The Interaction of Public and Private Insurance: Medicaid and the Long-Term Care Insurance Market

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December 2004

Abstract: We show that the provision of even incomplete public insurance can substantially crowd out private insurance demand. We examine the interaction of the public Medicaid program with the private market for long-term care insurance and estimate that Medicaid can explain the lack of private insurance purchases for at least two-thirds and as much as 90 percent of the wealth distribution, even if comprehensive, actuarially fair private policies were available. Medicaid's large crowd out effect stems from the very large implicit tax (on the order of 60 to 75 percent for a median wealth individual) that Medicaid imposes on the benefits paid from private insurance policies. Importantly, Medicaid itself provides an inadequate mechanism for smoothing consumption for most individuals, so that its crowd out effect has important implications for overall risk exposure. An implication of our findings is that public policies designed to stimulate private insurance demand will be of limited efficacy as long as Medicaid continues to impose this large implicit tax.

Key Words: Crowd-Out; Implicit Tax; Long-Term Care Insurance; Medicaid

JEL Classification Codes: H4, H51, I11, J14

We thank Courtney Coile, David Cutler, John Cutler, Cheryl DeMaio, Jonathan Feinstein, Robert Gagne, Wojciech Kopczuk, Kathleen McGarry, JaneMarie Mulvey, Edward Norton, Dennis O'Brien, Ben Olken, Mark Pauly, Jim Poterba, Josh Rauh, Casey Rothschild, Al Schmitz, Karl Scholz, Jonathan Skinner, Kent Smetters, Mark Warshawsky, Steve Zeldes, and numerous seminar participants for helpful comments and discussions. We are especially grateful to Jim Robinson for generously sharing his data on long-term care utilization and for helpful discussions, and to Norma Coe for exceptional research assistance. We also thank Qian Deng and Chiao-Wen Lin for programming assistance. We are grateful to the Robert Wood Johnson Foundation, TIAA-CREF and the Campus Research Board at the University of Illinois at Urban-Champaign for financial support.

Most insurance in the United States is provided by a mix of public and private sources. Often the public insurance – although heavily subsidized from the individual's perspective – offers only limited insurance protection. This holds true in many other countries as well, where public insurance against risks such as longevity and medical expenditures usually provides only partial coverage. In this paper, we show that even a very incomplete public insurance program can have substantial crowd-out effects on demand for more comprehensive private insurance. As a result, public provision of insurance has the potential to reduce overall insurance coverage and thus increase overall risk exposure.

We examine the interaction of public and private insurance for one of the largest uninsured financial risks facing the elderly in the United States today: long-term care expenditures. At $135 billion annually, long-term care expenditures represent over 8.5 percent of total health expenditures *for all* ages, or roughly 1.2 percent of GDP (CBO, 2004). Real expenditures for long-term care are projected to triple over the next 35 years due to rising medical costs and the aging of the baby boomers (CBO, 1999). Private insurance reimburses only 4 percent of long-term care expenditures, while about one-third of expenditures are paid for out-of-pocket. To put this in perspective, for the health sector as a whole, private insurance pays for 35 percent of expenditures, and only 17 percent are paid for out of pocket (CBO 2004, National Center for Health Statistics, 2002).

Although many theories have been proposed to explain the limited size of the private insurance market (see Norton 2000 for a comprehensive overview of potential explanations), we have virtually no evidence on which factors are important. This paper examines the role of Medicaid, the public insurance program for the indigent, in crowding out demand for private long-term care insurance. Medicaid functions as a payer-of-last resort, covering long-term care expenditures only after the individual has met stringent asset and income tests. It is thus a highly incomplete – but "free" – substitute for private long-term care insurance.

Our analysis contributes to a long tradition in public finance of examining how public programs can crowd out private activity in areas as diverse as education (Peltzman, 1973), savings (e.g., Feldstein, 1974; Hubbard, Skinner and Zeldes 1995), and family assistance (Schoeni 2002), among many others.

Several papers have also found evidence of a crowd-out effect of public insurance on demand for private insurance against risks such as workplace accidents (Kantor and Fishback, 1996) and acute health care expenses among working families (e.g. Cutler and Gruber, 1996). While these prior studies have focused on aggregate economic implications – particularly for government expenditures and national savings – our study emphasizes that crowd-out can also have an important effect on risk exposure for individuals. In particular, we show that even a highly incomplete form of public insurance can crowd-out more comprehensive private insurance.

To investigate the impact of Medicaid on the private long-term care insurance market, we develop a utility-based model of a 65-year old risk averse individual who chooses an optimal inter-temporal consumption path in the presence of uncertainty about long-term care expenditures. We parameterize this uncertainty using detailed actuarial data on the distribution of long-term care expenditure risk. We use the model to calculate the willingness to pay for a private insurance contract, defined as the dollar-denominated utility gain from following an optimal inter-temporal consumption path with private insurance relative to following an optimal inter-temporal consumption path without private insurance.

Using common state Medicaid rules, we estimate the willingness to pay for a typical private insurance policy to insure against long-term care expenditure risk. Typical private policies provide partial insurance coverage at a price marked up substantially above expected claims (Brown and Finkelstein, 2004). The model produces results that are broadly consistent with the empirical patterns of long-term care insurance coverage found in survey data. Specifically, the results indicate that most individuals would not want to purchase these contracts, that men and women have a similar willingness to pay for coverage despite very different pricing loads, and that willingness to pay rises steeply with assets.

