Long-Term Care Insurance and the Family

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This paper examines whether informal care by family members influences the demand for long-term care insurance. Motivated by evidence that the availability of informal caregivers correlates with lower insurance demand and that informal care substitutes for formal care, I estimate a dynamic model of long-term care decisions between an elderly parent and her adult child. The availability of informal care lowers demand for insurance by 7 percentage points and suppresses Medicaid spending. A policy that provides equivalent cash benefits for informal care for such families can generate meaningful increases in insurance demand and family welfare and decreases in Medicaid spending.

I. Introduction

The elderly in the United States face significant risk of incurring large and persistent long-term care expenses. Formal long-term care expenditures

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totaled $379 billion in 2018 and are projected to rise dramatically with population aging, raising concerns about the burden that these costs place on both families and social programs, such as Medicaid (Watts, Musumeci, and Chidambaram 2020). These costs are not evenly distributed among individuals: while 40% of 60-year-olds will never enter a nursing home, 5% will spend over 4 years in institutional care at an average annual cost of roughly $100,000 (Reaves and Musumeci 2015; Hurd, Michaud, and Rohwedder 2017). Despite this risk, very few individuals own long-term care insurance. While several studies have quantified the role that various factors play in explaining the observed patterns of long-term care insurance demand, none have quantitatively addressed the fact that the majority of long-term care is provided informally by family members. This paper fills this gap by examining the effect of informal care—and family interactions more broadly—on the demand for long-term care insurance.

There are two main objectives of the paper. The first is to assess the extent to which the availability of informal care affects the demand for long-term care insurance. The primary mechanism by which informal care may reduce demand relies on the fact that insurance policies typically do not cover informal care. If the family can replace formal services as a preferable or less costly substitute source of care, then elderly individuals and their families face a trade-off between (1) insurance that provides financial protection against formal care and (2) family care that is preferred but whose indirect costs are uninsured.[1] The second objective of the paper is to quantify the welfare costs and the burden on social programs of standard long-term care insurance policies relative to alternative policies that include coverage of family care. I focus on informal care from adult children because, along with spouses, they are the predominant source of care provision, and adult children arguably face a higher trade-off between informal care and labor supply than spouses, whose opportunity cost of time is likely lower.

I first present two empirical facts that suggest that the family—and particularly family care—may be an important determinant of long-term care insurance demand. I show that, controlling for a range of demographic and health characteristics, individuals who have more potential sources of informal care (e.g., individuals with children, siblings, friends) are significantly less likely to own a long-term care insurance policy than

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[1] I use the terms *informal care* and *family care* interchangeably and to mean informal care by family members. Moreover, most informal care is provided by family members—particularly spouses and adult children—as I show later in sec. II.C.

individuals who do not have these potential sources of informal care. Second, I review evidence from the literature that shows that family care is a substitute for formal care. This substitution provides a plausible mechanism for the difference in insurance demand between individuals with and without access to informal care.

I use these facts to motivate a dynamic model of decision-making between an elderly parent and her adult child. The model provides a framework to study demand for long-term care insurance, family care, savings behavior of both parents and their children, and the labor supply of adult children in an environment that offers Medicaid benefits and private insurance of (formal) long-term care services and in which parents have preferences over formal care and Medicaid-provided care. The family faces three sources of risk: long-term care shocks that require either formal care or informal care by the child, uncertainty over the longevity of the parent, and shocks to the adult child's permanent wage that influence the opportunity cost of informal care. The parent and child interact in a limited commitment framework with strategic and altruistic concerns but cannot commit to future allocations of resources and hence cannot fully cooperate (Kocherlakota 1996). I obtain estimates of the parameters of the model using data from the Health and Retirement Study (HRS) and the Panel Study of Income Dynamics (PSID). Identification of key parameters is driven by asset trajectories, Medicaid rates, and informal care and insurance rates across the wealth distribution. The model replicates important features of long-term care behavior, particularly insurance demand across the wealth distribution, savings rates, informal care usage, labor supply, and Medicaid rates.

Using the parameter estimates, I conduct two main counterfactual exercises. First, I find that removing the availability of family care increases demand for insurance by 7 percentage points overall from a base of 5.9% to 13.4% for single parents with adult children. While large relative to baseline ownership (a 126% increase), this effect is relatively small relative to baseline nonownership (an 8% decrease). The magnitude of this effect varies by wealth—from a null effect for the poorest parents to a 17 percentage point effect for wealthier parents—and mirrors the empirical difference in insurance demand between parents with and without children. These differences across the wealth distribution are due to two main opposing effects. On the one hand, removing the availability of family care increases the demand for insurance because the costs of the remaining source of care—formal care—are covered by insurance. This is the dominant effect for wealthy individuals. On the other hand, long-term care becomes more expensive for some parents whose source of care was children with low opportunity costs of time. The increase in the expected cost of long-term care generated by a lack of availability of informal care thus acts as a wealth effect, which induces some of these parents to spend down to Medicaid in lieu of purchasing insurance (i.e., Medicaid crowd-out; Brown and Finkelstein 2008). This effect is more relevant for poorer parents, whose insurance demand barely changes. Complementing these effects of family care, I also show that less generous Medicaid benefits, lower risk-sharing ability of families, and better contract features additionally increase the demand for insurance.

Next, I evaluate a set of alternative policies that introduce financial compensation for family care by replacing formal care benefits (i.e., in-kind benefits) with their cash value. This exercise quantifies the role of the in-kind nature of insurance on demand for long-term care insurance but also may have policy implications: many other countries have long-term care policies with cash options.[2] First, I find that converting in-kind Medicaid benefits to cash benefits has little effect on private (in-kind) insurance demand, implying that wealthy individuals place a high value on protecting their assets over spending down to Medicaid, even if Medicaid compensates for family care. However, converting the benefits of a private insurance policy from in-kind to cash leads to an almost 10 percentage point increase in insurance demand (almost triple the demand for in-kind insurance, though again, small relative to the rate of nonownership) and a $4,000 welfare gain to these families, on average. I find that these results are muted but can still be substantial if premiums must rise to pay for verification costs that may arise because of this conversion from in-kind benefits to cash benefits.

Finally, I show that both the availability of informal care and long-term care insurance policies with cash benefits have meaningful consequences for the Medicaid program for this demographic group of single parents with children. Removing the availability of informal care increases Medicaid rates by almost 50% from a base of 20% to 28% and almost doubles total Medicaid expenditures for this demographic group. Insurance with cash benefits, however, would slightly reduce the Medicaid participation rate to 19% and reduce Medicaid spending on long-term care by 12% for these families. The results suggest that a future downward shift in the availability of informal caregivers—due to lower fertility and higher female labor force participation—could put increased strain on the Medicaid program. One caveat to these findings and those of private insurance demand above is that they pertain to only the demographic group of single parents with children since the model is estimated from data on this group alone. One reason the results may not apply to couples is

[2] For a summary of long-term care systems in several European countries, see Da Roit and Le Bihan (2010). In the United States, several states have piloted the use of cash benefits through Medicaid Cash and Counseling experiments. In addition, the 2010 Affordable Care Act proposed a public long-term care insurance option that compensated family care called the Community Living Assistance Services and Supports Act, but this provision was not implemented.

that the economics of spousal care may differ from care by an adult child (e.g., spousal care may come with lower opportunity costs because the spouse is retired), which will have different implications for insurance demand.

This paper makes several contributions to the literature. First and most directly, it contributes to the literature that explores reasons for the lack of demand for long-term care insurance. Closely related theoretical work by Pauly (1990) shows that the desire to receive informal care can result in the rational nonpurchase of long-term care insurance. An empirical literature quantifies the effects of Medicaid (Brown and Finkelstein 2008), bequest motives (Lockwood 2018), home equity (Davidoff 2010), beliefs about needs (Brown, Goda, and McGarry 2012), and market imperfections and product flaws (Finkelstein and McGarry 2006; Ameriks et al. 2018; Braun, Kopecky, and Koreshkova 2019; Ko 2022). This paper builds on both the theoretical work of Pauly (1990) and the empirical literature to quantify the role of informal care and its interaction with Medicaid policy. In this vein, the most closely related work is Ko (2022), which uses an intergenerational model with insurance demand and informal care provision to study how private information about informal care availability induces adverse selection in long-term care insurance markets.[3] Beyond modeling differences (e.g., characterizing the model as a noncooperative game vs. a limited commitment framework, not allowing inter vivos transfers or child savings vs. allowing for such decisions), the two papers focus on distinct issues: Ko (2022) focuses on adverse selection, while the focus of this paper relates to whether informal care depresses demand for insurance or interactions with Medicaid and whether alternative policies that reimburse informal care can be welfare improving.

More broadly, this paper contributes a new model of intergenerational family decision-making with limited commitment frictions.[4] The most closely related studies of long-term care decisions and intergenerational dynamics assume noncooperative decision-making between parents and children (Fahle 2014; Barczyk and Kredler 2017; Ko 2022). Limited commitment offers several advantages. First, it allows for cooperation to the realistic extent that it is advantageous to both parties. This feature may be particularly relevant for long-term care decisions in which many aspects of the lives of parents and adult children are intertwined. Moreover,

[3] Other papers on long-term care insurance and informal care include Mellor (2001), who shows that current or future caregiver availability does not predict long-term care insurance ownership; Brown, Goda, and McGarry (2012), who find the opposite; and Coe, Van Houtven, and Goda (2020), who find that long-term care insurance induces less future informal care.

[4] Limited commitment models are increasingly being applied to models of marital interactions (Mazzocco 2007; Yamaguchi, Ruiz, and Mazzocco 2014; Voena 2015; Bronson 2019; Low et al. 2020; Foerster 2021); this paper shows that this type of model can be suitable for capturing intergenerational interactions as well.

noncooperative models often impose stringent assumptions on behavior, such as an inability of both individuals to save (Barczyk and Kredler [2017] is an exception) or taking a stand on which player moves first in a sequential game. This paper incorporates savings not only of the parent but also of the child, which is important to capture several aspects of the environment, including appropriately evaluating the opportunity cost of informal care, the outside option of adult children and the resulting risk-sharing ability of the family, and the financial well-being of adult children when they retire.[5]

The paper also contributes to the literature on models of elderly savings and health risk. Work by Hubbard, Skinner, and Zeldes (1995)—and, in the specific case of long-term care insurance, Pauly (1990) and Brown and Finkelstein (2008)—show that means-tested social insurance such as Medicaid can reduce the propensity to save or privately insure. De Nardi, French, and Jones (2010) show that large out-of-pocket medical expense risk and life expectancy risk can reduce the propensity to dissave among higher-income retirees, and De Nardi, French, and Jones (2016) show that the Medicaid program has important implications throughout the wealth distribution.[6] This paper expands on these analyses by introducing family interactions and private insurance as important channels for understanding elderly savings and welfare.

In section II, I describe key features of long-term care in the United States. Section III provides descriptive evidence on the relationship between the family and long-term care insurance and reviews evidence on the substitutability between formal and informal care. In section IV, I describe the model. Data, identification, and estimation results are in section V, and section VI reports results from counterfactuals. Section VII concludes.

II. Long-Term Care in the United States

Long-term care in the United States, defined as assistance performing activities of daily living (ADLs) or instrumental activities of daily living (IADLs),[7] is expensive: the average price of a private room at a nursing

[5] This paper is one of the first to incorporate individual saving in an empirical model of limited commitment. An exception to this is Bayot and Voena (2014), who study prenuptial agreements.

[6] Many others have also contributed to this literature: Kotlikoff (1989), Gruber and Yelowitz (1999), Palumbo (1999), Scholz, Seshadri, and Khitatrakun (2006), and Kopecky and Koreshkova (2014) on medical vs. nursing home risk; Lockwood (2018) on bequest motives; Low and Pistaferri (2015) on disability; and Ameriks et al. (2018, 2020) on elicited preferences over long-term care.

[7] The set of ADLs in the data I use includes walking across a room, dressing, bathing, eating, getting in and out of bed, and using the toilet. The set of IADLs includes using a map, using a telephone, managing money, taking medications, shopping for groceries, and preparing hot meals.

home is pushing $100,000, and the average hourly price of a home care aide was $20 per hour in 2015 (Reaves and Musumeci 2015). In 2018, formal long-term care costs in the United States added up to $389 billion, or 10% of all health expenditures for all ages. Although 70% of elderly individuals will depend on long-term care at some point, utilization is not distributed evenly across the population: 30% of 60-year-olds will eventually enter a nursing home for a long stay, and 5% of them will remain in a nursing home for over 4 years (Hurd, Michaud, and Rohwedder 2017; Johnson 2019). Formal long-term care costs are financed through three main sources: out-of-pocket spending, private insurance, and public insurance, of which the largest payer is Medicaid. Additionally, over half of long-term care is provided informally by family members.

A. *Private Long-Term Care Insurance*

The long right tail of nursing home utilization suggests that insurance against costly long-term care expenses could produce large gains to individual welfare. Nevertheless, the private long-term care insurance market is small: during the time period of this study, only 7% of formal long-term care expenditures were paid by private insurance policies, and fewer than 10% of elderly individuals owned a private insurance policy. Individuals typically purchase policies in their 60s, at which point they typically lock in an annual premium. Rejections are common, and even if an individual is offered a policy, typical policies offer far from complete insurance: they rarely provide lifetime benefits and instead typically provide benefit periods of 6 or 3 years (Thau, Helwig, and Schmitz 2014), include maximum daily or monthly payouts (e.g., $5,000 per month) and elimination periods (number of days for which individuals must pay for their care before insurance begins to pay), and pay out 18% less in expected benefits than expected contributions (Brown and Finkelstein 2007). Prior work has explored various supply-side explanations for the lack of completeness and price markups, including administrative and transaction costs (Braun, Kopecky, and Koreshkova 2019) and an inability to diversify aggregate risk (Brown and Finkelstein 2007). Other studies have examined adverse selection, including the role of risk preferences (Finkelstein and McGarry 2006), the role of informal care (Ko 2022), and the role of rejections (Hendren 2013; Braun, Kopecky, and Koreshkova 2019).

Despite the existence of such issues, Brown and Finkelstein (2007) argue that they alone cannot explain the small size of the private long-term care insurance market. Several studies have found that demand-side forces may also limit the market: bequest motives reduce the opportunity cost of precautionary savings (Lockwood 2018), wealth stored in housing can be used to pay for a nursing home (Davidoff 2010), individuals have limited information about risks or insurance coverage (Brown, Goda, and

McGarry 2012), and Medicaid can act as a substitute source of coverage (Brown and Finkelstein 2008; Goda, Golberstein, and Grabowski 2011). Aside from Mellor (2001) and Brown, Goda, and McGarry (2012), who find conflicting evidence on the association between (future) caregiver availability and long-term care insurance demand, this study is the first to carefully model and estimate the effect of available family care on insurance demand.

