours	150.64	508.85
Personal care hours	90.43	531.11
Demographics of respondents		
Female	0.63	0.48
Age	57.24	6.93
Number of living siblings	3.15	2.36
Number of siblings living within 10 miles of parents	0.54	0.91
Demographics of HRS respondents' parents		
Marital status	0.43	0.84
Education	10.78	3.41
Age at death	79.67	10.14
In nursing home	0.07	0.26
Need personal care	0.24	0.43
Memory-related disease	0.12	0.33
Can be left alone for 1h+	0.88	0.32
Live within 10 miles of respondent	0.43	0.49
Frequency of contact with respondent every month	16.41	54.40
MAW spending (10 millions)		
MAW expenditures	32.40	59.72
MAW expenditures changes	1.88	10.83
Unique individuals	10,892	
Observations	36,901	

Notes: The data used are from our working sample of HRS respondents who had at least one living parent in the 1998-2014 period. The care hours are the total hours of personal care or errands care the HRS respondents provided in the two years prior to the interview year. Personal care includes help with basic personal needs such as dressing, eating, bathing, or toileting. Errands care include help with household chores, errands, medication management, or transportation. MAW expenditures are the mean MAW spending in 1998-2014 across states. Policy expenditures change is the mean change in policy expenditures from year to year in 1998 to 2014 across states. The scale of the policy change is shown in 10 millions, which is the standard unit for measuring MAW expenditures.

Table A6: The Effects of MAW Expenditures on State Characteristics in HRS 1998-2014

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Poverty	High School	White	Marriage	PCE	PI	Employment	Political Affiliation
MAW spending ($2014)	0.003	0.001	0.000	-0.002	-0.905	2.656	0.001***	-0.004***
	(0.002)	(0.002)	(0.001)	(0.002)	(0.766)	(2.018)	(0.000)	(0.001)
Mean	18.10	85.16	79.61	7.34	30,056	37,344	4.05	0.57
Number of individuals	10,795	10,795	10,795	10,754	10,795	10,795	10,795	10,795
Number of observations	36,605	36,605	36,605	36,218	36,605	36,605	36,605	36,605

Notes: The data used are from our working sample of HRS individuals who had at least one living parent in the 1998-2014 period. The demographic and employment variables are from the Census Bureau and the BLS, and the personal income (PI) and, personal consumption expenditures (PCE) variables are from the Bureau of Economic Analysis Regional Analysis Accounts. The dependent variable is the MAW spending in millions in 2014 real dollars of each state. All models control for individual FEs, year FEs, and state-specific linear time trends as well as for the demographics of individuals and their parents such as age and marital status. See details in the text. The mean row summarizes the Mean of dependent variables in each column. Standard errors are clustered at the state level and shown in parentheses. *** p<0.01, ** p<0.05, * p<0.10.

Table A7: Definitions of Health-related Variables

Variable	Definition
Self-reported health	Respondent's self-reported general health status, one for excellent, two for very good, three for good, four for fair, and five for poor.
Mobility difficulty	Index of mobility difficulties ranging from zero to five, which indicates whether the respondent is having any difficulties in walking one block, walking several blocks, walking across a room, climbing one flight of stairs, and climbing several flights of stairs
ADL difficulty	Index of difficulties in Activities of Daily Living (ADL) ranging from zero to five, which indicates whether the respondent is are having any difficulties in bathing, eating, getting dressed, getting in/out of bed, or walking across a room
IADL difficulty	Index of difficulties in Instrumental Activities of Daily Living (IADL) ranging from zero to five, which indicates whether the respondent is having any difficulties in using the phone, managing money, taking medications, shopping for groceries, or preparing hot meals
Depression scores	Index of mental health ranging from zero to eight based on the score on the Center for Epidemiological Studies Depression (CESD) scale, which represents the sum of five negative indicators minus two positive indicators. The negative indicators measure whether the respondent has the following sentiments all or most of the time: depression, everything is an effort, restless sleep, feeling alone, sad, and cannot get going. The positive indicators measure whether the respondent feels happy and enjoys life.
Cognition scores	The total cognition score is the sum of the total word recall and mental status test scores ranging from zero to 35. The word recall index sums the immediate and delayed word recall test scores. The mental status index includes the scores for the following tests: serial 7's, counting backwards from 20, naming objects, recalling dates, and naming the president/vice-president
Hospital stays	Dichotomous indicator of whether the respondent reports any overnight hospital stay during the two years since the last interview
Doctor visits	Dichotomous indicator of whether the respondent reports any doctor visit during the two years since the last interview
Medication	Dichotomous indicator of whether the respondent reports regular use of prescription drugs during the two years since the last interview
Nursing home stay	Dichotomous indicator of whether the respondent reports any overnight nursing home stay during the two years since the last interview

Notes: The table displays the definitions of the health variables used in Table 2 in section 5 on testing the identification assumption.