We use the model to investigate the effect of Medicaid on willingness to pay for private long-term care insurance and on providing consumption-smoothing benefits in the absence of private insurance. We have three principle findings.

First, we find that Medicaid is quantitatively important in explaining the absence of private insurance. Indeed, we find that even if we "fix" whatever supply side problems may exist – and therefore offer

comprehensive private policies at actuarially fair prices – at least two-thirds, and as much as 90 percent, of the wealth distribution still does not want to buy comprehensive insurance. This finding points to the important role played by Medicaid in fundamentally constraining demand for private long-term care insurance, even in the absence of any private market problems. A related implication is that eliminating any private market failures that contribute to high loads and/or limited benefit comprehensiveness would not substantially increase private insurance coverage for long-term care in the presence of the existing Medicaid system.

Of course, we recognize that there are a variety of factors that are not in our model – such as individual myopia or the potential to rely on support for one's children – which may further limit demand for private long-term care insurance. Nonetheless, our results suggest that – even without these additional limiting factors – the existence of Medicaid as a payer of last resort presents a fundamental impediment to private coverage. In other words, we find that as long as Medicaid remains in its current form, it will be extremely difficult to substantially increase demand for private long-term care insurance. Thus, we show that changes to the Medicaid system are necessary, although not necessarily sufficient, for the private long-term care insurance market to considerably expand.

Second, we use the model to explore the reason behind Medicaid's large crowd-out effect on private insurance. We show that Medicaid's large crowd out effect stems from the fact that – due to the design of Medicaid – a large part of the premium for existing private policies goes to pay for benefits that simply replace benefits that would otherwise have been provided by Medicaid. Using our utility-based model, we estimate that this "implicit tax" that Medicaid imposes on the purchase of a private insurance policy is quite large. For example, for the median male (female), we estimate that 60 percent (75 percent) of the benefits from a private policy are redundant of benefits that Medicaid would otherwise have paid. One reason for this implicit tax is that Medicaid's status as a secondary payer requires private insurance to pay first, even if the individual is eligible for Medicaid. A second reason is that because of Medicaid's means-tested eligibility requirement, private insurance reduces the chance of Medicaid eligibility by protecting financial assets. We estimate that recently enacted state Medicaid reforms – as well as federal

and state tax subsidies to long-term care insurance premiums – that were designed to stimulate private insurance demand are, in fact, poorly suited to reducing Medicaid's implicit tax, and therefore unlikely to have a significant effect of demand for private long-term care insurance.

Third, we find that Medicaid provides an inadequate consumption smoothing mechanism for all but the poorest of individuals, even in the absence of a desire to leave a bequest. We show that Medicaid's income and asset spend-down requirements impose severe restrictions on an individual's ability to engage in optimal consumption smoothing across care states and over time. As a result, the net effect of Medicaid is to crowd out private insurance demand while still leaving much of the elderly population exposed to considerable out-of-pocket expenditure risk. Indeed, we show that individuals would be willing to pay for insurance to "top up" Medicaid (i.e. cover the expenditures that Medicaid does not) if such a policy were available, even at current market loads. Taken together, these findings suggest that a public insurance system can substantially crowd-out private insurance, even when the public insurance itself provides only limited reductions in risk exposure.

The rest of the paper is structured as follows. Section one provides background information on the distribution of long-term care risk and on public and private insurance for long-term care expenditures. Section two develops the analytical framework of the paper. Section three describes the base case parameterization of the model. Section four shows that this parameterization produces estimates of willingness to pay for private insurance that are broadly consistent with the empirical patterns of long-term care insurance coverage in survey data, and explores the impact of Medicaid on the willingness to pay for private insurance. Section five investigates the mechanism behind the large crowd-out effect of Medicaid that we estimate. Section six examines the implications of this crowd-out for total insurance coverage. Section seven demonstrates the robustness of our findings to numerous alternative modeling assumptions. The final section concludes.

1. Background

1.1 The Distribution of Long-Term Care Utilization Risk

There is considerable variation among the elderly in their long-term care utilization, suggesting that insurance coverage that reduces this variation may produce potentially large welfare gains. By way of illustration, Table 1 provides some summary statistics on the distribution of long-term care utilization for 65-year old men and women. A detailed discussion of the data and methods used to produce these statistics is provided in Section 3.1.

The average risk of nursing home use – the most expensive form of long-term care – is high. A 65 year-old man has a 27 percent chance of entering a nursing home at some future point. The risk is even higher for women; a 65 year-old woman has a 44 percent chance of ever entering a nursing home. Women who use care also tend to spend a longer time in care than men who use care; for example, men who enter a nursing home spend on average 1.3 years there, while women spend on average 2 years.

These gender differences are largely but not entirely explained by longevity differences. For example, among individuals who survive until age 80, women have a 10 percent change of having used nursing home care before age 80, compared to only 7 percent for men (results not shown). The gender differences also likely reflect the fact that elderly men are more likely than elderly women to receive unpaid care from their spouses in lieu of formal, paid care (Lakdawalla and Philipson, 2002) as well as underlying health differences between men and women.