B. Medicaid

Public expenditures for long-term care are shouldered almost entirely by Medicaid. While Medicare is the primary source of medical insurance for individuals age 65 and over, it notably does not cover most long-term care costs.[8] Medicaid, on the other hand, is a means-tested program but covers long-term care in addition to medical care. To become eligible, an individual must have sufficiently low levels of income and assets (monthly income of around $771 and financial assets of around $2,000 [Musumeci, Chidambaram, and O'Malley Watts 2019], though this varies by state).

Like private insurance, Medicaid predominantly reimburses only formal services,[9] and it is a secondary payer to private insurance, meaning that Medicaid will reimburse expenses only once private insurance pays out. Brown and Finkelstein (2008) show that this feature induces a significant implicit tax on private insurance. Overall, given the high costs of formal long-term care and the fact that very few individuals are covered by private insurance, Medicaid ends up paying for roughly 60% of formal long-term care services.

C. Informal Care

Because most individuals do not purchase private insurance and Medicaid pays out only once individuals are impoverished, around one-third of formal long-term care expenditures are paid out of pocket. An often overlooked alternative option when studying long-term care financing, however, is the role of informal care and its indirect costs.

[8] Medicare covers only postacute long-term care expenses. Specifically, it covers up to 100 days of nursing home care but only following at least a 3-day hospital stay. Because these postacute long-term care needs are relatively well insured by Medicare, they are not the focus of this paper.

[9] Historically, Medicaid also excluded most home-based services in favor of nursing home services (its so-called institutional bias). However, in the 1980s, Medicaid began offering more home and community-based services. This was both an effort to lower Medicaid's long-term care costs by shifting to potentially cheaper home care as well as an acknowledgement that most individuals would prefer to remain in the community than receive long-term care in a nursing home (see the US Supreme Court's 1999 Olmstead decision, Olmstead v. L.C., 527 U.S. 581 [1999]).

TABLE 1
Relationship of Respondent to Caregivers

			Single	
Caregiver	Everyone (1)	Married (2)	With Children (3)	Without Children (4)
Spouse	.214	.407	. . .	. . .
Child	.260	.197	.387	.038
Other family	.055	.030	.052	.234
Nonfamily	.472	.366	.561	.727
Total	1.00	1.00	1.00	1.00
% nonfamily paid	.943	.955	.946	.895
Observations	12,922	6,781	5,127	1,014

Note.—The sample includes retirees aged 65 and over who report receiving help with (I)ADLs in the HRS, 1998–2014. Rows denote the type of caregiver, and columns denote sample restrictions. "% nonfamily paid" reports the percentage of caregivers who are paid among all nonfamily caregivers. Column 3 shows nonzero care from children because care from children includes former stepchildren and former children-in-law.

Over half of the elderly in need of long-term care rely solely on family members for help with everyday activities. Table 1 shows that among retirees age 65 and over who report receiving long-term care in the HRS, over 50% of main caregivers are family members. For married individuals, most informal care is provided by spouses; for single individuals with children, almost all informal care is provided by their adult children; and for single individuals without children, almost 75% of care is provided by nonfamily members. When care is not provided by family members, over 94% of caregivers are paid (i.e., formal care).

The fact that some individuals elect to purchase formal care in lieu of family care suggests that there are important implicit costs of informal care. These indirect costs, such as lost wages, are not included in the annual $379 billion price tag of long-term care,[10] suggesting that definitions of long-term care risk that capture only formal care outcomes may drastically mismeasure the amount of risk that individuals face. Using time use and wage data, Chari et al. (2015) place the annual implicit cost of informal caregiving at an additional $520 billion.

D. *Why Doesn't Insurance Cover Informal Care?*

Despite the extensive use and potential costs of informal care, private insurance and Medicaid rarely reimburse costs related to informal care. In the rare cases in which private insurance covers informal care, they are not very generous and not easy to access: they often come with many

[10] Of note in this calculation, however, is the implicit subsidy provided to nonmarket activities, like informal care, by the income tax and transfer system.

exclusions (such as caregivers residing in the same home) and coverage limits. For example, Genworth Financial, which was one of the largest long-term care insurers during the sample period, offered a group plan with an informal care benefit that paid for expenses "up to 1% of the Monthly Nursing Facility Maximum per day for up to 30 days per calendar year." Given a typical facility maximum of around $3,000, an informal caregiver could get paid $30 per day for a maximum of only $900 per year compared with $36,000 in coverage for nursing facility care (Genworth Life Insurance 2019). Informal care coverage under Medicaid is somewhat more prevalent, though even this is a relatively recent phenomenon. When states allow reimbursement to informal care providers, it is usually only for individuals who need significant amounts of care, and there are often waiting lists to receive this type of reimbursement (Spillman, Black, and Ormond 2016).

The general lack of informal care coverage in private insurance contracts and Medicaid raises the question of why such coverage is not offered. One possibility is that long-term care needs are sometimes difficult to ascertain. This creates a potential targeting concern: if the benefit is desired only when necessary (e.g., a nursing home), then it is well targeted; if the benefit is desirable regardless of one's long-term care needs, then individuals without long-term care needs may use the benefit (e.g., cash benefits). In the context of Medicaid's Cash and Counseling demonstration programs, Lieber and Lockwood (2019) find that the targeting benefit of noncash benefits outweigh the cost of using a less preferable benefit.

In the case of private insurance, including informal care coverage may be costly for other reasons from which I largely abstract in this paper. For one, long-term care insurance is notoriously difficult to price given the long-running nature of contracts (Brown and Finkelstein 2009; Aizawa and Ko 2023). This could stifle experimentation with new contract features, such as coverage of informal care. There could also be other advantages of in-kind benefits to insurers, such as better bargaining positions with formal care providers over prices relative to cash benefits. Finally, if insurers believe that individuals underestimate the implicit costs of informal care and thus undervalue insurance against such costs, they may choose not to offer such a benefit that does not increase demand (particularly in the presence of the above factors).

Of course, this does not necessarily mean that coverage of informal care should never be offered. For example, one way to potentially overcome targeting issues is to design a benefit with strict guidelines for informal care reimbursement, such as regular check-ins to verify that the caregiver is providing needed care. Indeed, other countries have (cash) benefits that allow for informal care reimbursement. I return to this idea in section VI, where the model shows that offering cash benefits could improve welfare and lower the cost to Medicaid.

III. Empirical Evidence on Insurance and Family Care

In this section, I present two additional pieces of evidence that the family—and particularly family care—is an important consideration in long-term care decisions. I first establish that single retirees with children are significantly less likely to own a long-term care insurance policy than single retirees without children. I then review evidence from the literature that shows that informal care by children can substitute for formal care. Together, these facts suggest that an important determinant of insurance purchase is the future availability of substitute caregivers. I use this evidence as motivation for the model of a single parent and adult child in section IV.

A. Insurance Coverage by Family Characteristics

I start by providing empirical evidence on the relationship between long-term care insurance demand and the presence of future potential informal caregivers. Using a pooled sample of single individuals aged 60–69 in the 1998–2014 HRS (see sec. V.A for a full description of the data), I examine whether individuals who have a greater number of potential future sources of informal care—for example, children, siblings, and friends—are less likely to hold long-term care insurance policies than individuals who do not have these potential future sources of care.

Figure 1 shows long-term care insurance coverage across the wealth distribution, broken down by whether the individual has children or not. Overall, 9% of these individuals have long-term care insurance policies. However, there is large variation by wealth: fewer than 4% of individuals in the poorest wealth quintile have insurance, while 19% of individuals in the wealthiest quintile own a policy. There is also variation by the presence of children: individuals with children are 5 percentage points less likely overall to own an insurance policy, and this effect is largely driven by wealthier individuals. While large compared with a baseline ownership of 9%, it is relatively small compared with a baseline nonownership of 91%. Appendix tables 1–3 (tables A.1 and 9 and app. tables 1–13 are available online) report similar findings in linear regressions with controls and additional breakdowns. Appendix table 4 reports the relationship between children and other outcomes that could be related to long-term care insurance demand and shows that individuals with children are more likely to own a life insurance policy, less likely to reside in a nursing home, no more or less likely to have difficulty with an ADL, and more likely to own their home.

On the whole, these results show that individuals with children are less likely to purchase long-term care insurance, but the results suggest that

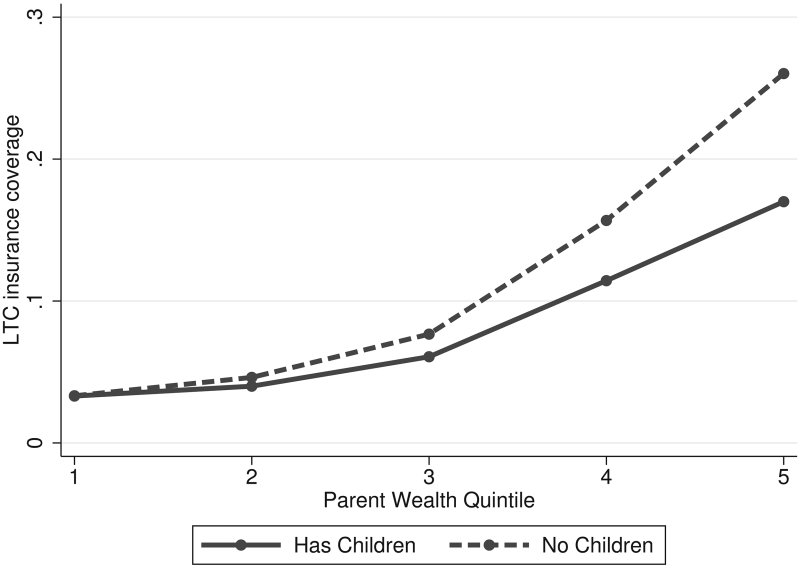

Fig. 1.—Long-term care insurance coverage by wealth quintile. The sample includes single individuals aged 60–69 in the pooled 1998–2014 HRS. Solid line indicates the percentage of individuals with children who own a long-term care insurance policy, by wealth quintile (from the poorest quintile on the left to the wealthiest quintile on the right). Dashed line indicates the percentage of individuals without children who own a long-term care insurance policy. Wealth quintile is defined using the combined wealth distribution of parents and nonparents in the sample.

this is not because they are sicker (as the ADL result shows) or less likely to purchase insurance in general (as the life insurance results show). They are, however, less likely to enter a nursing home (perhaps because of the presence of children as informal caregivers, as Ko [2022] studies) and more likely to own a home (which other studies have found to be related to both insurance demand [Davidoff 2010] and the presence of children [Barczyk, Fahle, and Kredler 2023]).

B. *Substitutability of Informal and Formal Care*

As shown in table 1, long-term care is provided both formally and informally. What is less clear is whether formal and informal care are substitutes or whether instead they provide different services for different types (or severity) of needs. Intuitively, long-term care activities are basic activities that any able-bodied adult could be able to assist with.

Several studies have tried to causally determine the substitutability of informal and formal care using a variety of methods, margins, and data sources. Using variation in childrens' characteristics as instruments, Van Houtven and Norton (2004) and Charles and Sevak (2005) find strong evidence of substitution between informal care and nursing home care. Mommaerts (2018) exploits policy changes over time in state Medicaid eligibility generosity to show that individuals who are more likely to be eligible for Medicaid are more likely to reside in nursing homes than coreside with family members. The channeling demonstration—an experiment that expanded the generosity of publicly funded home care for low-income elderly in the 1980s—led to small reductions in informal care (Pezzin, Kemper, and Reschovsky 1996). Lieber and Lockwood (2019) show that Medicaid's Cash and Counseling experiments, which provided cash-like home care benefits, led to much lower rates of formal care. Finally, Coe, Van Houtven, and Goda (2020) use state variation in subsidies to long-term care insurance policies as an instrument for insurance coverage and find that an increase in long-term care insurance coverage—which significantly lowers the marginal cost of formal care—induces significantly less informal caregiving.

Overall, this literature suggests that the type of long-term care that individuals receive is to some extent a choice that is influenced by economic motives, such as the relative price of formal and informal care. Moreover, because individuals have the option to use informal care as a substitute for formal services, the presence of the family may affect decisions of whether to purchase long-term care insurance. I now turn to a model of long-term care and the family that incorporates these insights.

IV. Model

To understand the mechanisms by which the presence of adult children affects long-term care insurance purchase decisions and to evaluate potential welfare-improving policies, I develop a dynamic model of elderly parent and adult child interactions in which the parent and child decide how much to each save and consume; how the child allocates her time between market work, family care, and leisure; and whether the parent buys long-term care insurance at retirement. The model incorporates four main features that capture the key trade-offs that elderly individuals and their families face when choosing whether to purchase insurance and which type of care to receive. First, the model is dynamic because savings is an important factor in long-term care decisions: it acts as a self-insurance device, a barrier to Medicaid, and a means of transferring resources across generations. Second, long-term care can be provided by formal or informal means, and formal costs can be paid by long-term care insurance, out-of-pocket payments, and Medicaid. Third, the model includes the behavior of not only an elderly individual but also her adult child to account for both formal and informal costs of long-term care as well as the life cycle and intergenerational impacts of these choices.[11] Fourth, the parent and adult child face risk, including long-term care shocks to the parent that require formal care or informal care by the child, uncertainty over the longevity of the parent, and permanent shocks to the adult child's wage that influence the opportunity cost of informal care.

I assume that the parent and child make decisions with limited commitment. This is in contrast to other models of parent-child interactions that use a noncooperative framework to study long-term care decisions (Fahle 2014; Barczyk and Kredler 2017; Ko 2022). I instead adopt a limited commitment framework because the level of interaction observed in the data—such as the fact that one-quarter of parents and adult children coreside and one-quarter of adult children help parents with their finances—suggests a level of coordination beyond a noncooperative game. On the other hand, it is important in this setting that commitment is not full because full commitment has the unattractive features of indeterminate asset separation between the parent and child as well as full insurance. Limited commitment allows for separate assets between the parent and child, which is important for capturing Medicaid eligibility and allows for partial insurance between the two, as other work has shown to be more realistic (Hayashi, Altonji, and Kotlikoff 1996; Attanasio, Meghir, and Mommaerts 2019).

A. *Preferences*

The model involves a single elderly parent and her adult child in every period from $t = 1, \ldots T$, in which period $t = 1$ corresponds to retirement (age 65) of the parent and T corresponds to age 93. The parent and child have time-separable expected utility preferences over consumption, leisure, and care arrangements.