Table A8: Effect of Lagged State Economic Conditions on MAW Expenditures

Unemployment rate lag 1	100.806	-555.51							-433.68
	(75.69)	(448.28)							(485.89)
Unemployment rate lag 1^2		92.68							84.16
		(75.47)							(85.02)
Unemployment rate lag 1^3		-3.91							-4.38
		(3.27)							(4.33)
Employment rate lag 1					-60.28	-2,264.11			-4,885.61
					(54.76)	(3,403.71)			(3,595.02)
Employment rate lag 1^2						31.03			77.77
						(51.86)			(57.28)
Employment rate lag 1^3						-0.14			-0.41
						(0.26)			(0.30)
Unemployment rate lag 2			207.21	275.11					322.61
			(165.64)	(528.02)					(667.86)
Unemployment rate lag 2^2				-54.21					-68.72
				(90.361)					(114.090)
Unemployment rate lag 2^3				3.830					4.73
				(4.91)					(6.17)
Employment rate lag 2							-91.42	27.48	4,534.34
							(83.31)	(3,836.61)	(4,923.31)
Employment rate lag 2^2								-9.91	-71.66
								(61.18)	(78.92)
Employment rate lag 2^3								0.09	0.37
								(0.33)	(0.42)

Notes: The data used are from a state-year panel for the 1998-2014 period. The unemployment and employment level data are from the BLS; the state population data are from the Census Bureau; and the GDP, personal income (PI), and the personal consumption expenditures (PCE) data are from the Bureau of Economic Analysis Regional Analysis Accounts. The dependent variable is MAW spending in millions in 2014 real dollars of each state in the years 1999-2014. Each cell reports estimates from a separate specification. The last column includes lagged income controls such as GDP per capita, PI per capita, and PCE per capita. All regressions include state and, year fixed effects, and are weighted using the state population. Standard errors are clustered at the state level and shown in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.10$.

Table A9: Robustness Checks of the Effects of Nursing Home Expenditures on Informal Care

	(1)	(2)	(3)	(4)	(5)
	Panel A Dependent Variable: Any Care				
Nursing home expenditures ($2014)	0.00014	0.00013	0.00016	0.00016	0.00011
	(0.00012)	(0.00011)	(0.00012)	(0.00013)	(0.00015)
Mean of dependent variables	0.362	0.362	0.362	0.362	0.362
	Panel B Dependent Variable: Errands Care				
Nursing home expenditures ($2014)	0.00016	0.00015	0.00017	0.00017	0.0001
	(0.00015)	(0.00015)	(0.00015)	(0.00017)	(0.00019)
Mean of dependent variables	0.341	0.341	0.341	0.341	0.341
	Panel C Dependent Variable: Personal Care				
Nursing home expenditures ($2014)	-0.00001	-0.00001	-0.00003	-0.00006	-0.00005
	(0.00007)	(0.00007)	(0.00007)	(0.00007)	(0.00008)
Mean of dependent variables	0.099	0.099	0.099	0.099	0.099
Number of nursing homes		Y			Y
Number of nursing home beds			Y		Y
Number of nursing home residents				Y	Y

Notes: This table shows robustness checks of the results for the impact of Medicaid nursing home spending on informal care. The working sample of HRS respondents who had at least one living parent in the 1998-2014 period consists of 10,754 unique individuals and 36,218 observations. Column 1 reports the estimates of the effect of Medicaid spending on nursing homes on the informal care variables using the main specification in column 4 of Table 4. Column 2 reports the estimates of the effects of nursing home expenditures on informal care, which adds the number of nursing homes in each state. Column 3 shows the sensitivity estimates of the effects of nursing home expenditures on informal care to the number of nursing home beds in each state. Column 4 controls for the number of nursing home residents in each state. Column 5 tests the results for the impact of nursing home expenditures on informal care controlling for all the nursing home relevant variables in column 2-4. These nursing home data are collected from CMS websites in the 1998-2014 period at the state level. All models control for individual FEs, year FEs, state-specific linear time trends, and expenditures of other state plans that might cover services similar to those covered in MAWs, as well as all controls listed in column 4 of Table 4, such as demographics of respondents and their parents, growth of the older population, and state characteristics. Details of each control and panel can be found in the footnotes in Table 4. The mean row summarizes the Mean of dependent variables in each column. Standard errors in parentheses are clustered at the state level. *** $p<0.01$, ** $p<0.05$, * $p<0.10$

Table A10: Robustness of the Effects of MAWs on Informal Care to Nursing Home Variables