There is a considerable right-tail to the distribution of nursing home utilization. Although most 65 year olds will never enter a nursing home, of individuals who do enter a nursing home, 12 percent of men and 22 percent of women will spend more than 3 years there; one-in-eight women who enter a nursing home will spend more than 5 years there.

1.2 The Private Market for Long-Term Care Insurance

The private long-term care insurance market is extremely limited along two different dimensions.[1] First, only 10 percent of the elderly have any private long-term care insurance. Second, those who do

[1] This section draws heavily on the evidence presented in Brown and Finkelstein (2004). Substantially more detail on the nature of the private insurance market can be found there.

have private long-term care insurance have policies that cover only a very limited proportion of expected long-term care expenditures. As a result, only 4 percent of long-term care expenditures are reimbursed by private insurance (CBO, 2004).

A policy is purchased for a pre-specified annual nominal premium that will continue throughout the individual's lifetime. The typical policy purchased by a 65-year old (roughly the average age of purchase) covers only one-third of the expected present discounted value of long-term care expenditures. The primary factor limiting the comprehensiveness of private long-term care insurance policies is that they specify a fixed and binding daily benefit cap that is the maximum amount of incurred expenditures that will be reimbursed per day in covered care. The average maximum daily benefit on long-term care insurance policies sold in 2000 was about $100 per day; this is substantially below the national average daily cost of nursing home care which is $143 per day. Moreover, maximum daily benefits are typically constant in nominal terms, and thus declining in real terms over time, while daily care costs are increasing in real terms.

There is compelling evidence that the private market for long-term care insurance is not efficient. Prices are high: imperfect competition and transaction costs result in prices that are marked up substantially above expected claims, with loads on typical policies about 18 cents on the dollar.[2] In addition to marking up prices, a variety of private market problems have been hypothesized to limit the supply of more comprehensive insurance contracts. For example, there is evidence of asymmetric information in this market (Finkelstein and McGarry 2003) and it is well known that asymmetric information may result in insurance rationing. This rationing may well take the form of binding maximum payout caps (see e.g. Young and Browne, 1997). In addition, Cutler (1996) has argued that insurance companies' inability to diversify the substantial inter-temporal aggregate risk of dramatically increased long-term care costs (which cannot be diversified through the traditional insurance approach of

[2] This estimate of the load is a "gross load" in that it counts all benefits paid by the policy. We will show in section 5 that the "net load" is much higher since many of these benefits are redundant of benefits Medicaid would have paid if the individual did not have private insurance.

pooling idiosyncratic risks) results in the specification of binding dollar daily benefit caps which do not expose the insurance companies to this aggregate risk.

The perception that private market imperfections in general, and high prices in particular, are important limitations to demand has motivated a number of recent policy interventions intended to stimulate private insurance demand. The federal government recently introduced a tax-subsidy to employer-provided long-term care insurance that is as generous as the federal tax subsidy to employer-provided health insurance. State governments have also introduced tax subsidies for private long-term care insurance in an attempt to stimulate demand (Wiener et al, 2000).

1.3 Public Coverage of Long-Term Care Expenditures

The primary source of public funds for long-term care expenditures is Medi*caid*, the public health insurance program for the indigent. Medicaid reimburses approximately 35 percent of long-term care expenditures for the elderly (CBO 2004). While Medi*care,* the public health insurance program for the elderly, provides limited coverage for short-term nursing home stays, its coverage is primarily designed to help beneficiaries recover from acute illnesses rather than to provide for long-term care per se.[3] In contrast, Medicare's coverage of home health benefits has evolved to cover genuine long-term care, although Medicare's coverage of home health care constitutes only 13 percent of total long-term care expenditures (CBO 2004).

Medicaid, the most important source of public insurance, is a payer-of-last resort. It will cover an individual's long-term care expenditures only after he has exhausted a substantial portion of his financial resources. Medicaid is a secondary payer relative to any private insurance policy. If an individual with private long-term care insurance spends down to sufficiently low income and assets that he is eligible for Medicaid, the private policy must pay whatever benefits it owes before Medicaid makes any payments. By contrast, Medicare coverage is not means tested and Medicare is a primary payer; it thus pays first if the individual has private insurance.

[3] Medicare's coverage of short-term nursing home stays comprises about 12 percent of the $135 billion in total long-term care expenditure costs (CBO 2004).

Medicaid is likely to be an imperfect substitute for private insurance. Medicaid allows the individual to keep very little in the way of income and assets to finance non-care consumption while receiving Medicaid-financed long term care or to consume or bequeath after exiting from care (AARP, 2000). Of course, individuals may try to "hide" assets from Medicaid by transferring them to a spouse or children. In order to make this more difficult, state Medicaid programs impose a 3 to 5 year look back period on assets (Stone, 2002). The fact that one-third of long-term care expenditures are paid for out of pocket points to limits to individuals' ability to "game" the Medicaid system.