The adult child's per-period utility while cooperating is

$$U_t^{\mathrm{K}}(c_t^{\mathrm{K}}, \ell_t^{\mathrm{K}}) = u(c_t^{\mathrm{K}}, \ell_t^{\mathrm{K}}), \tag{1}$$

where c_t^{K} is child consumption and ℓ_t^{K} is child leisure.[12] The parent's per-period utility is

$$U_t^{\mathrm{P}}(c_t^{\mathrm{P}}, F_t, U_t^{\mathrm{K}}) = u(c_t^{\mathrm{P}}, \ell_t^{\mathrm{P}}) + z_F \times \mathbb{1}_{F_t=1} + z_{\mathrm{M}} \times \mathbb{1}_{F_t=1}\mathbb{1}_{m_t>0} + \eta U_t^{\mathrm{K}}, \tag{2}$$

[11] As shown in table 1, married retirees receive a significant amount of care from spouses and children, while single retirees receive the vast majority of informal care from their children. I model only single retirees in order to focus on a simpler set of informal caregivers. I restrict the model to one child for the same reason. See sec. V.A and app. A (apps. A–E are available online) for further discussions of this choice.

[12] Noncooperation includes an additional preference term to capture guilt, as defined in more detail in sec. IV.E and app. sec. B.4.

where c_t^{P} is parent consumption and ℓ_t^{P} is parent leisure, which is set to the total amount of allocatable hours. z_{F} is disutility if they receive formal care ($\mathbb{1}_{F_t=1}$ is an indicator for whether formal care F_t, a binary variable, is equal to 1) and reflects the notion that parents, all else equal, may prefer care from their child over a hired caregiver. Similarly, z_{M} is disutility over receiving Medicaid-funded care ($\mathbb{1}_{m_t>0}$ is an indicator for whether the individual receives any Medicaid-funded care, $m_t > 0$) and reflects the notion that Medicaid-funded care may be of lower quality.[13] Finally, the parent may also care about the child's well-being, which enters the parent's utility function as permanent altruism η over the child's utility U_t^{K}.

Preferences over consumption and leisure for both the parent and child take the following form:

$$u(c, \ell) = \frac{c^{1-\gamma_{\mathrm{c}}}}{1-\gamma_{\mathrm{c}}} + \alpha \frac{\ell^{1-\gamma_\ell}}{1-\gamma_\ell}, \tag{3}$$

where γ_{c} and γ_ℓ control the curvature over consumption and leisure, respectively, and α dictates how much individuals value leisure relative to consumption. The leisure function primarily matters for the child, who makes labor supply and care decisions, while the parent does not work or provide care and thus does not make a leisure choice.

Preferences at the time of the parent's death t_{d} are consistent with the preferences above: the parent realizes a value $V_{t^{\mathrm{d}}}^{\mathrm{P}} = \eta V_{t^{\mathrm{d}}}^{\mathrm{K}}$, where V^{K} is the child's value function, which will be defined in more detail in section IV.E. This value to the parent is in contrast to a warm glow bequest function, in which the parent cares about the amount of the bequest rather than the well-being of the child (e.g., as in De Nardi 2004; De Nardi, French, and Jones 2010; Lockwood 2018).

The child's terminal value captures the value of savings a_{T+1}^{K} for their retirement:

$$V_{T+1}^{\mathrm{K}}(a_{T+1}^{\mathrm{K}}) = \frac{(a_{T+1}^{\mathrm{K}})^{1-\gamma_{\mathrm{b}}}}{1-\gamma_{\mathrm{b}}}. \tag{4}$$

B. Sources of Risk

The parent and child face three key sources of risk when making long-term care decisions. The parent faces uncertainty over future long-term care needs and the timing of death, both of which will influence insurance

[13] This disutility could arise from several factors, such as stigma attached to welfare programs, utility costs to applying for benefits, or lower-quality care. There is strong evidence that suggests that Medicaid-funded long-term care is lower quality. For example, Medicaid typically funds only semiprivate rooms in nursing homes, and nursing homes that primarily serve Medicaid residents have fewer nurses, lower occupancy rates, and other indicators of low quality (Mor et al. 2004).

and precautionary savings choices. The child faces a stochastic wage process, which will impact the opportunity cost of family care.

1. Income Processes

The child's wage is subject to a permanent shock each period that follows a random walk process:

$$\log w_t^{\mathrm{K}} = \log w_{t-1}^{\mathrm{K}} + \xi_t,$$

where $\xi_t \sim N(0, \sigma_\xi^2)$. This assumption follows from several previous studies that show empirically that income shocks are well characterized as a random walk (MaCurdy 1982; Abowd and Card 1989; Meghir and Pistaferri 2004). The child's income follows as $y_t^{\mathrm{K}} = w_t^{\mathrm{K}} L_t$, in which (annual) labor supply is a discrete choice between not working, working part-time (20 hours per week), or working full-time (40 hours per week):[14]

$$L_t = \begin{cases} 0 & \text{if not working,} \\ 1{,}000 & \text{if part-time (20 hours per week),} \\ 2{,}000 & \text{if full-time (40 hours per week).} \end{cases} \tag{5}$$

The parent's income process is a constant (real) stream of nonasset income y^{P} (De Nardi, French, and Jones 2010; Lockwood 2018) This is a reasonable approximation since most income for retirees comes from annuitized Social Security and pension wealth.

2. Long-Term Care Needs and Death

I discretize the parent's (annual) long-term needs into three categories, $h_t \in \{0; 1{,}000; 2{,}000\}$, corresponding to (1) they do not need care ($h_t = 0$), (2) they need 20 hours of care per week (or $h_t = 1{,}000$ hours per year), or (3) they need 40 hours of care per week (or $h_t = 2{,}000$ hours per year). The transition probabilities for long-term care status depend on prior status, income (y^{P}), and age:

$$h_{t+1} = h_{t+1}(h_t, y^{\mathrm{P}}, t).$$

The probability of parent death is modeled analogously, so that the probability of survival to time $t + 1$ is $s_{t+1}(h_t, y^{\mathrm{P}}, t)$.

Parents who need care ($h_t > 0$) either receive it formally from a paid source ($F_t = 1$) or informally from their child ($F_t = 0$). It is important

[14] This formulation abstracts from dynamic wage effects of caregiving, which would add additional state variables to the problem (see Skira [2015] for a single-agent model of caregiving and dynamic wage effects).

to note that the type of care, F_t, affects utility but does not enter as an input into the long-term care transition function $h_t(\cdot)$ or the survival function $s_t(\cdot)$. I do this for two main reasons. First, long-term care concerns the ability to perform basic personal tasks, in contrast to other types of health care whose quality may more acutely affect subsequent health outcomes. Second, a small literature has found no effects of the type of long-term care on health outcomes (e.g., Brown et al. 2007; Bakx et al. 2020).

C. *Long-Term Care Costs and Insurance*

The annual cost of long-term care, ltc_t, depends on long-term care needs (h_t) and whether the care is provided formally or by the child (F_t): $\mathrm{ltc}_t(h_t, F_t)$. When care is hired formally, ltc_t is equal to \$20,000 for $h_t = 1{,}000$ (light care) and \$61,700 for $h_t = 2{,}000$ (intensive care). This roughly corresponds to hiring a home care aide at \$20 per hour for light care and the cost (net of room and board) of a midrange nursing home for intensive care. When care is provided informally by the child, $\mathrm{ltc}_t = 0$ for both care needs states. The implicit cost to the child of family care is the hours of care needed, h_t.

There are two main sources of insurance against long-term care risk. The first is private insurance, ltci, which covers formal long-term care costs at the cost of annual premiums p_t. Importantly, this product does not reimburse any (implicit) costs associated with family-provided care. The benefit is denoted by $\lambda_t(h_t, F_t)$ and depends on direct long-term care needs state h_t and whether care is provided formally, F_t. The contract is a typical contract as described by Brown and Finkelstein (2007), which has a maximum yearly benefit of \$44,350 (corresponding to \$100 per day in 2000 US dollars) and an 18% load.[15] Note that because the maximum benefit is less than the cost of long-term care when $h_t = 2{,}000$, the net formal long-term care cost to the individuals will remain positive in that state, so $\mathrm{ltc}_t - \lambda_t \mathbb{1}_{\mathrm{ltci}} \geq 0$ for all h_t. The decision to purchase this insurance product is modeled as a once-and-for-all decision at $t = 1$ (age 65), which roughly corresponds to the average age of insurance purchase (Brown and Finkelstein 2007). I do not allow individuals who are initially in poor health to purchase insurance, a restriction used to match the fact that around one-third of individuals are ineligible to purchase long-term care insurance because of health conditions (Hendren 2013).[16]

[15] The load on an insurance product is defined as 1 − (expected present discounted value benefits/expected present discounted value premiums), so an 18% load means that the policy pays \$0.82 in expected benefits for every \$1.00 in expected premiums. I calculate the premium necessary to satisfy an 18% load given expected needs of the sample.

[16] Two abstractions I make from typical policies are that (1) policies often have maximum benefit periods of, e.g., 5 years, after which the policy no longer provides coverage; and (2) lapsation of policies is not uncommon. I abstract from these two features to

The second source of long-term care insurance is Medicaid, a means-tested public insurance program (see more details in sec. II). The Medicaid benefit, m_t, is modeled as a net resource floor, as is done in much of the related literature.[17] Specifically,

$$m_t = \max\{0, \underline{c} + \mathrm{ltc}_t - \lambda_t \mathbb{1}_{\mathrm{ltci}=1} - [a_t^{\mathrm{P}} + y^{\mathrm{P}}]\}. \tag{6}$$

The Medicaid benefit is positive if the parent's net resources are less than the net resource floor $\underline{c}$. For parents with zero long-term care expenditures, net resources are simply the sum of income y^{P} and assets a_t^{P}, and the floor is analogous to the amount of resources that would encompass the basket of social safety net programs, such as food stamps and welfare.[18] For parents with positive long-term care expenditures ($\mathrm{ltc}_t > 0$), net resources are the sum of income and assets minus out-of-pocket formal long-term care expenditures ($\mathrm{ltc}_t - \lambda_t$). If parents with long-term care needs receive Medicaid benefits, Medicaid also pays the remaining formal long-term care costs $\mathrm{ltc}_t - \lambda_t \mathbb{1}_{\mathrm{ltci}=1}$. Note that Medicaid does not pay for long-term care insurance premiums, nor does it pay for long-term care costs covered by private insurance: by law, Medicaid is a secondary payer, meaning that private insurance must pay benefits λ_t for an individual with an insurance policy before Medicaid will pay.

D. *Family Budget Constraint*

In cooperation, the parent and child can transfer resources across time through savings according to the following budget constraint:

$$\begin{aligned} a_{t+1}^{\mathrm{P}} + a_{t+1}^{\mathrm{K}} = (1 + r)[a_t^{\mathrm{P}} + a_t^{\mathrm{K}} + y^{\mathrm{P}} + L_t w_t^{\mathrm{K}} - c_t^{\mathrm{P}} - c_t^{\mathrm{K}} - \mathrm{ltc}_t \\ + (\lambda_t - p_t)\mathbb{1}_{\mathrm{ltci}} + m_t + sn_t^{\mathrm{K}}]. \end{aligned} \tag{7}$$

While this is written as a family budget constraint, the parent and child still own separate assets a_t^{P} and a_t^{K} in each period, and it could equivalently be written as two individual budget constraints along with transfers between the parent and child.[19] Determinacy of the asset split between

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simplify an already computationally heavy problem, as they would add an additional state variable and choice variable.

[17] See, e.g., De Nardi, French, and Jones (2010), Lockwood (2018), and Braun, Kopecky, and Koreshkova (2019). This convenient specification for Medicaid abstracts from the issue that some assets are (sometimes) excluded from Medicaid's definition of net resources (e.g., housing assets; for recent work on the topic, see Chang and Ko 2021; Achou 2023). Fully incorporating this would be infeasible, as it would require yet another asset state variable (in addition to parent and child assets).

[18] In this sense, the child also has a net resource floor, denoted $sn_t^{\mathrm{K}} = \max\{0, \underline{c} - [a_t^{\mathrm{K}} + y_t^{\mathrm{K}}]\}$.

[19] In noncooperation, the parent and child have separate budget constraints and inter vivos transfers are ruled out, as discussed in more detail in app. sec. B.4.

the parent and child (i.e., meaningfully owning separate assets) is essential in this setting because of the importance of own assets in determining Medicaid eligibility (see eq. [6]). As will become clearer in section IV.E, the fact that commitment between parent and child is limited is key to generating this feature.

E. Parent-Child Problem

I assume that the parent and child cooperate but with limited commitment, in which either party can threaten to exit cooperation to their outside option. To characterize this problem, I adopt the approach developed by Marcet and Marimon (2019) and used in other work that uses limited commitment models to study family decisions (e.g., Voena 2015; Foerster 2021), in which the parent and child jointly solve a Pareto problem with participation constraints in each period t.

I first define the individual value functions of the parent and child and their outside options of noncooperation in period t as a function of the state space ω_t.[20] Given a sequence of choices $\{q_t(\omega_t)\}_{t=1}^{T}$, the individual value functions for the parent and child are

$$V_t^{\mathrm{P}}(\omega_t) = U_t^{\mathrm{P}}(c_t^{\mathrm{P}}(\omega_t), F_t(\omega_t), U_t^{\mathrm{K}}(\omega_t)) + \beta E_t V_{t+1}^{\mathrm{P}}(\omega_{t+1}|\omega_t), \tag{8}$$

$$V_t^{\mathrm{K}}(\omega_t) = U_t^{\mathrm{K}}(c_t^{\mathrm{K}}(\omega_t), \ell_t^{\mathrm{K}}(\omega_t)) + \beta E_t V_{t+1}^{\mathrm{K}}(\omega_{t+1}|\omega_t), \tag{9}$$

in which the continuation values are defined recursively on the basis of the terminal condition in equation (4):

$$V_T^{\mathrm{P}}(\omega_T) = U_T^{\mathrm{P}}(c_T^{\mathrm{P}}(\omega_T), F_T(\omega_T), U_T^{\mathrm{K}}(\omega_T)) + \eta\beta V_{T+1}^{\mathrm{K}}(a_{T+1}^{\mathrm{K}}(\omega_T)), \tag{10}$$

$$V_T^{\mathrm{K}}(\omega_T) = U_T^{\mathrm{K}}(c_T^{\mathrm{K}}(\omega_T), \ell_T^{\mathrm{K}}(\omega_T)) + \beta V_{T+1}^{\mathrm{K}}(a_{T+1}^{\mathrm{K}}(\omega_T)). \tag{11}$$

If the parent dies at time $t_{\mathrm{d}} < T$, the parent's terminal value is simply $V_{t_{\mathrm{d}}}^{\mathrm{P}}(\omega_{t_{\mathrm{d}}}) = \eta V_{t_{\mathrm{d}}}^{\mathrm{K}}(\omega_{t_{\mathrm{d}}})$, and the child's problem reverts to a simple life cycle model, as described in appendix section B.3.