	(1)	(2)	(3)	(4)	(5)
	Panel A Dependent Variable: Any Care				
MAW expenditures ($2014)	0.00027*	0.00032**	0.00032**	0.00024	0.00019
	(0.00015)	(0.00015)	(0.00015)	(0.00021)	(0.00022)
Mean of dependent variables	0.362	0.362	0.362	0.362	0.362
	Panel B Dependent Variable: Errands Care				
MAW expenditures ($2014)	0.00052***	0.00055***	0.00055***	0.00049**	0.00044*
	(0.00016)	(0.00016)	(0.00016)	(0.00023)	(0.00024)
Mean of dependent variables	0.341	0.341	0.341	0.341	0.341
	Panel C Dependent Variable: Personal Care				
MAW expenditures ($2014)	-0.00007	-0.0001	-0.00011	-0.0001	-0.00005
	(0.00013)	(0.00013)	(0.00013)	(0.00014)	(0.00015)
Mean of dependent variables	0.0988	0.0988	0.0988	0.0988	0.0988
Number of nursing homes	Y				Y
Number of nursing home beds		Y			Y
Number of nursing home residents			Y		Y
Medicaid expenditures on nursing homes				Y	Y

Notes: This table shows robustness checks controlling for the robustness of the effects of MAWs on informal care to nursing home variables. The working sample of HRS respondents who had at least one living parent in the 1998-2014 period consists 10,754 unique individuals and 36,218 observations. Column 1 reports the estimates of the effects of MAWs on informal care, which are robust to adding the number of nursing homes in each state. Column 2 shows the sensitivity estimates of the effects of MAWs on informal care to the number of nursing home beds in each state. Column 3 controls for the number of nursing home residents in each state. Column 4 tests the main results for the effects MAWs on informal care controlling for the Medicaid spending on nursing homes at the state level. Column 5 includes all of the nursing home relevant variables to show the robustness of our main results in Table 4. These nursing home data are collected from CMS websites for the 1998-2014 period at the state level. All models control for individual FEs, year FEs, state-specific linear time trends, and expenditures of other state plans that might cover services similar to those covered in MAWs as well as all controls listed in column 4 of Table 4, such as demographics of individuals and their parents, growth of the older population, and state characteristics. Details of each control and panel can be found in the footnotes in Table 4. The mean row summarizes the Mean of dependent variables in each column. Standard errors in parentheses are clustered at the state level. *** p<0.01, ** p<0.05, * p<0.10

Table A11: Robustness of the Effects of MAWs on Informal Care to Different Cutoffs

	(1) Cutoff at 0	(2) Cutoff at 25	(3) Cutoff at 50	(4) Cutoff at 75	(5) Cutoff at 100
			Panel A Dependent Variable: Any Care		
MAW expenditures ($2014)	0.00032**	0.00029	0.00029*	0.00029*	0.00026
	(0.00015)	(0.00018)	(0.00017)	(0.00016)	(0.00019)
Mean of dependent variables	0.362	0.347	0.324	0.315	0.248
			Panel B Dependent Variable: Errands Care		
MAW expenditures ($2014)	0.00055***	0.00047***	0.00051***	0.00048***	0.00028*
	(0.00016)	(0.00016)	(0.00015)	(0.00014)	(0.00016)
Mean of dependent variables	0.341	0.326	0.301	0.291	0.215
			Panel C Dependent Variable: Personal Care		
MAW expenditures ($2014)	-0.0001	-0.00003	-0.00006	-0.00002	0.00002
	(0.00013)	(0.00012)	(0.00013)	(0.00012)	(0.00014)
Mean of dependent variables	0.099	0.094	0.090	0.089	0.075

Notes: This table shows robustness checks of the effects of MAWs on informal care constructed with different cutoffs. The working sample of HRS respondents who had at least one living parent in the 1998-2014 period consists of 10,754 unique individuals and 36,218 observations. Column 1 reports the main estimates of the effects of MAWs on informal care variables defined using the cutoff at 0 hours in Table 4, column 2 shows the sensitivity estimates on informal care created using the cutoff at 25 hours, and column 3 uses the cutoff at 50 hours to create care indicators. Column 4 tests the main results on informal care constructed at the cutoff of 75 hours, and column 5 reports the robustness results using the cutoff at 100 hours to define informal care dummies. All dependent variables are equal to 1 if the care hours provided by respondents in the last two years are above the cutoffs, and are otherwise equal to 0. All models control for individual FEs, year FEs, state-specific linear time trends, and expenditures of other state plans that might cover services similar to those covered in MAWs, as well as all controls listed in column 4 of Table 4, such as demographics of individuals and their parents, growth of the older population, and state characteristics. Details of each control and panel can found in the footnotes in Table 4. The mean row summarizes the Mean of dependent variables in each column. Standard errors in parentheses are clustered at the state level. *** p<0.01, ** p<0.05, * p<0.10