An incomplete but publicly funded source of long-term care insurance has the potential to substantially reduce demand for private insurance coverage. Pauly (1989, 1990) provides a highly stylized model to demonstrate this theoretical possibility. However, whether Medicaid is, *in practice*, an important factor limiting private long-term care insurance coverage is an open question. We know of no evidence of the extent of the crowd-out effect of Medicaid on the market for long-term care insurance. Indeed the voluminous empirical literature on the impact of Medicaid on financial and health outcomes has focused almost entirely on the non-elderly, non-disabled populations (see Gruber forthcoming for review of this literature), despite the fact that total Medicaid expenditures on long-term care are roughly equal to the program's expenditures on the non-elderly, non-disabled.

A sizeable empirical literature has investigated the extent of Medicaid's crowd out of acute private health insurance among working families. The combined evidence suggests that Medicaid does crowd-out acute private health insurance, although the magnitude of the effect varies considerably across studies (see Cutler 2002 or Gruber forthcoming for a review of this literature). It is unclear whether Medicaid's effect on long-term care insurance demand for the elderly will be similar to its effect on acute private health insurance demand by working families. For one thing, providers of acute medical care (i.e. hospitals and doctors) cannot receive both Medicaid reimbursement and additional private payment for their services (Newhouse, 2002). By contrast, nursing homes can and do receive payment for a given patient's care from both private insurance and Medicaid; the private insurance pays first, with Medicaid covering any additional costs not covered by the private insurance (such as the deductible). In addition,

Medicaid provides substantially less comprehensive insurance for long-term care expenditures for the elderly than for acute medical expenses, for which Medicaid provides full insurance for eligible individuals (if they can get a provider to accept it).[4] As a result, analysis of Medicaid's crowd-out effect on acute health insurance has focused on its implications for public expenditures, rather than for individual's risk exposure.

More generally, we know of no evidence of substantial crowd-out effects of private insurance demand by very limited public insurance programs. To the contrary, the existing evidence suggests that other forms of partial public insurance do not have substantial crowd out effects on private insurance demand by the elderly. For example, Mitchell et al. (1999) find that the presence of publicly-provided partial annuitization through Social Security is not sufficient to explain the limited demand for private annuities, and Finkelstein (2004) finds that the partial public Medicare coverage for acute medical expenditures for the elderly does not crowd out private supplemental insurance coverage.

2. Analytical Framework

This section describes the analytical framework we develop to investigate the role of the Medicaid program in explaining the limited size of the private long-term care insurance market. We consider an individual at age 65 who chooses a consumption path to maximize remaining expected lifetime utility subject to a budget constraint and various Medicaid rules. We describe how we use this framework to estimate how much a risk-averse life-cycle consumer would be willing to pay, over and above the required premiums, for a long-term care insurance contract that offers a specific set of benefits with a particular load. We will subsequently use this same model in Section 5 to construct our measure of the "implicit tax" that Medicaid imposes on a private policy.

[4] The much more incomplete nature of Medicaid's insurance coverage for long-term care than for acute care is not due to any formal differences in coverage for these two types of expenditures. Rather, it stems from differences in the nature of the expenditure risk for long-term care, which is substantially larger than acute medical care. Therefore, in practice people don't spend down to Medicaid eligibility for acute care whereas one-third of nursing home residents who are admitted as private payers eventually spend down to Medicaid (Weiner et al., 1996). For these individuals, the asset spend-down requirements thus make Medicaid very incomplete insurance, as we demonstrate below.

To construct our measure of willingness to pay, we first calculate the maximum expected lifetime utility that can be achieved when the individual purchases a particular long-term care insurance contract. We then "take away" this insurance contract and find the increment to financial wealth such that, when the individual follows his new optimal consumption path, the individual achieves the same level of expected lifetime utility that he had when he was insured.

This approach allows us to put a dollar value on the utility gains from insuring against long-term care expenditure risk. We refer to this as an individual's "willingness to pay" for the insurance above and beyond the required premium payments. It is roughly analogous to an equivalent variation measure in applied welfare analysis, although our measure captures discrete changes in insurance status rather than a marginal price change. A positive value suggests that the ability to purchase the long-term care insurance contract is welfare enhancing, while a negative value indicates that the purchase of the insurance contract would reduce utility. Thus a positive value indicates that we should see the individual buying the policy, and a negative value indicates that we should not see the individual buying the policy. There is a large literature that calculates similar measures of the willingness to pay for annuities (e.g., Kotlikoff & Spivak 1981, Mitchell et al 1999, Davidoff et al., 2003). This present study represents, to our knowledge, the first such analysis of the market for long-term care insurance.

At the core of the model is a 65 year old with a stock of financial wealth and a predetermined stream of annuity payments (e.g., from Social Security) who maximizes expected lifetime utility by choosing an optimal consumption path. This individual faces two sources of future uncertainty: long-term care expenditures and mortality. In particular, in each period the individual may be in one of five possible states of care (s): at home receiving no care, at home receiving paid home health care (denoted "hhc"), in residence at an assisted living facility ("alf"), in residence in a nursing home ("nh"), or death.[5]

When alive, the individual derives utility from real consumption in state *s* at time *t* ($C_{s,t}$). Following

[5] Our base case models a unitary decision maker. Appendix B discusses some of the conceptual difficulties that arise in modeling decision-making for a couple and implements an alternative specification which models the joint consumption decisions of a husband and wife and calculates the household utility gain from each spouse having insurance relative to neither having insurance. We find an even lower valuation of private long-term care insurance than in our base case, and discuss the contributing factors.