The outside options of noncooperation for the parent and child are denoted by $Z_t^{\mathrm{P}}(\omega_t)$ and $Z_t^{\mathrm{K}}(\omega_t)$ and are defined as the solution to an environment with a breakdown in family ties in which the parent and child make separate decisions in all future periods, and all opportunities for family care and inter vivos transfers cease (see app. sec. B.4 for the formulation). The only monetary transaction between the parent and child is a potential bequest at the death of the parent. The model incorporates these restrictions on behavior to capture the notion that family care is

[20] Because noncooperation never occurs in equilibrium (as discussed in more detail below), I write the individual value functions in each period under the implicit assumption that cooperation occurs in all future periods as well.

a complex decision that requires a level of coordination that is infeasible when families cannot make joint decisions.

With these definitions of the parent and child's value functions and their outside options, the parent and child jointly choose $q_t = \{c_t^{\mathrm{P}}, c_t^{\mathrm{K}}, a_{t+1}^{\mathrm{P}}, a_{t+1}^{\mathrm{K}}, F_t, L_t\}$, given state variables $\omega_t = \{a_t^{\mathrm{P}}, a_t^{\mathrm{K}}, y^{\mathrm{P}}, w_t^{\mathrm{K}}, h_t, \mathrm{ltci}, \theta_t^{\mathrm{P}}, \theta_t^{\mathrm{K}}\}$,[21] to solve the following constrained Pareto problem, in which the parent's Pareto weight is indicated by θ_t^{P} and the child's weight by θ_t^{K}:

$$V_t(\omega_t) = \max_{qt} \theta_t^{\mathrm{P}}(U_t^{\mathrm{P}}(c_t^{\mathrm{P}}, F_t, U_t^{\mathrm{K}}) + \beta E_t V_{t+1}^{\mathrm{P}}(\omega_{t+1})) + \theta_t^{\mathrm{K}}(U_t^{\mathrm{K}}(c_t^{\mathrm{K}}, \ell_t^{\mathrm{K}}) + \beta E_t V_{t+1}^{\mathrm{K}}(\omega_{t+1})) \tag{12}$$

subject to the following sets of constraints. The first are monetary constraints consisting of the family budget constraint (eq. [7]), the Medicaid benefit (eq. [6]), and no-borrowing constraints: $a_{t+1}^{\mathrm{P}} \geq 0$ and $a_{t+1}^{\mathrm{K}} \geq 0$. The second is the child's time constraint: $\mathcal{T} = L_t + \ell_t^{\mathrm{K}} + h_t \mathbb{1}_{F_t=0}$. Finally, the parent and child participation constraints must be satisfied:

$$\mu_t^{\mathrm{P}} : V_t^{\mathrm{P}}(\omega_t) - Z_t^{\mathrm{P}}(\omega_t) \geq 0, \tag{13}$$

$$\mu_t^{\mathrm{K}} : V_t^{\mathrm{K}}(\omega_t) - Z_t^{\mathrm{K}}(\omega_t) \geq -G_t, \tag{14}$$

which state that the value of cooperation for the parent $V_t^{\mathrm{P}}(\omega_t)$ relative to their outside option of noncooperation $Z_t^{\mathrm{P}}(\omega_t)$ must be positive and that the value of cooperation for the child $V_t^{\mathrm{K}}(\omega_t)$ relative to their outside option of noncooperation $Z_t^{\mathrm{K}}(\omega_t)$ must be greater than a punishment $G_t = \Sigma_{s=t}^{T}\beta^{s-t}g$. The latter captures a sense of guilt or social stigma from not cooperating with one's parents and is mechanically similar to the punishment of leaving a risk-sharing arrangement in Ligon, Thomas, and Worrall (2002).[22] The Lagrange multipliers for these participation constraints, μ_t^{P} and μ_t^{K}, dictate that the evolution of the Pareto weights follow $\theta_{t+1}^{\mathrm{P}} = \theta_t^{\mathrm{P}} + \mu_t^{\mathrm{P}}$ and $\theta_{t+1}^{\mathrm{K}} = \theta_t^{\mathrm{K}} + \mu_t^{\mathrm{K}}$, as described in section 2.1 and appendix A of Marcet and Marimon (2019). Intuitively, when a participation constraint binds ($\mu_t^{\mathrm{P}} > 0$ or $\mu_t^{\mathrm{K}} > 0$), just enough resources are shifted to that party to satisfy them.[23] Note that this theory is silent on the initial weights

[21] In the first period, ltci is a decision variable, not a state variable. Moreover, I write out separate weights θ_t^{P} and θ_t^{K} for ease of understanding, but it can also be written as a normalized θ_t and $1 - \theta_t$ because only the relative weights matter (see app. sec. C.1 for more details).

[22] I use this specification instead of pure altruism because the literature on child altruism toward parents at this stage of life typically finds small effects (e.g., Fahle 2014; Barczyk and Kredler 2017), guilt is an empirically important motive for family interactions (Li, Rosenzweig, and Zhang 2010), and two-sided altruism in a dynamic setting often requires additional restrictions to avoid multiple equilibria, as Kaplan (2012) and Barczyk and Kredler (2014) discuss.

[23] Note that the allocation q_t^* dictated by these constraints corresponds to an updated Pareto problem with weights $\theta_t^{\mathrm{P}} + \mu_t^{\mathrm{P}}$ and $\theta_t^{\mathrm{K}} + \mu_t^{\mathrm{K}}$, but the planner's objective function

θ_0^i; I thus estimate them as parameters of the model to pin down a unique equilibrium.

While noncooperation can be threatened by both the parent and child, it will never materialize in equilibrium. This is because there always exists an allocation in which both the parent and child are at least as well off cooperating as noncooperating because of the positive surplus of cooperation, which consists of risk-sharing opportunities, as well as potential monetary savings through the ability to substitute family care for formal long-term care, preferences over family care, and child guilt. Indeed, the surplus in this problem allows for a greater degree of cooperation than the surplus from risk sharing alone would. This is in contrast to most marriage models with limited commitment (e.g., Yamaguchi, Ruiz, and Mazzocco 2014; Voena 2015; Bronson 2019), in which noncooperation (divorce) is feasible because negative preference shocks can eliminate any marital surplus that previously made marriage desirable.

F. Model Discussion

Before turning to estimation, there are several points to emphasize about how the presence of the family changes the economics of insurance demand and savings and how the model compares with other models of family interactions.

1. Implications for Insurance Demand and Savings

In a standard life cycle model, the typical forces that dampen the demand for long-term care insurance are Medicaid and savings. Medicaid pays for long-term care expenses for those with few resources, thus crowding out the demand for private insurance (particularly at the low end of the wealth distribution), and the ability to save acts as self-insurance, which may be attractive if insurance does not offer actuarially fair policies.

Adding the family to such a model introduces several new factors that can influence insurance demand. First, family care may reduce the demand for insurance through both financial and preference considerations. The opportunity cost of family care to the child (lost wages and leisure) will dictate the relative cost of family care, such that families with low opportunity costs of time will have lower demand for insurance. Moreover, the parent's preference for family care may lower the demand for insurance since it does not cover family care. Second, parent altruism

in eq. (12) evaluated at q_t^* is calculated using weights θ_t^{P} and θ_t^{K}. For more detail on this point, see app. sec. B.1, which explicitly incorporates the Lagrange multipliers into the family problem. In addition, while it is written as a planner problem, it is equivalent to a decentralized problem in which the parent and child make individual decisions (see app. sec. B.2 for the formal definition of the equilibrium concept).

has an ambiguous effect on insurance demand. On the one hand, the desire to leave a bequest (or transfer assets to a child) increases the value of long-term care insurance because insurance protects assets (Pauly 1990). On the other hand, bequests lower the value of insurance by reducing the opportunity cost of precautionary savings (Lockwood 2018). Finally, risk sharing with the child will also lower the demand for insurance: the ability of the parent to spread long-term care cost shocks between both members of the family is a form of insurance in and of itself, thereby substituting for a formal insurance product. Limited commitment, however, decreases the overall ability to share risk, which will mute the negative effect of risk sharing on insurance demand.

Family care, altruism, and risk sharing have analogous effects on savings behavior. In addition, limited commitment plays an essential role in the distribution of assets between the parent and child, which is important for capturing the realities of Medicaid eligibility. A model with full commitment would counterfactually give all resources to the child so that the parent can gain Medicaid eligibility (known as Medicaid planning). With limited commitment, individual assets affect the threat points to cooperation because larger asset holdings makes noncooperation more attractive through an enhanced ability to self-insure. This generates a strategic incentive to place more assets with the agent who receives more of the surplus of the arrangement in order to create a liquidity constraint on the member that may otherwise find noncooperation more attractive (Ligon, Thomas, and Worrall 2000). While Medicaid planning could still occur, limited commitment disciplines this behavior because holding onto assets plays an important role in the parents' bargaining position.[24]

2. Comparison to Other Models of Family Interactions

To further highlight the value of the limited commitment model, it is useful to discuss its differences with other models of family interactions and, in particular, the model used in Ko (2022). Compared with a cooperative model with full commitment, limited commitment generates determinacy in the wealth distribution between parents and children (as explained above). Limited commitment also generates partial insurance between parents and children against various shocks over the life cycle,

[24] In reality, Medicaid rules attempt to prevent such behavior by having a 5-year look-back period, during which transferred assets still count toward Medicaid eligibility. A family could still game it by transferring assets well in advance of entering Medicaid, but again that comes at the cost to the parent of forgoing their bargaining position. I do not model this look-back period because it would require keeping track of assets over the past 5 years (several more continuous state variables), and there is very little such behavior in the model anyway.

whereas a full commitment model would imply the unrealistic result of full insurance between parents and children.[25] The main difference between noncooperative models (as others in this literature have used) and cooperative models is that cooperative models result in efficient (or constrained efficient, with limited commitment) decisions, while the solutions to noncooperative models can be far from the Pareto frontier. In the context of families and long-term care, the data suggest a high level of coordination: for example, one-quarter of parents and adult children coreside, one-quarter of adult children help parents with their finances, and the vast majority of parents are confident in the capability and trustworthiness of their children to make financial decisions on their behalf in the event of cognitive decline (Ameriks et al. 2023).

There are several important differences between this model and the model used in the most closely related paper, Ko (2022). Ko (2022) assumes a noncooperative model and does not permit inter vivos transfers, nor does it allow the child to save. These restrictions might obscure the child's choices, as they cannot smooth consumption over time with either their own resources or their parent's resources. For example, if they do not have access to savings, then it is much more costly to provide informal care and not work, thus accentuating the opportunity cost of informal care in such a model. On the other hand, these restrictions allow Ko (2022) to add more heterogeneity to the model, such as gender and proximity to parents. These differences allow for complementary questions and counterfactuals: the focus of my model is to understand demand-side forces, for which the resources of children may be particularly important, while Ko (2022) focuses on adverse selection, for which the private information contained in the heterogeneity is important.[26] Braun, Kopecky, and Koreshkova (2019) also focus on adverse selection and other supply-side issues, like administrative costs, but abstract from the role of informal care. While such equilibrium considerations would be an interesting extension, this paper focuses on the complexities of the demand side and, in particular, the role of the family.

V. Estimation

To quantify the effect of the family on long-term care insurance demand, understand how the family interacts with Medicaid, and evaluate counterfactual policies, I structurally estimate the model using data from the

[25] Partial insurance also implies that agents are exposed to the other agents' risk in addition to their own; see Attanasio, Meghir, and Mommaerts (2019) and Boar (2021) for work on this.

[26] Appendix table 5 reports average long-term care needs (converted to dollar amounts by pricing the care at its formal care cost) and the fraction of individuals who purchase insurance by parent and child income and shows weak suggestive evidence of adverse selection.

HRS and the PSID. I use a two-step procedure in which I first estimate certain parameters of the model directly from the data (outside the model) and calibrate others from the literature. In the second step, I numerically solve the model and structurally estimate the remaining parameters, conditional on the first-stage parameters, using simulated method of moments (McFadden 1989; Pakes and Pollard 1989).

A. *Data*

The main source of data is the HRS, a longitudinal survey of individuals aged 50 starting in 1992. The survey contains detailed questions about health, wealth, income, and demographic and family characteristics, including some key information about their children.

My sample consists of single individuals aged 65 and above who are retired and have at least one child.[27] While the model includes only one child, I do not restrict my sample to parents with one child because this would significantly reduce my sample. Following Lockwood (2018), I restrict the sample to individuals who do not miss an interview between 1998 and their death, are single throughout the sample, and have annual labor earnings of less than \$3,000 to better ensure that they are retired.[28] All dollar amounts are converted to 2010 US dollars using the Consumer Price Index.

Table 2 reports summary statistics for the 2,698 parent-child pairs in the sample. Eighty-seven percent of the parents are widowed and 83% are female, which reflects the fact that women often outlive their spouses. On average, the parent has over three children, 20% of them are on Medicaid, and only 8% own a long-term care insurance policy.

I measure long-term care needs by the amount of help the parent reports receiving for ADLs or IADLs.[29] I categorize their needs as $h_t = 0$ if

[27] An alternative identification strategy would be to also leverage differences in long-term care insurance rates and other data patterns by whether the elderly individual has children (e.g., fig. 1). Instead, I focus on a sample of parents with children for a few main reasons. First, most individuals have children, so splitting many different moments by whether they have children would result in very small sample sizes for the childless subsample. Second, individuals without children are very different from individuals with children along many margins beyond the presence of children, such as asset profiles, bequest motives, and risk preferences.

[28] From the sample of 10,784 individuals age 65 and over in 1998, the restriction to single individuals reduces the sample size to 4,200. The restriction to individuals with at least one child reduces the sample size to 3,499. The restriction to annual labor earnings less than \$3,000 reduces the sample size to 3,186. Finally, the restriction to individuals who do not miss an interview reduces the sample size to 2,689.

[29] The set of ADLs asked about includes walking across a room, dressing, bathing, eating, getting in and out of bed, and using the toilet. The set of IADLs asked about includes using a map, using a telephone, managing money, taking medications, shopping for groceries, and preparing hot meals. The exact wording of the question is as follows: "Because of a health or memory problem, do you have any difficulty with . . .?" The respondent is

TABLE 2
Summary Parent and Selected Child Characteristics

	Value
	B. Parent Characteristics
Age	82.0
Female	.83
Widowed	.87
Number of children	3.3
Medicaid	.20
Own long-term care insurance	.08
Need light care	.16
Share family care, % (median hours/week)	.60 (7.5)
Need intensive care	.20
Share family care, % (median hours/week)	.42 (52.5)
Permanent income, mean (US$)	18,348
Permanent income, median (US$)	14,157
Wealth, mean (US$)	227,785
Wealth, median (US$)	73,778
Number of parent-child pairs	2,689
	A. Selected Child Characteristics
Age	54
Female	.59
Married	.62
Number of children	2.1
High school or less	.45
Not working	.33
Part-time work	.09
Family income >US$35,000	.57
Average care (hours/week)	17.2

Note.—The sample includes single retired individuals aged 65 and over and their selected child in the pooled 1998–2014 HRS, where the selected child in families with multiple children is defined using the following rules, with each subsequent rule breaking ties from the previous rule: (1) highest number of family care hours provided over the sample period, (2) geographically closest to parent, (3) daughter, and (4) oldest. Light care is defined as 1–100 hours per month; intensive care is defined as over 100 hours per month. For "Share family care," the first number denotes the percentage of care that is provided by family members, and the second number denotes median hours per week of family care received for those who receive family care. Income is defined as the average over all periods of total income less asset income and government transfers. Wealth is defined as the sum of all assets less debts. Average care is the mean number of hours per week spent on family care when the parent needs care.

they do not need any care, $h_t = 1{,}000$ if they need 1–100 hours per month of help (light care), and $h_t = 2{,}000$ if they need over 100 hours per month (intensive care). In addition, I categorize their needs as $h_t = 1{,}000$ and $h_t = 2{,}000$ if the parent reports living in an assisted living facility or a

specifically asked to "exclude any difficulties you expect to last less than 3 months." If the respondent reports any difficulty, s/he is asked, "Does anyone ever help you . . .?" The look-back period for the hours of care is only the previous month. Because the length of a period in the model is 2 years, the implicit assumption in the model is that this monthly amount is consistent over the course of 2 years.

nursing home, respectively. Table 2 shows that 16% of the sample needs light care and 20% needs intensive care at a given point in time.

I assign the type of care (formal or family care) on the basis of the relationship of the helper to the parent as well as the residential status of the parent. If the parent receives any help from the child, the help is categorized as family care. Otherwise, it is categorized as formal care. The only exception to this is if the parent resides in an assisted living facility or a nursing home, in which case the help is categorized as formal care.[30] In my sample, 61% of light care is provided informally for 8 hours per week at the median, and 42% of intensive care is provided informally for 53 hours per week at the median.

Permanent income of the parent is the average over all periods observed of total income less asset income and government transfers. On average, 80% of this income comes from Social Security and most of the remainder from pension income. Median income is around $14,000 a year in my sample. Parent assets are the sum of all assets less debts. The HRS has a rich set of asset questions that includes the value of housing and real estate, vehicles, value of a business or farm, savings accounts and other liquid assets, individual retirement accounts, Keoghs, stocks, mutual funds, bonds, and other assets. Because of inaccuracies in the wealth variables in early survey years, I use data only from 1998 onward (for more details, see Lockwood 2018 and references therein). Because I model a parent from age 65 through death but have data only from 1998–2014, I rely on five cohorts to trace out life cycle savings paths (and simulate each cohort starting from when I first observe them in the data).[31] Across all ages, median wealth is $74,000.

For child characteristics, I use a combination of the HRS and the PSID. To determine which child to use in the sample when a parent has multiple children (85% of the sample have multiple children), I first choose the child who provides the highest number of hours of family care over the sample period. This determines 56% of the sample with multiple children. For the remaining sample, I sequentially apply the following rules until a tie is broken: (1) the child who lives closest to the parent, as determined by whether the child lives within 10 miles of the parent (this determines an additional 27%); (2) whether the child is a daughter (8%);

[30] Forty-one percent of parents categorized as formal care recipients also receive some amount of family care (a median of 3 hours per week conditional on any family care), but the vast majority of these cases are nursing home residents whose main source of care is formal. Twenty-eight percent of parents categorized as receiving family care also receive some amount of formal care (a median of 15 hours per week conditional on any formal care).

[31] As such, each cohort's initial conditions begin at different ages. Since θ_0 is an initial condition, the Pareto weight of a 71-year-old in the youngest cohort has evolved from θ_0 since age 65, while a 71-year-old in the second-youngest cohort enters the model at age 71 with the initial θ_0. Sensitivity analyses that modify θ_0 for older cohorts to the average θ_t at their initial age by the youngest cohort generate very similar simulated outcomes.

(3) the oldest child (9%); and (4) for the remaining few ties, I randomly select a child.[32] Panel B of table 2 reports summary statistics for selected children and shows that 59% are female, 62% are married and have around two children, 33% are not working, and, among those who provide care, they provide 17 hours per week on average.

In the model, children are differentiated by their potential wage and their savings. To measure the child's potential wage, I categorize children on the basis of their education instead of their household income, which is a result of labor supply decisions and reported only in large intervals. I assign children with a high school degree or less as low types (45% of the sample) and children with more than a high school degree as high types (55% of the sample) to capture differences in opportunity costs of time. To get a sense of the correlation between parent wealth and child potential income, parents of children with more than a high school degree have $121,487 in median assets, while parents of children with a high school degree or less have $45,902 in median assets (not shown in table).

Child assets are not ascertained in the HRS, so I turn to the PSID. The PSID is a nationally representative longitudinal study that started in 1968 that includes detailed information about income and assets. Importantly, it follows children as new sample members after they split off from their parents' household. I follow the same sample restrictions and wealth definitions for parents in the PSID as in the HRS and link this sample to their children. I then impute child assets in the HRS sample using predictive mean matching. Specifically, I use demographic information about the parent and child contained in both datasets, including parent wealth and income percentiles, child income bin corresponding to the child income bins in the HRS, child age bin, parent age bin, child gender, child marital status, child education, whether the child has children, and year.

B. *First-Stage Parameters*

Prior to estimating the key parameters inside the model, I estimate certain parameters outside the model that do not require the structure of the model. Parent income and long-term care costs are estimated directly from the data. Because I assume that survival probabilities and transitions between long-term care needs states depend on only the prior need state, age, and permanent income, these transitions are exogenous to choices made within the model. These values, in addition to values of parameters taken from the literature, are shown in table 3.

[32] A comparison of sample children and all children of the parents is shown in app. table 6. Selected children are more likely to be female and more likely to be educated but less likely to be working full-time. They are much more likely to live within 10 miles or even live with their parent. These effects are all magnified for selected children who eventually provide long-term care for their parent.

TABLE 3
FIRST-STAGE PARAMETERS

Parameter	Description/Source	Value
	A. Long-Term Care	
λ_t	Long-term care insurance premium (estimated from HRS sample; US$)	3,099 (18% load)
	Cost of formal long-term care (US$)	20,000/61,700
$h_t \mathbb{1}_{F_t=0}$	Hours of informal long-term care needed	1,000/2,000
	B. Health Transition	
Long-term care probabilities	Estimated from HRS sample	See table 4
Survival probabilities	Estimated from HRS sample	See table 4
	C. Income	
y^P terciles	Parent permanent income (estimated from HRS sample; US$)	8,131/14,648/25,007
y_0^K	Initial child income (Bureau of Labor Statistics; US$)	24,960/45,600
σ_ξ^2	Child wage shock variance (Meghir and Pistaferri 2004)	.0277/.0437
	D. Other	
$\mathcal{T}$	Total hours available (16 × 365)	5,840
β	Discount factor (Lockwood 2018)	.94
r	Market return on assets	1.03
t	Length of decision period, years	2

NOTE.—Parameters values are denominated in annual amounts. All monetary values are in 2010 US dollars.

1. Long-Term Care Cost and Insurance Parameters

I assume that formal care costs $20,000 per year for light care (equivalent to around $20 per hour for a home aide for 1,000 hours) or 1,000 hours per year of informal care by the child. For heavy care, I assume that care costs $61,700 per year formally, which is the average nonhealth cost of a nursing home in 2010 (Lockwood 2018), or 2,000 hours of informal care.

Following Lockwood (2018), I use a simple long-term care contract in which premiums are paid annually in exchange for benefits in years in which the parent needs and uses formal long-term care services, up to a maximum daily benefit of $100 in 2000 US dollars, which in 2010 amounts to $44,350 per year. Using the average long-term care needs distribution in my estimation sample, I calculate expected benefits and set the premium to exceed expected benefits by 18%, which is the average load in the United States (Brown and Finkelstein 2007). This amounts to premiums of $3,099 per year.

TABLE 4
Simulated Mortality and Long-Term Care Use

	Age 65	Age 75	Age 85	Age 93	Ever
Life expectancy at age 65	17.3				
% dead	.0	.24	.57	.89	
Long-term care status:					
% healthy	.85	.86	.59	.35	. . .
% need light care	.13	.07	.21	.31	.50
% need intensive care	.02	.07	.20	.34	.41
% need any care	.15	.14	.41	.65	.66

Note.—The table reports simulated long-term care and mortality statistics. The simulations use the initial health and income conditions of the sample of parents reported in table 2; simulated individuals are assigned long-term care needs and mortality status on the basis of the estimated transition probabilities. Transitions are estimated at a biennial rate. Light care is defined as 1–100 hours per month; intensive care is defined as over 100 hours per month.

2. Long-Term Care and Mortality Transitions

I estimate the probability of death and transitions between states of long-term care need as logistic functions of previous long-term care need, permanent income percentile, a cubic in age, and age interacted with permanent income rank and previous long-term care need, similar to De Nardi, French, and Jones (2010).[33] In the model, simulated individuals are assigned actual long-term care need and mortality trajectories of individuals from the data to reduce simulation noise. To form their expectations over future long-term care and mortality shocks, however, I use the estimated transition probabilities.

Table 4 uses the estimated long-term care and mortality transitions to simulate individuals with the initial conditions (but not the actual trajectories for this exercise) found in the data. Conditional on reaching age 65, individuals on average live 17.3 years longer, with 24% dying by age 75 and 11% living past age 93. Eighty-five percent of the sample initially receive no long-term care, but by age 85, over one-third of living individuals need long-term care. Two-thirds of individuals at age 65 will need some amount of long-term care within their lifetime.

3. Income and Other Parameters

I allow for three values of parent permanent income, which are the medians of each tercile in the sample. I allow the child's income process to vary by whether the child went to college (high types) or not (low types)

[33] Brown and Finkelstein (2008) and Lockwood (2018) use an actuarial model of formal services (Robinson 2002) to calculate health state transitions. Since I assume that using formal services is endogenous, the Robinson model is inappropriate for the context of this paper. Indeed, by defining only long-term care risk over formal services, these models may be critically underestimating the amount of long-term care risk that individuals face.

and use average earnings by education from the 2010 usual weekly earnings series from the Bureau of Labor Statistics, converted to posttax annual earnings assuming a 20% income tax rate.[34] The annual variance of permanent shocks to log wages is set to $\sigma_\xi^2 = 0.0277$ for low types and $\sigma_\xi^2 = 0.0437$ for high types, both of which are taken from Meghir and Pistaferri's (2004) estimates of the variance of permanent income shocks using data from the PSID.[35] Total hours available is set to 16 hours each day, or 5,840 per year. The discount factor is set to 0.94 (Lockwood 2018) and the return on assets is 3%. Each period in the model is 2 years to match the biennial nature of the HRS data.[36]

C. *Internally Estimated Parameters*

In the second stage, I use the method of simulated moments to estimate the remaining parameters inside the model: the parent's preference for family care versus formal care (z_{F}) and Medicaid-paid care (z_{M}); the parent's altruism (η); the child's guilt (g); the net resource floor ($\underline{c}$); the relative weight on leisure (α); the curvature utility over consumption (γ_{c}), leisure (γ_ℓ), and terminal assets (γ_{b}); and the initial weight on the parent's value function relative to the child's value function (θ_0). These estimates, $\hat{\boldsymbol{\psi}}$, are chosen to match the simulated moments from the model as closely as possible to the moments from the data, using a two-step optimizer that first uses a global controlled random search algorithm and then a local Nelder-Mead algorithm. I use 94 moments: 39 parent median assets and 39 child median assets corresponding to biennial age paths of the parent from ages 65 to 93 for five cohorts, the percentage of parents with long-term care needs who receive family care for each quintile of parent assets at age 65, the percentage of parents who own private long-term care insurance for each quintile of parent assets at age 65, the overall percentage of parents on Medicaid, and the overall rate of full-time work among children for each of the five cohorts.

[34] These earnings figures do not necessarily correspond to my sample of selected children if my sample of children is drawn from a different part of the income distribution. However, the literature suggests that this is not a bad approximation. For example, McGarry (1998) and Fahle and McGarry (2022, 215) find that "the strongest predictors of caregiving are the number of unmarried parents, their age, and the absence of sisters. . . . there is no evidence that caregivers are drawn from the population with weaker attachment to the labor force." In my particular sample, child family income is somewhat lower (see app. table 6) but not meaningfully so.

[35] This wage shock variance plus variation in work hours (full-time or part-time) corresponds to a variance of log earnings of 0.39, in line with what Meghir and Pistaferri (2004) find using PSID data.

[36] Two-year periods were also chosen because of computational costs of shorter periods; however, the model fit when simulating the model with annual periods but with parameter estimates from the 2-year period model was largely similar.

TABLE 5
INTERNALLY ESTIMATED PARAMETERS

Parameter	Description (1)	Estimate (2)	Standard Error (3)	Consumption Units (US$) (4)
z_F	Parent formal care preference (10^{-7})	-2.0	.09	2,004
g	Child guilt (10^{-7})	3.0	.10	1,903
z_M	Medicaid preference (10^{-7})	-44.5	.70	24,597
η	Parent altruism	.08	.0009	
$\underline{c}$	Net resource floor	11,691	65.7	
α	Weight on leisure	.54	.011	
γ_ℓ	Curvature on leisure	2.26	.0026	
γ_c	Curvature on consumption	2.11	.0034	
γ_b	Curvature on terminal assets	1.89	.0026	
θ_0	Initial weight on parent	.60	.019	

NOTE.—The table reports estimates of the estimated structural parameters of the model. Parameters are estimated by method of simulated moments. Weighting matrix is the diagonal of the variance-covariance matrix of the data. Standard errors are calculated using the standard sandwich formula, taking the first-stage estimates as given. Consumption units convert the parameter estimate to US dollars.