Pauly (1989, 1990), we also allow for the possibility that the individual derives some consumption value from long-term care, such as from the provision of food or shelter that would otherwise need to be funded out of an individual's income or wealth. We denote the consumption portion of long-term care expenditures by $F_{s,t}$. Our framework also allows us to capture the fact that – for a variety of possible reasons – individuals may get less utility from care paid for by Medicaid than care paid for by private payers. We denote the consumption value of care financed from public payers relative to the consumption value of care financed by private players by α_s. Thus $\alpha_s = 1$ when care is paid from private resources and $0 \le \alpha_s \le 1$ when care is paid by Medicaid.

Utility when alive is denoted U_s where the subscript s denotes the individual's state of care. Thus the individual's utility function while alive is given by: $U_s\left(C_{s,t} + \alpha_s * F_{s,t}\right)$, where $F_{s,t}$ denotes the consumption portion of long-term care expenditures and α_s may vary depending on whether the care is paid for by private or public funds. Note that when the individual receives no care, $F_{s,t}$ is equal to zero, so that utility is defined solely over ordinary consumption.

The individual's value function $V_{s,t}(W_t; A)$ denotes the individual's maximum expected discounted lifetime utility at period t from following an optimal consumption path, given that the individual is in care state s and period t. W_t is real financial wealth at time t, and A is a Tx1 vector of real annuity payments, such as from Social Security. Using standard dynamic programming techniques (e.g. Stokey and Lucas, 1989), we are able to define $V_{s,t}(W_t; A)$ recursively in the form of a Bellman equation, discretize the relevant state (financial wealth), and solve for the optimal consumption path iteratively from the final period (T) back to the beginning. Note that $V_{5,t+1}$ is the utility the individual in period t expects if he or she dies in the next period; our model thus allows us to consider utility from bequests at death.

Formally, the recursive Bellman equation is:

$$\underset{C_{s,t}}{Max} V_{s,t}\left(W_t; A\right) = \underset{C_{s,t}}{Max} U_s\left(C_{s,t} + \alpha_s * F_{s,t}\right) + \sum_{\sigma=1}^{5} \frac{q_{t+1}^{s,\sigma}}{\left(1+\rho\right)} V_{\sigma,t+1}\left(W_{t+1}; A\right) \qquad (1)$$

All values are expressed in real terms. ρ is the discount rate. We denote by $q_{t+1}^{s,\sigma}$ the conditional probability that an individual who is in care state *s* at time *t* is in care state σ at time t+1. We define t in terms of months (rather than years) so that we can generate a richer and more realistic distribution of long-term care stays of various lengths, including relatively short stays. We assume a maximum lifespan for a 65 year old of 105 years; therefore T=480.

The individual chooses an optimal consumption path to maximize the value function in equation (1) subject to three constraints: (i) an initial level of non-annuitized financial wealth, W_0, and a given trajectory of annuitized income, A; (ii) a no borrowing constraint (imposed to eliminate the possibility that the individual may die in debt), and (iii) the wealth accumulation equation. In the absence of Medicaid, the wealth accumulation equation is:

$$W_{t+1} = \left(W_t + A_t + \min\left[B_{s,t}, X_{s,t}\right] - C_{s,t} - X_{s,t} - P_{s,t}\right)\cdot\left(1+r\right) \qquad (2)$$

As described in Section 1.2, the long-term care insurance policy pays a benefit equal to the lesser of the per-period maximum benefit ($B_{s,t}$) and the actual costs incurred ($X_{s,t}$). It charges a monthly insurance premium of $P_{s,t}$ that is fixed in nominal terms and is paid only in states in which the individual is not receiving benefits. When the individual has no insurance, $B_{s,t}=P_{s,t}=0$. Unconsumed financial wealth accumulates at the real interest rate r. Therefore, equation (2) indicates that wealth next period is simply wealth this period plus inflows (income and insurance payments) minus outflows (consumption, care expenditures, and premium payments) plus interest.

Constraint (2) shows how financial wealth evolves in a world where the individual is solely responsible for his own care. In practice, however, Medicaid may pay for some care expenses. These payments alter the wealth accumulation equation (2) above. To be eligible for Medicaid reimbursement, the individual must (i) be receiving care, (ii) meet the Medicaid asset test, and (iii) meet the Medicaid income test. The asset test requires that the individual's wealth W_t be less than the asset cutoff $\underline{W}$. The income test requires that the income from the annuity A_t, plus any insurance benefits $\min[B_{s,t}, X_{s,t}]$, minus the actual care expenditures $X_{s,t}$, be less than the co-payment rate, which we denote as $\underline{C}_s$. If a person is

eligible, Medicaid pays an amount equal to $X_{s,t} - \left(A_t - \underline{C}_s\right) - \min(B_{s,t}, X_{s,t}) - \max(W_t - \underline{W}, 0)$. In words, Medicaid pays for all care expenses ($X_{s,t}$) that are not covered by current income over the disregard level ($A_t - \underline{C}_s$), private insurance ($\min(B_{s,t}, X_{s,t})$), or wealth over the asset test limit ($\max(W_t - \underline{W}, 0)$.