The optimal choice of $\hat{\psi}$ is the solution to the criterion function

$$\hat{\psi} = \arg\min_{\psi}(\mathbf{m}_{\text{data}} - \mathbf{m}_{\text{sim}}(\psi))\mathbf{G}(\mathbf{m}_{\text{data}} - \mathbf{m}_{\text{sim}}(\psi))', \qquad (15)$$

in which $\mathbf{m}_{\text{data}}$ is the vector of empirical moments and $\mathbf{m}_{\text{sim}}(\psi)$ is the corresponding vector of simulated moments calculated at ψ. The weighting matrix $\mathbf{G}$ is the inverse of the diagonal of the variance-covariance matrix of the data, $[\text{var}(\mathbf{m})]^{-1}$, which was chosen because Altonji and Segal (1996) shows the potential biases introduced by the optimal weighting matrix. Standard errors are calculated using the standard sandwich formula with numerical gradients, taking as given the first-stage estimates.[37]

The parameter estimates are shown in table 5. The first three preference parameters indicate that parents have a distaste for formal care and Medicaid-financed care, and children feel guilt if they do not cooperate with their parent. To interpret the magnitude of these coefficients, I convert these estimates to consumption units in column 4. For the parent's formal care (Medicaid) preferences, this is calculated as the amount of additional consumption a parent with median consumption would need to receive in a particular period while using formal care (receiving Medicaid) to be indifferent between that outcome and an outcome with

[37] I calculate the derivative of each moment with respect to each parameter by resolving the model with a small change in the parameter in both directions and taking the difference, divided by twice the small change. The fact that first-stage estimates are taken as given means that this procedure does not incorporate uncertainty in the first-stage estimates in the calculation of the standard errors of the second-stage estimates. This will lead to underestimates of these standard errors.

median consumption while receiving informal care (not receiving Medicaid), holding all else constant. Analogously, for child guilt, this is calculated as the amount of additional consumption a child with median consumption would need to receive in a particular period while experiencing guilt to be indifferent between that outcome and an outcome with median consumption but without experiencing guilt, holding all else constant. Parents would be willing to pay over $2,000 to avoid formal care and over $24,000 to avoid Medicaid, and adult children would be willing to pay almost $2,000 to avoid guilt from noncooperation. This distaste for formal care is in line with other models: Barczyk and Kredler (2017) estimate a formal care penalty of $3,800, similar to my willingness-to-pay estimate, and Ko (2022) also estimates a distaste for formal care. It is also in line with experimental evidence that shows that when given money to hire an in-home caregiver, around two-thirds of individuals hire a family or friend, suggesting a preference for family and friends over formal care (Brown et al. 2007; Cronin and Lieber 2024). Some work has found heterogeneity in this preference, but it is not clear whether this preference is correlated with other model features. Nevertheless, the model and identification arguments rest on the assumption of homogeneity of care preferences.

Parent altruism is similar to Kaplan (2012), whose estimate is 0.04 for parents at a younger stage in life. The low value of altruism is also consistent with Bernheim, Shleifer, and Summers (1985) and Cox (1987), who find that exchange motives are more important than altruistic motives in long-term care decisions, but much lower than Barczyk and Kredler (2017). The net resource floor is $11,691, which is higher than the typical Supplemental Security Income (SSI) benefit of $7,800 but not much higher than SSI plus a Medicaid income and asset allowance.[38] Another reason it may be higher than other estimates is due to implicit insurance from the family that allows individuals to more easily avoid Medicaid; thus, to match the data, the floor must be higher. Individuals place a weight of 0.54 on utility from leisure relative to consumption, and curvature over consumption, leisure, and terminal assets are all around 2.[39] The initial Pareto weight for the parent of 0.6 signifies that at age 65, they have somewhat higher initial bargaining power in the relationship than their children, though this is mediated by their altruism.

[38] While this floor dictates the amount of public transfers an individual receives, it does not dictate their final consumption, which can be higher because of transfers from the other family member. Appendix table 7 shows median consumption and assets for parents and children by whether the parent hits the floor and shows that consumption is significantly higher than the floor because of such transfers.

[39] For consumption, this is in line with or slightly higher than much of the macro literature uses (e.g., Barczyk and Kredler [2017], Boar [2021], and Barczyk, Fahle, and Kredler [2023] all set it to 2.0) and lower than what is estimated in recent models of elderly saving (e.g., 2.8 and 3.8 in De Nardi, French, and Jones 2010, 2016). For leisure, this is in line with Chetty's (2012) synthesis, which suggests that it is between 2.0 and 2.5.

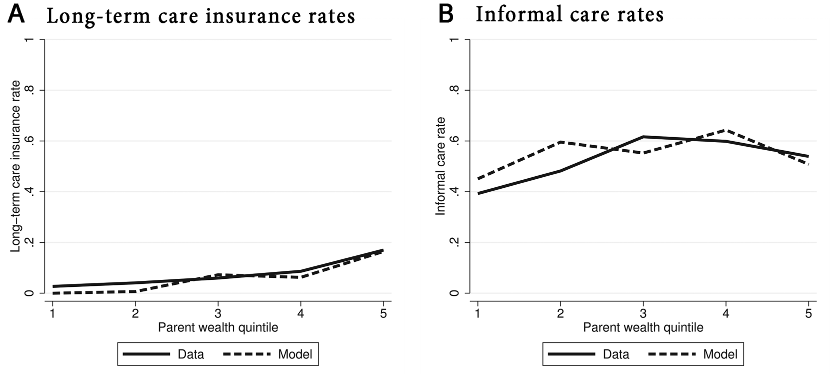

FIG. 2.—Model fit: long-term care insurance and informal care rates by parental wealth. The figure reports data and simulated moments for long-term care insurance coverage (*A*) and informal care usage among parents with long-term care needs (*B*) by parent wealth quintile. Model-based insurance rates are calculated on the simulated cohort that starts at age 65. Solid lines indicate data moments, and dashed lines indicate model moments.

D. Model Fit and Additional Model Patterns

Figures 2–5, table 6, and appendix figure 1 (app. figs. 1–9 are available online) show that the model fits both targeted moments as well as nontargeted moments quite well. Figure 2*A* reports long-term care insurance rates by parent wealth quintile in the data (solid line) and model (dashed line) and shows that the model is able to capture both the overall low demand for insurance as well the increase in demand with wealth. Figure 2*B* shows that the model can also capture overall informal care rates among living parents in periods with long-term care needs (i.e., before death and not while healthy) as well as the slight hump shape by parent wealth quintile. The model is able to generate the lower rates of informal care for high-asset parents because their children are likely to have higher opportunity costs of time; for low-asset parents, this is primarily generated by the fact that Medicaid offers free formal care despite low-asset parents having on average lower opportunity cost children.

Figure 3 shows the fit of median assets for parents (*A*) and children (*B*) for five cohorts of parents, with solid lines indicating data moments and dashed lines indicating model moments (black and gray lines correspond to different cohorts for visual distinction). The model is able to track median assets relatively well, with some undershooting among parents and overshooting among children. Figure 4 shows that the model can also fit the data on full-time work by cohort well.

Table 6 shows that the remaining targeted moment—the overall Medicaid rate—fits the data very well. In addition, the table reports nontargeted work status moments by parent health and shows that the model

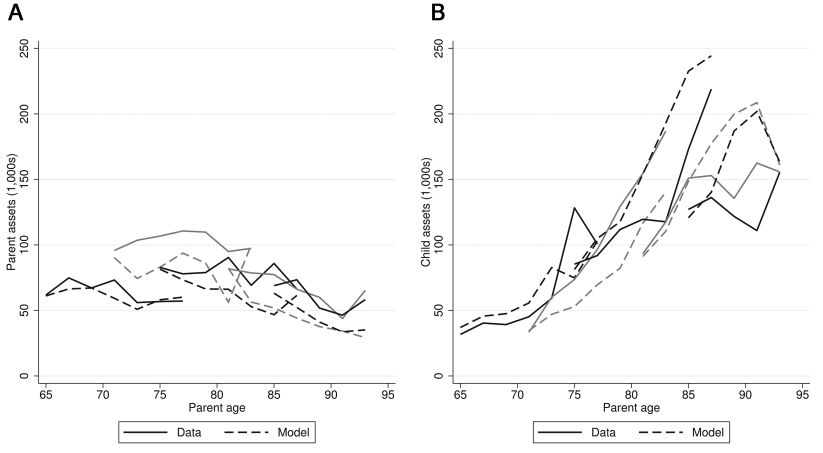

Fig. 3.—Model fit: median wealth of parents and children. The figure shows median wealth (US$1,000s) of parents (*A*) and children (*B*) over time for each of the five cohorts. Solid lines indicate data moments, and dashed lines indicate model moments.

replicates well the fact that children are much more likely to work full-time when the parent is healthy than when they are sick. The model generates higher part-time work than the data; this could be due to the fact that the model assumes equivalent wage rates for part-time and full-time work, while in reality, many part-time jobs are lower paying.

The model is also able to replicate other features of the data that were not explicitly targeted in estimation. Figure 5 reports Medicaid rates across the parent wealth distribution (fig. 5*A*) and the cumulative density function of parent assets in the year they died (fig. 5*B*) and shows that the model fits the data quite well. In addition, appendix figure 1 reports the 25th and 75th percentiles of the wealth distribution (app. fig. 2 reports the 10th and 90th percentiles) and shows that the model tracks the data reasonably well except for the upper end of the parent distribution, in which the model decumulates assets faster than in the data and similarly at the very end of the life cycle, when the asset distribution condenses. Appendix figures 3 and 4 report informal care rates for individuals with intensive care needs and child working rates by parent wealth quintile and show that the model replicates the data patterns reasonably well. Overall, the model is able to match the data quite well with a parsimonious set of parameters.

Moreover, the model is able to illuminate additional features of parent-child interactions that are less readily observed in data. Appendix figure 5 shows the evolution of the Pareto weight over time, with around 16% of cases changing in a given period, and a decrease in the parent's bargaining

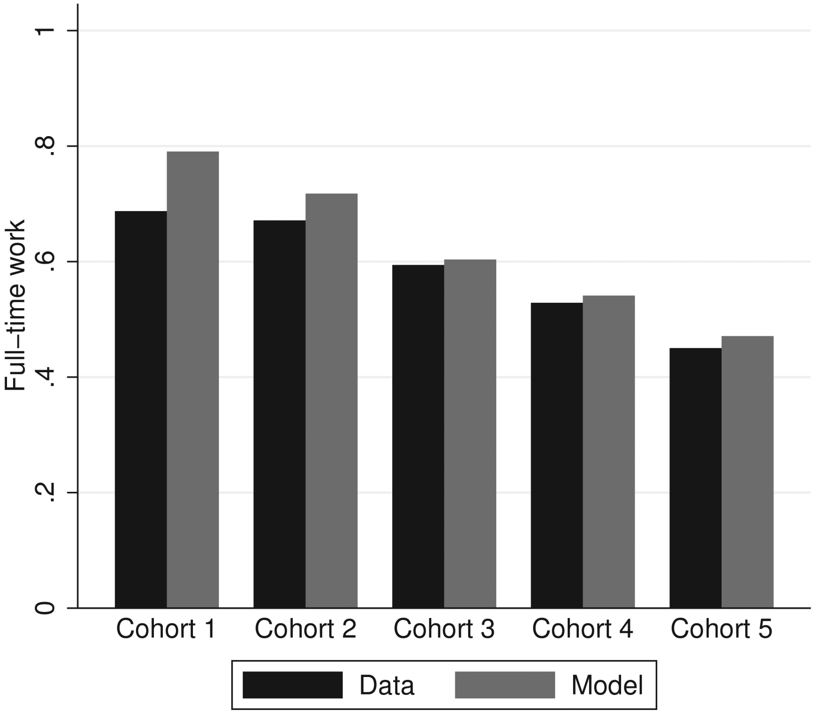

FIG. 4.—Model fit: full-time work by cohort. The figure shows the percentage of children who work full-time for each of the five cohorts. Black bars indicate data moments, and gray bars indicate model moments.

power over time, on average, from around 0.5 to 0.3. To explore what triggers changes in the Pareto weight, appendix table 8 shows regressions of correlates of binding participation constraints for parents and children. Binding participation constraints of the parent typically correspond to

TABLE 6
MODEL FIT

Moment	Data	Model
Other targeted:		
Medicaid rate	.20	.21
Nontargeted:		
Full-time work given healthy parent	.64	.64
Full-time work given sick parent	.48	.54
Part-time work given healthy parent	.09	.16
Part-time work given sick parent	.10	.18

NOTE.—The table reports data and simulated moments for the targeted Medicaid moment and nontargeted moments (full-time and part-time work by parent health).

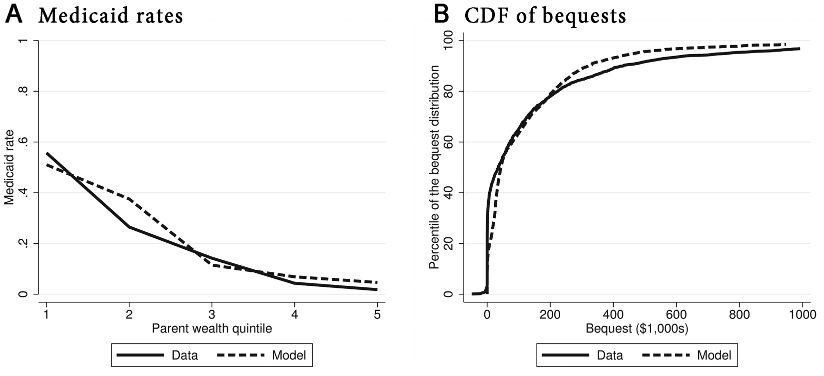

FIG. 5.—Model fit of nontargeted moments: bequest distribution and Medicaid rates. The figure reports data and simulated moments for other nontargeted moments: Medicaid rates by parent wealth quintile (*A*) and the cumulative density function of parent assets in the year of death (*B*). Solid lines indicate data moments, and dashed lines indicate model moments.

times when income of the child decreases or health of the parent increases; conversely, the child's threat point is more likely to kick in when child income increases or parent health deteriorates.