Using these relations, we can re-write the wealth accumulation equation that applies when the individual is receiving Medicaid as follows:

$$W_{t+1} = \left[W_t - \max(W_t - \underline{W}, 0) + \left(\underline{C}_s - C_t\right)\right](1 + r) \qquad (3)$$

In other words, when on Medicaid in period t, wealth carried into period t+1 will be equal to the wealth in period t, minus any wealth that Medicaid rules require to be used for period t care ($\max(W_t - \underline{W}, 0)$), plus any saving the individual does out of their income disregard level $\left(\underline{C}_s - C_t\right)$.[6] More generous program rules (i.e., higher $\underline{C}_s$ and $\underline{W}$) allow an individual to qualify for Medicaid while retaining a large amount of income and assets.

3. Data and Initial Parameterization

3.1 Estimates of Transition Probabilities Across States of Care ($q_{t+1}^{s,\sigma}$)

In order to compute a risk averse consumer's willingness to pay for a long-term care insurance contract, it is necessary to have extremely rich and detailed data on long-term care utilization. While there exist excellent published studies estimating nursing home utilization (see e.g. Dick et al. 1994, Kemper and Murtaugh, 1991, Murtaugh et al. 1997, and Society of Actuaries 1992), they do not characterize the full distribution of nursing home utilization. More importantly, we know of no published studies that characterize the full set of transition probabilities across different types of care. Most long-term care insurance policies cover not only nursing homes, but also assisted living facilities and home

[6] In practice, there will be little incentive to save out of the income disregard because if the person is in care in period t+1, any such savings would be implicitly taxed away at a 100% rate by the t+1 asset test.

health care (HIAA 2000). We therefore require detailed information on the full distribution of transitions across all of these care states, as well as the states of "no care" and of death. It is important to know the full distribution of expenditures, rather than just the mean or other summary statistics, because a risk averse individual will place a disproportionately high weight on low probability but large loss outcomes.

To meet these requirements, we use a "state of the art" model of transitions across states of care that was developed and provided to us by Jim Robinson, a former member of the Society of Actuaries' Long-Term Care Insurance Valuation Methods Task Force (Society of Actuaries, 1996).[7] This model uses data from the 1985 National Nursing Home Survey, and the 1982 through 1994 waves of the longitudinal National Long Term Care Survey to produce estimates of age- and gender-specific Markov transition probabilities across the five care states in the model: no care, home care, assisted living, nursing home, or death.[8] The model also produces estimates of the number of hours of skilled home care and unskilled home care provided during a home care episode. The model indicates substantial churning across types of care; for example, we estimate that a man who uses a nursing home has a 55 percent change of also using home health care. This underscores the importance of having a rich source of transition and utilization data.

The Robinson model has a very strong pedigree. Versions of this model have been used by insurance regulators, private insurance companies, state agencies administering public long-term care benefit programs, and the Society of Actuaries LTC Valuation Methods Task Force (Robinson, 2002). We spoke with numerous actuaries in consulting firms, insurance companies, and the Society of Actuaries who confirmed that the model is widely used to price long-term care insurance policies and that it is very highly regarded. Perhaps most importantly, we also independently verified, where direct comparisons are

[7] Readers interested in a more detailed description of the model should consult Brown and Finkelstein (2004) and especially Robinson (1996).

[8] The model begins with transitions across *health* states, which are modeled so as to allow persistence in health status across time. Transitions across states of *care* are then a function of these health states. Thus, while we do not allow for care state persistence per se, the care transition probabilities are based on an underlying distribution of health states that do themselves exhibit persistence.

possible, that the model produces estimates that are broadly consistent with other published estimates. Appendix Table A1 summarizes the results of this validation exercise.

The Robinson estimates are designed to be representative of the general population. We use the same estimates when estimating the maximum lifetime utility achievable with and without private insurance, an assumption supported by empirical evidence indicating that care utilization rates for insured individuals are indistinguishable from those for the population at large (Society of Actuaries, 2002; Finkelstein and McGarry, 2003).[9]

To make the estimates relevant for the long-term care insurance purchase decision, we use a version of the model that assumes that the individual is medically eligible for private long-term care insurance at 65. This requires that at age 65 the individual has no limitations to activities of daily living and is not cognitively impaired (over 98 percent of 65 year olds meet this requirement). We also count care utilization only if this care represents long-term chronic care rather than short-term rehabilitation. Insurance companies define health-related "benefit triggers" for reimbursement eligibility to ensure that the expenditures are for long-term rather than acute care. The Medicaid benefit triggers – and the vast majority of benefit triggers in private policies – require that the individual must either need substantial assistance in performing at least 2 of 6 activities of daily living (ADLs) and assistance must be expected to last at least 90 days, or the individual must require substantial supervision due to severe cognitive impairment (Wiener et al., 2000, LIMRA 2002, Stone 2002). These triggers effectively limit nursing home care to the type of care that Medicare (which covers some short-term, acute nursing home care) would not cover. The summary statistics reported in Table 1 and discussed in Section 1.1 describe the distribution of care utilization that meets these "benefit triggers" for a 65 year old who is medically eligible for private long-term care insurance.

3.2 Estimates of Current and Future Long-Term Care Costs

[9] The estimates do not incorporate any projected changes in morbidity or care utilization; this is standard practice for the industry (see e.g. Tillinghast-Towers Perrin, 2002) and for academic research (see e.g. Wiener et al. 1994). It reflects the substantial disagreement in the literature over the *sign* of projected changes in morbidity (compare e.g. Manton et al. 1997 and Manton and Gu 2001 to Lakdawalla et al., 2001) or in care utilization conditional on morbidity (compare e.g. Lakdawalla and Philipson, 2002 to CBO 1999).

Data on average national daily care costs for nursing homes, assisted living facilities, and home health care $(X_{t,s})$ are taken from Metlife Market Survey national data (MetLife 2002a, MetLife 2002b). These data were collected and used to determine pricing for the new federal long-term care insurance program. The national average daily cost of nursing home care in 2002 is $143 per day for a semi-private room (private rooms are more expensive), and thus already above the typical $100 maximum daily benefit of a private policy. By contrast, care costs for an assisted living facility average only $72 per day. Home health care is by far the least expensive type of care, and accounts for just under one-third of total long-term care expenditures (CBO 2004). We estimate that even a current 90 year old male (female) in home health care would only incur, on average, $30 ($45) per day of insurable home health care costs.

We downward adjust the estimated home health care costs that an individual may have to pay to reflect the fact, as noted earlier, that Medicare reimburses a portion of these costs (CBO 2004).[10] Medicare is a *primary payer*, meaning that it will reimburse these home health care expenditures whether or not the individual has private insurance, and therefore the individual will never be exposed to these expenditures.

We project forward the 2002 estimates of long-term care costs based on the general industry and academic consensus that, because the primary cost for all of these types of care is labor inputs, costs will grow at the rate of real wage growth (Wiener et al. 1994, and conversations with industry officials).[11] We use the Wiener et al. (1994) and Abt (2001) assumption of 1.5 percentage point annual real growth in care costs. Given all these parameters, we estimate that the minimum amount of financial wealth needed in the absence of any payer of last resort to be absolutely certain that long-term care expenditures could not completely exhaust one's resources is $1.55 million.[12] Of course, individuals with this or more financial wealth might still find insurance valuable as it would allow them to consume more of their

[10] The details of this adjustment are described in Brown and Finkelstein (2004).
[11] The image of an individual in a nursing home hooked up to many machines is in fact a tiny share of the nursing home population. As Wiener et al. (1994) note, "long-term care is extremely labor intensive, and much of it involves hands-on, personal services, where opportunities for substantial gains in productivity are few."
[12] This calculation assumes a 3 percent real interest rate and a 3 percent inflation rate. The $1.55 million represents the amount needed in the extremely unlikely "worst case" outcome that an individual enters a nursing home at age 65 and remains in it until death at the maximum age of 105.

wealth rather than having to hold it in reserve against potential long-term care expenditures.

3.3 Initial Medicaid Parameterization

For our base case Medicaid parameterization, we choose eligibility rules that are strict in terms of their income and asset requirements for eligibility.[13] By doing so, we make Medicaid a less attractive substitute for private insurance and bias ourselves against finding a crowd-out effect of Medicaid. In addition, as noted in Section 1.3, opportunities to hide assets and "game" the Medicaid system are limited. To the extent that they exist, however, the effective Medicaid rules will be more generous than the statutory ones used here, which again would make Medicaid an even more attractive substitute for private insurance than we allow.

Specifically, we use the modal state income and asset disregards in 1999 for a single individual which impose a deductible of all but \$2,000 of one's assets (i.e. $\underline{W} = \$2000$), and a co-payment of all but \$30 per month of one's income (i.e. $(\underline{C}_{alf}, \underline{C}_{nh}) = \$30$) before Medicaid will cover institutional care costs. These parameters – which are used by 35 states – are on the low end of the states' disregards; in Section four, we show that using the most generous state rules instead exacerbates Medicaid's crowd out effect, while doing very little to enhance the consumption-smoothing properties of Medicaid. For home health care, the same asset test applies, but we set the income disregard ($\underline{C}_{hhc}$) considerably higher, at \$545 per month, to reflect the fact that the individual is permitted to keep a higher level of income when in home care than in institutional care in order to meet day-to-day living expenses. Again, this choice is on the restrictive end of the spectrum. However, in one respect it may overstate the generosity of Medicaid. Although all states currently provide home care benefits under Medicaid, these benefits are not an entitlement the way that nursing home care is; states set enrollment caps and these may bind. In the sensitivity analysis below, we investigate alternative specifications designed to capture the fact that Medicaid may not always cover home health care – and that individuals may prefer receiving care at

[13] All of the information in this section is from AARP (2000).

home to receiving it in an institution. Our core findings are not sensitive to these alternative specifications.