More broadly, appendix figure 6 shows an event study of labor supply, informal care, and Pareto weight changes when the parent gets sick for the first time. The top figure shows this separately by high (top two) and low (bottom two) quintiles of the parent wealth distribution, and the bottom figure shows this separately by whether the parent owns a long-term care insurance policy or not. A few interesting patterns emerge. First, children are much less likely to be working once the parent receives a health shock if the parent is relatively wealthy than if the parent is relatively poor, despite similar increases in informal care. There is much less of a differential impact on working by insurance status even though much less informal care is provided among individuals with insurance. These patterns are mirrored in the data, which show that the decline in work is much larger among high-asset parents than low-asset parents, but the gap is similar by insurance status. Second, the Pareto weight is much more likely to decrease (in favor of the child) when the parent has a health shock, particularly among families with poorer parents and parents with insurance. Intuitively, this is because poorer parents do not have as much to offer the child when they get sick, making the child's outside option relatively more attractive; similarly, formal insurance offers protection against large financial losses regardless of cooperation for the child, again making the child's outside option more attractive.

The model also generates implicit transfers between the parent and child.[40] Appendix table 9 reports a regression of net parent-to-child transfers on various variables in the model and shows that they flow from better-off to less well-off agents. They are increasing in parental assets and income and decreasing in child assets and income (consistent with, e.g., McGarry and Schoeni 1995 and Norton, Nicholas, and Huang 2013). They are also lower when the parent is sick, except in the case when the child provides informal care. On average, net parent-to-child transfers total around $1,000. These results suggest that transfers are not only altruistically motivated but also exchange motivated.

E. Identification

Identification of the parameters of the model is based on logical argument along with graphs that show the sensitivity of moments to parameter changes. Figure 6 reports this variation for five key parameters in the model. First, the key sources of identification for the Medicaid and formal care preferences are informal care rates over the parent wealth distribution. The preference over Medicaid-funded care (z_M) is heavily influenced by the informal care rate of the poorest parents, whose care options are effectively either free Medicaid-funded formal care or informal care. The top left panel shows that as disutility over Medicaid increases, informal care rates for poor parents rise dramatically. The preference over formal care more generally (z_F) is then driven by informal care rates over the entire distribution of parents, and the bottom left panel shows that as disutility over formal care increases, median and average informal care rates increase.

Second, the child guilt parameter (g) influences the degree to which the parent and child are able to cooperate. As guilt decreases, the likelihood that the child can effectively threaten noncooperation increases and the ability to risk share may break down. The top right panel of figure 6 shows that this instability increases the appeal of long-term care insurance since parents are less able to rely on adult children for implicit insurance than when guilt is high.

Third, the asset behavior of parents and children disciplines parent altruism toward the child (η) and the initial Pareto weight θ_0. Note that these two parameters are separately identified only in a dynamic setting

[40] I do not explicitly compare these numbers with transfers in the data because transfers are hard to measure in the data: there is often mismatch between parent and child reports of transfers, and measures of monetary transfers exclude in-kind transfers, such as housing costs or food, which Barczyk and Kredler (2017) show are particularly relevant in this setting. Nevertheless, unlike noncooperative altruism models, it is difficult for models with limited commitment to generate the large number of zeros we see in the data without additional frictions on transfers.

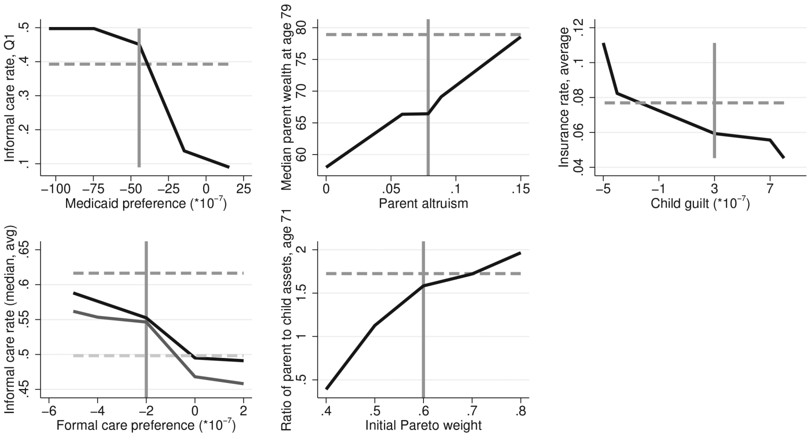

FIG. 6.—Identification of z_M, η, g, z_F, and θ_0. The figure shows (clockwise from top left) Medicaid-funded care preference z_M, parent altruism toward the child η, formal care preference z_F, child guilt parameter g, and initial Pareto weight θ_0. In each panel, the x-axis is the value of the parameter, and the y-axis is the moment that identifies the parameter. Solid black line indicates the simulated moment, and vertical line indicates the estimated value. Horizontal dashed line indicates the data moment. For the formal care figure, darker lines correspond to the median informal care rate, and lighter lines correspond to the average informal care rate.

(in which θ changes over time, as app. fig. 5 shows, while η is constant over time). Because asset holdings between parent and child influence threat points, the initial Pareto weight will influence the split of assets between the parent and child toward the beginning of the model. Specifically, as the Pareto weight increases (toward the parent), the child's fraction of total assets should decrease, which is implied by the increasing ratio of parent-to-child assets in the bottom middle panel of figure 6.[41] It should not necessarily be the case, however, that the child's fraction of total assets should decrease as altruism decreases, as it does not matter for altruistic reasons who holds the assets. Conditional on θ_0 being identified by the ratio of assets, parent altruism toward the child (η) influences the rate at which parents decumulate assets: the larger the altruism parameter, the more the parent wishes to bequeath upon death. The top middle panel shows that as η increases, median parental wealth at age 79 increases. In

[41] The logic is related to the outside option: someone's outside option is relatively more attractive if they have a low Pareto weight than a high Pareto weight, because in the cooperative solution, they receive relatively low surplus with a low Pareto weight. To reduce the extent to which their participation constraint binds (i.e., to get as close as possible to first best), the cooperative solution will then use the split of assets between the two people as an influence on that person's outside option. Specifically, the person with a relatively low Pareto weight will receive a lower fraction of the assets, which then decreases their outside option (which depends on their assets; Ligon, Thomas, and Worrall 2000).

addition, appendix figure 7 shows alternative parameter-moment combinations that suggest that parent altruism is not identified by the ratio of parent-to-child assets, θ_0 is not identified by median parent wealth at age 79, and θ_0 adjusted for altruism is still identified by the ratio of assets.

Finally, rates of Medicaid and full-time work, along with asset paths of parents of children, provide information to identify the remaining parameters. The net resource floor ($\underline{c}$) is informed by the Medicaid recipiency rate. The average fraction of children working full-time helps identify the relative weight on leisure (α) in the utility function, while full-time rates over time (by cohort) and the asset holdings of the child and parent throughout the time span inform the curvature parameters on leisure (γ_ℓ) and consumption (γ_c), respectively. The amount of assets the child holds toward the end of the model directly informs the parameter of the terminal value function, γ_b.

I conduct two additional exercises to supplement these identification arguments. First, appendix table 10 reestimates the model, setting various parameters to values in the literature to show how the model fit and other parameter values adjust. This exercise points to the importance of estimating Medicaid parameters and the coefficient of relative risk aversion in particular in order to match important moments related to insurance, assets, and Medicaid. Second, appendix figure 8 reports the sensitivity of model parameters to changes in moments (as suggested in Andrews, Gentzkow, and Shapiro 2017), and the results are largely as expected. For example, the formal care preference, z_F, and informal care rates are negatively correlated, as expected, and when children feel less guilt, Medicaid rates increase, as do insurance rates.

VI. Counterfactuals

With these estimates of the structural parameters, I evaluate alternative environments and policies to understand how they may affect long-term care behavior and welfare.

A. Family Care and the Demand for Long-Term Care Insurance

First, I quantify how much the availability of family care affects demand for long-term care insurance among single elderly with children by shutting down the availability of family care (i.e., setting $F_t = 1$ whenever $h_t > 0$). The results of this exercise are presented in figure 7. The solid line is the benchmark model with the availability of family care that was matched to the data, and the dashed line is the counterfactual model without the availability of family care. The figure shows that the lack of family care increases the overall demand for insurance by 7.5 percentage points and

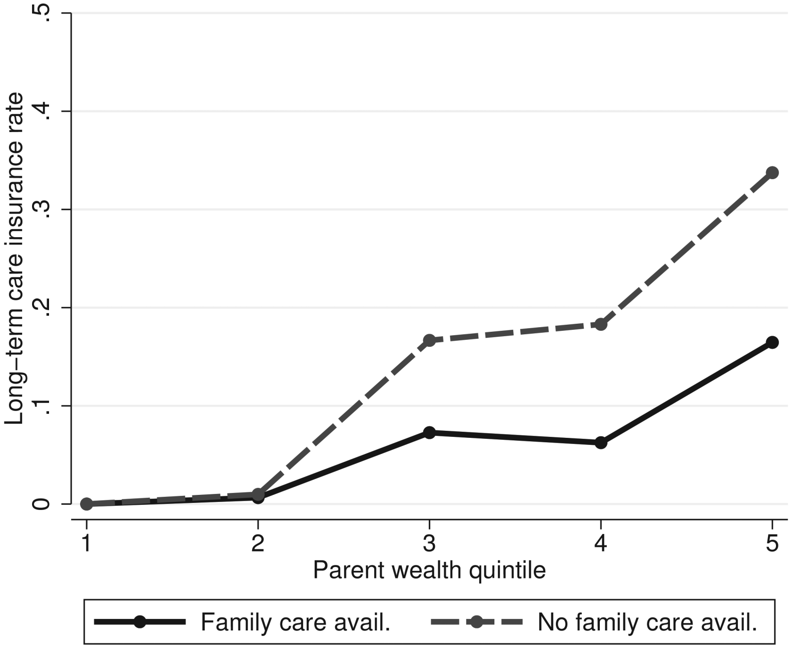

FIG. 7.—Counterfactual long-term care insurance coverage by family care availability. The figure reports the percentage of parents with long-term care insurance coverage at age 65 by parent wealth quintile. Solid line indicates the matched long-term care insurance coverage reported in figure 2, and dashed line indicates the counterfactual insurance coverage rate when family care is unavailable ($F_t = 1$). Insurance rates are calculated on the simulated cohort that starts at age 65.

that this change in demand is driven by the upper 60% of the parent wealth distribution.

Two main mechanisms drive these results. First, the lack of informal care induces a wealth effect: parents are effectively poorer without family care because some of them face higher long-term care expenses given that they can no longer depend on their children for informal care. This wealth effect induces some people—particularly those in the lower quintiles of the asset distribution—to spend down to Medicaid (i.e., Medicaid crowd-out; Brown and Finkelstein 2008) in lieu of purchasing insurance. This effect helps rationalize why the availability of family care contributes only 7 percentage points (which is a small change relative to a baseline nonownership rate of 94%). Second, the lack of a family care option increases the value of insurance for formal care because now the only source of care available is covered by insurance. This induces an increase in insurance demand in the absence of family care because there is no longer a trade-off between the risk protection value of insurance and the value of using family care. This is particularly relevant for those in the mid- to upper quintiles of the asset distribution, who have a stronger desire to protect their assets than less wealthy parents.

Interestingly, the effect sizes estimated in the model are similar to those estimated by comparing older individuals with and without children in the data in figure 1 and table 1. While somewhat reassuring, these effects are not fully comparable, because in the data, individuals without children are able to endogenously save during younger years in anticipation of (only) formal care, while the model counterfactual is a surprise change in family care availability at age 65.

Table 7 explores the additional role of Medicaid policy and family interactions in long-term care insurance demand by showing how various outcomes change when no family care is available and under noncooperation (which additionally eliminates inter vivos monetary transfers between the parent and child) both at the estimated Medicaid net resource floor and at 10% of the floor.[42] In panel A, the removal of the availability of family care coupled with a less generous floor does not increase demand for long-term care insurance but instead increases assets of both the parent and child, suggesting that the family shifts toward self-insurance and risk sharing with the child rather than additional formal insurance. In the noncooperative model, a less generous floor also increases parent assets, but there is no longer any ability to risk share with the child, so insurance demand also increases.[43]

To investigate the extent to which the demand for insurance even without available family care is impacted by the fact that the insurance product is not actuarially fair or complete insurance, in panel B, I modify the insurance product to be both full coverage and actuarially fair. In that case, the removal of the availability of family care coupled with a reduction in Medicaid generosity significantly increases insurance rates (11%–22%). With noncooperation, there is again a large increase in insurance when Medicaid generosity decreases but this time from a significantly higher base rate. Overall, table 7 suggests that individuals are reluctant to purchase insurance even when family care is not available and Medicaid is

[42] A concern with this counterfactual is that the distaste for Medicaid-funded care (z_M) could differ with a lower net resource floor. However, the floor relates to resources net of medical expenses, while the disutility parameter relates to the long-term care provided by Medicaid and is thus a separate component of the Medicaid program.

[43] Appendix table 11 explores the role of outside options and commitment in shaping insurance decisions and other outcomes by reporting outcomes under full commitment and various levels of child guilt. The results shows that the outside option of the child is important for insurance rates and informal care in particular: when the outside option of a child becomes less valuable, as captured by an increase in guilt, long-term care insurance rates decline and informal care rates increase, as parents can more reliably depend on their adult children for informal care if they need care.

TABLE 7
Counterfactual Outcomes by Medicaid, Family Care Availability, and Cooperation

	Baseline: 100%	Medicaid Net Resource Floor: No Family Care Available 100%	No Family Care Available 10%	Noncooperation 100%	Noncooperation 10%
	A. Baseline Insurance				
Long-term care insurance rate	.06	.13	.08	.10	.25
Medicaid rate	.21	.31	.21	.33	.19
Median parent assets, age 72 (US$)	59,303	43,797	76,086	67,367	96,607
Median child assets, age 72 (US$)	55,674	74,968	187,587		
Average parent weight, age 72	.43	.41	.35		
Full-time work when parent sick	.54	.75	.83		
	B. Full Fair Insurance				
Long-term care insurance rate	.09	.11	.22	.36	.57
Medicaid rate	.21	.31	.20	.33	.18
Median parent assets, age 72 (US$)	51,913	40,682	94,245	38,271	40,317
Median child assets, age 72 (US$)	84,435	97,995	174,613		
Average parent weight, age 72	.43	.41	.38		
Full-time work when parent sick	.55	.75	.83		

Note.—The table reports simulated outcomes from the baseline model, counterfactual models in which family care is not available, and counterfactual noncooperative models in which no inter vivos transfers (neither monetary nor time) are allowed but bequests are allowed. For the latter two, the model is simulated with the estimated Medicaid net resource floor as well as a counterfactual net resource floor of 10% the size. Panel A uses baseline insurance parameters (18% load, not full coverage), while panel B uses a counterfactual insurance product with 0% load and full coverage.

less generous because of the quality of the product (resonating the findings in Ameriks et al. 2018).

B. *Insurance with Cash Benefits*

Without coverage of family care in long-term care insurance policies, families must trade off (1) a preference for and potential cost savings of family care with (2) the insurance value of a contract that covers only formal care. Alternatively, an insurance product that covers both formal and family care would allow families to use family care without foregoing risk protection of indirect family care costs.

I next analyze a counterfactual insurance policy that pays the cash equivalent of the benchmark policy to the parent whenever the parent is sick.[44] This exercise quantifies the role of the in-kind nature of current

[44] In this counterfactual, the cash benefit replaces the in-kind benefit. An alternative counterfactual that offers a choice between the in-kind policy and the cash policy (such as whether the cash policy were a public option) generates the same patterns but with nonnegative welfare effects.

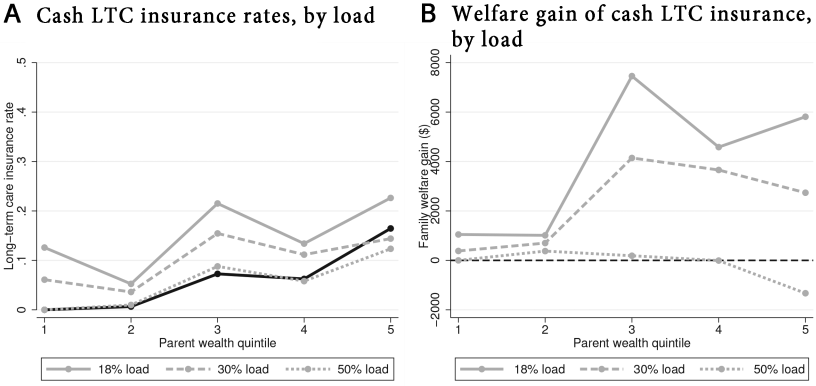

FIG. 8.—Counterfactual long-term care insurance coverage and welfare gain: cash benefits. *A*, Percentage of parents with long-term care insurance coverage at age 65 by parent wealth quintile. Black line indicates the matched long-term care insurance coverage reported in figure 2, and solid gray line indicates the insurance coverage rate when the insurance policy provides cash benefits at the same loads as an insurance policy that provides only formal care benefits. Dashed line denotes the insurance coverage rate when the insurance policy provides cash benefits at a 30% load, and dotted line denotes the insurance coverage rate when the insurance policy provides cash benefits at a 50% load. *B*, Welfare gains to the family of insurance policies with cash benefits at different loads relative to an insurance policy that covers only formal care at an 18% load. Welfare gains are defined as the asset transfer to the parent in the absence of the cash benefit that would make the family indifferent between formal care benefits and cash benefits. Lines correspond to the same insurance policy definitions as in *A*. Insurance rates and welfare gains are calculated on the simulated cohort that starts at age 65.

insurance policies in decreasing demand for insurance and quantifies the potential welfare gain to families of such a policy. This product has the same premium structure and pays the same dollar benefits in cash to the parent instead of to a formal care provider, or $\lambda^{\text{cash}}(h_t, \text{ltci}) = \lambda(h_t, F_t = 1, \text{ltci})$. This allows the parent to choose whether to hire a formal service or receive a cash payment to cover the indirect costs of family care.[45] Figure 8*A* reports the insurance demand for the cash benefit counterfactual (solid gray line). The demand for this insurance policy is roughly 10%–20% across the wealth distribution. The fact that even poorer parents choose to purchase this insurance in lieu of spending down to Medicaid (which does not reimburse family care) implies that they value the option of insuring family care.

Figure 8*B* reports the welfare gain of this insurance policy, defined as the value the family places on the availability of cash benefits above and beyond the value of the benchmark availability of insurance that covers

[45] Since child wages vary and are not necessarily equal to the formal cost of long-term care, the cash benefit will be either more or less than the wage value of the child's time, depending on the child's wage.

only formal care expenses. This value is the willingness to pay for the product, defined as the amount of money the parent would have to be given in the status quo environment to be indifferent between being offered cash insurance and in-kind insurance. The solid gray line shows that the average welfare gain by quintile is around $1,000 for the poorest two wealth quintiles and increases to around $6,000 for the wealthier three quintiles. This welfare gain is generated by the fact that cash benefits allow parents to receive family care, which is preferred and sometimes cheaper, without forgoing risk protection. The welfare gain for poorer parents is much lower than the welfare gain for wealthier parents, however, because they must weigh the relative value of cash benefits against the (free) risk protection provided by the Medicaid program.

Targeting concerns.—An important concern with the provision of cash benefits vis-à-vis in-kind benefits is the potential decrease in targeting: individuals have an incentive to feign sickness to obtain cash that they can use for ordinary consumption. In contrast, with in-kind benefits (i.e., only reimbursement for formal care), individuals do not gain any utility from using formal services unless they are sick. The in-kind nature of benefits thus acts as a targeting device.

To investigate this issue, I run a simple counterfactual exercise that assumes that subjecting individuals to lengthy doctor evaluations and home checks provides perfect verification of long-term care need. These evaluations are costly, however, which I incorporate by testing the sensitivity of increasing insurance premiums from a load of 18% to loads of 30% and 50%. The changes in insurance demand and changes in welfare gain of these policies are depicted by the dashed and dotted lines in figure 8. Insurance demand decreases, but even with a 50% load, the demand for insurance with cash benefits is still just as high as the demand for insurance with in-kind benefits. Correspondingly, welfare gains are smaller. For the wealthiest quintile, welfare gains from cash insurance are negative, as these individuals preferred benchmark insurance at 18% loads over cash insurance at higher loads. This illustrates a key potential trade-off in implementing insurance with cash benefits: the structure of benefits are better tailored to family preferences but at the cost of inefficient and costly targeting properties.

A related concern with such a structure of benefits is that any degree of heterogeneity in demand for care, conditional on verified care need, is left uninsured under a health-contingent cash benefit. For example, if the verified care need categorization is relatively crude, any residual within-category variation in care needs (or care preferences) remains uninsured. While the model abstracts from such heterogeneity, Lieber and Lockwood (2019) argue that such heterogeneity may be substantial, which further suggests that targeting concerns are an important consideration of cash benefit policies.

C. *Medicaid Cash*

As shown above, an insurance policy with cash benefits has the potential to generate large welfare gains to families but in practice might be difficult to implement. One policy lever that could be implemented within the existing set of social programs is to replace Medicaid's in-kind benefit with a cash benefit. Indeed, several states have piloted this type of program (see, e.g., Lieber and Lockwood 2019). In the model, this is equivalent to a Medicaid benefit of

$$m_t = \max\{0, \underline{c} + \mathrm{ltc}_t^{\mathrm{cash}} - \lambda_t - [a_t^{\mathrm{P}} + y^{\mathrm{P}}]\}, \tag{16}$$

where $\mathrm{ltc}_t^{\mathrm{cash}} = \mathrm{ltc}_t(h_t, F_t = 1)$.

Table 8 reports the impact of a Medicaid cash benefit on private insurance demand in column 2. There is virtually no change in private insurance demand. This null effect for poor individuals is unsurprising, since they enrolled in Medicaid even without cash benefits. Individuals with more wealth are not induced to spend down to Medicaid eligibility, however. The fact that they still choose to purchase private insurance in spite of Medicaid's increased attractiveness implies that they place a high value on protecting their assets. When instead the private insurance benefit is cash and the Medicaid benefit is in-kind, overall insurance jumps to 15% in column 3 and as in figure 8. Column 4 additionally converts the Medicaid benefit to cash and shows that private insurance decreases to 9% because Medicaid is relatively more attractive when it is also cash.

TABLE 8
COUNTERFACTUAL INSURANCE DEMAND WITH MEDICAID CASH POLICY

	Private Insurance Demand			
	(1)	(2)	(3)	(4)
Private insurance benefit	In-kind	In-kind	Cash	Cash
Medicaid benefit	In-kind	Cash	In-kind	Cash
Parent wealth quintile:				
1 (poorest)	.00	.00	.13	.00
2	.01	.00	.05	.00
3	.07	.13	.22	.20
4	.06	.08	.13	.10
5 (wealthiest)	.16	.16	.23	.14
Average	.06	.07	.15	.09

NOTE.—The table reports long-term care insurance demand by parent wealth quintile and by whether the private insurance benefit and/or Medicaid benefit is in-kind or cash. Column 1 reports the matched insurance coverage rates from fig. 2. Column 2 reports insurance demand when Medicaid provides cash benefits and private insurance benefits remain in-kind (i.e., formal care benefits). Column 3 reports insurance demand when Medicaid provides in-kind benefits and private insurance provides cash benefits (as in fig. 8), and col. 4 reports insurance demand when both private insurance and Medicaid provide cash benefits. Insurance rates and welfare gains are calculated on the simulated cohort that starts at age 65.

D. *Impacts on Medicaid Spending*

Family care—and its coverage through cash benefits—has potentially large implications for Medicaid enrollment and spending. Without available family care, some parents are induced to spend down to Medicaid, which increases program enrollment and spending. This suggests that demographic changes in the United States that affect the availability of family care—such as lower fertility rates and higher female labor force participation rates—may place a heavy burden on Medicaid. In contrast, cash benefits in private insurance allow parents to insure family care, and as a result, they are less likely to spend down to Medicaid.

Figure 9*A* shows the percentage of parents at each wealth quintile who qualify for Medicaid in the model. The benchmark scenario (solid line) shows that around 50% of the poorest parents are on Medicaid, and this decreases to around 5% for the wealthiest parents. Shutting down the availability of family care (dashed line) increases these rates across the distribution. Insurance with cash benefits (dotted line) lowers the percentage of parents who qualify for Medicaid only slightly compared with the benchmark scenario.

Figure 9*B* reports the percentage difference in total Medicaid spending between the three models: the middle bar shows that total Medicaid spending on long-term care would almost double if families could not provide informal care. In contrast, insurance with cash benefits would provide relief to the Medicaid program: Medicaid spending would be around 88%

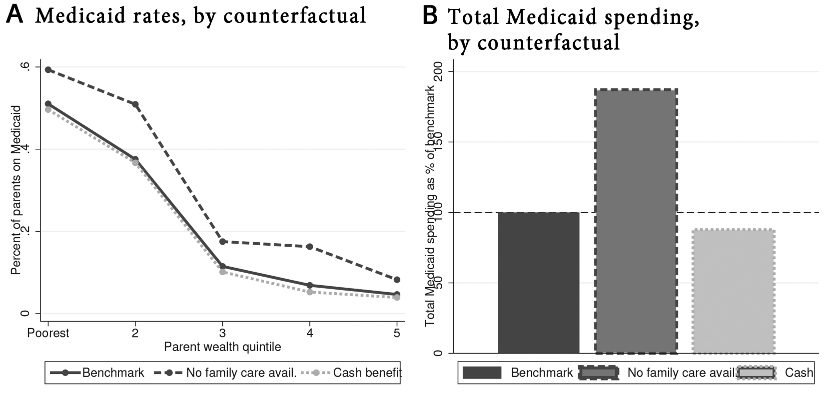

Fig. 9.—Consequences for Medicaid. *A*, Percentage of parents on Medicaid by parent wealth quintile. Solid line indicates the estimated scenario (as in fig. 5), dashed line indicates the counterfactual in which family care is unavailable ($F_t = 0$), and dotted line indicates the counterfactual in which the insurance policy provides cash benefits. *B*, Total cost to Medicaid over the remaining lifetime of the parent for the same scenarios.

of the benchmark amount of spending.[46] Overall, these results reveal that family care and insurance coverage thereof is an important determinant of Medicaid long-term care spending among this population.

VII. Conclusion

This paper demonstrates that informal care by family members plays an important role in long-term care decisions. I build and estimate a dynamic model of long-term care decisions between an elderly parent and her adult child to examine (1) the extent to which the availability of informal care impacts the demand for long-term care insurance and (2) what the interaction between informal care and insurance reveals about alternative long-term care policy.

I find that the availability of informal care lowers the demand for long-term care insurance by 7.5 percentage points among single parents with adult children and that this change in demand is driven by the upper 60% of the parent wealth distribution. In contrast, insurance demand for the rest of the wealth distribution is largely crowded out by Medicaid. In counterfactual insurance exercises, I show that introducing a policy that provides cash benefits instead induces greater take-up and can generate large welfare gains to these families. These results suggest that the fact that current insurance policies do not cover informal care is an important—but certainly not only—factor in explaining the demand for insurance for this population.

More generally, the prevalence of informal care has important implications for long-term care policy in the United States. The availability of informal care can have substantial effects on the size of the Medicaid program: I find that the removal of informal care would almost double Medicaid expenditures for long-term care for single parents with adult children. These results suggest that future demographic changes that impact the availability of informal care (e.g., through lower rates of fertility) may impose a heavy burden on Medicaid. Second, insurance with cash benefits (that allow for compensation for informal care) not only is welfare improving to these families but also reduces Medicaid spending. Several countries around the world have implemented such insurance programs and are important cases for study to inform much needed policy discussions in the United States.

[46] Moreover, these counterfactuals also have a fiscal externality in terms of foregone tax revenue as well as implications for private long-term care insurance profits. Appendix fig. 9 shows an increase in tax revenue when no informal care is available (because of an increase in child labor supply) and a slight decrease in tax revenue with cash benefits. In addition, it shows positive marginal values of public funds of cash benefits despite the decline in tax revenue, especially once the savings from Medicaid is accounted for. Appendix table 12 reports realized insurance loads for the sample that purchases the insurance and shows that insurers lose money when informal care is not available but make higher profits under cash benefits.

An important limitation of this paper is that the results pertain to only single individuals with adult children. While this sample restriction still captures 40% of individuals aged 65 and over, it is difficult to generalize the findings to families with two elderly parents. Spousal care likely involves different trade-offs than care from children: care from a retired spouse may have lower opportunity costs because the spouse is not otherwise working and also lives with the person in need of care, and moving one spouse to a nursing home may lead to higher disutility in the context of an elderly couple. While the magnitudes of the findings in this paper may not generalize to spousal care, the limited commitment framework developed could prove fruitful to analyze spousal care. I leave this investigation to future work.

Data Availability

Code replicating the tables and figures in this article as well as information about the data can be found in Mommaerts (2024) in the Harvard Dataverse, https://doi.org/10.7910/DVN/RT0AYC.

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