3.4 Other Initial Parameters

To solve the utility maximization problem (1) subject to the relevant constraints, we assume a constant relative risk aversion (CRRA) utility function. A long line of simulation literature (Hubbard, Skinner, and Zeldes 1995; Engen, Gale, and Uccello 1999; Mitchell et al 1999; Davis, Kubler, and Willen 2002; and Scholz, Seshadri, and Khitatrakun 2003) uses a base case value of 3 for the risk aversion coefficient. However, a substantial consumption literature, summarized in Laibson, Repetto & Tobacman (1998), has found risk aversion levels closer to 1, as did Hurd's (1989) study among the elderly. Given this, we will report most results for risk aversion levels of 1, 2, and 3. Recognizing that still other papers report higher levels of risk aversion (e.g., Barsky et al 1997, Palumbo 1999), we also explore the sensitivity of our results to even higher levels of risk aversion.

We assume the real interest rate, discount rate, and inflation rate are each equal to 0.03 annually. The estimates for the real interest rate and inflation are roughly consistent with U.S. historical experience, and all three are fairly standard assumptions in the literature (Hubbard, Skinner, and Zeldes 1995; Engen, Gale, and Uccello 1999; Mitchell et al 1999; and Davis, Kubler, and Willen 2002).

We initially examine a private insurance policy that covers all three types of care with no deductible and offers a constant nominal maximum daily benefit of $100. This is broadly consistent with the typical policy purchased in 2000 (HIAA 2000). We assume the policy is offered at typical current market loads; these are 0.50 for men and -0.06 for women (Brown and Finkelstein, 2004). These loads indicate that on average, a man (woman) gets back 50 cents ($1.06) in EPDV benefits for every dollar paid in EPDV premiums and correspond to an annual premium of $1,816.

Loads are substantially higher for men than women because long-term care insurance polices are priced on a unisex basis, but women have substantially higher expected utilization. This unisex pricing

pattern is not due to any regulatory restrictions.[14] It is ostensibly puzzling why insurance companies would voluntarily offer substantially different loads for men and women; this pricing practice cannot be explained by the within-couple correlation in purchasing (Brown and Finkelstein, 2004). The subsequent results in this paper suggest a possible explanation: once the implicit tax on private insurance levied by Medicaid is taken into account, the effective loads on policies are actually quite similar for men and for women (see Section 5).

For the food and housing consumption value when in facility-based care (i.e. $F_{alf,t}$ and $F_{nh,t}$), we use the monthly amount ($513) that the Supplemental Security Income (SSI) program pays to a single, elderly individual in 2000. We choose this value since SSI is designed to provide a minimum subsistence level of food and housing. Our base case assumes no consumption value from home health care expenditures (i.e. $F_{hhc,t} = 0$) since, unlike facility-based care expenditures, home health care expenditures do not substitute for food or rent that must otherwise be purchased.

Finally, we note that our base case is intentionally designed to abstract from the large number of parameters over which there is considerable uncertainty. Therefore, the initial parameterization assumes state independent utility ($U_s = U \; \forall \; s$), no consumption value for home health care ($F_{hhc,t} = 0$), no difference in the consumption value of care provided by public and private payers ($\alpha_s = 1 \; \forall \; s$), no bequest motives, no role for family members in providing home health care, and no within-household risk sharing. In numerous sensitivity analyses we relax each of these assumptions in turn and conclude that all our core findings are robust to these alternative models; these are discussed in Section 7 and Appendix B.

4. Does Medicaid Crowd Out Private Insurance Coverage?

4.1 Basic findings from the model

For the parameterization described above, we calculate the willingness to pay for 65-year old men

[14] Indeed, pricing is largely unregulated in this market. Nonetheless, companies price based on very little information – typically age and a few broad health categories – and do not experience rate their policies.

and women at each decile in the wealth distribution. Our estimate of the wealth distribution is based on a sample of individuals who are 65 in the 1996, 1998 or 2000 Health and Retirement Survey (HRS).[15] Total wealth is defined as the sum of financial wealth (which excludes housing wealth and any annuitized wealth) and annuitized wealth. Annuitized wealth is defined as the sum of the present discounted value of Social Security benefits and defined benefit pension wealth, which are calculated using the Social Security and pension calculators from Coile and Gruber (2000).[16] The results are shown for men and for women in Figures 1 and 2 respectively.[17] We report results for three different levels of risk aversion. Table 2 provides the exact numbers underlying the figures. As in all subsequent tables, positive willingness to pay estimates are shaded gray.

According to the results of the model, most individuals throughout the wealth distribution do not have a positive willingness to pay for a typical long-term care insurance policy at existing prices. This is broadly consistent with the high non-purchase rate (90 percent) among the elderly population found in survey data. For example, with log utility (CRRA = 1), even a male or female at the 90th wealth percentile would find the purchase of the policy welfare reducing. Even with risk aversion of 3, private insurance only becomes attractive at the 70th percentile for men and the 60th percentile for women. Moreover, we ascertained (in results not shown) that the negative willingness to pay in the bottom half of the wealth distribution persists at substantially higher risk aversion levels at well. For example, at the fourth decile, it is not until risk aversion reaches 8 for men and 10 for women that the individual has a positive willingness to pay for the contract; at the fifth decile, risk aversion of 5 is required.[18]

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[15] We are extremely grateful to Courtney Coile and Josh Rauh for their help constructing these estimates in the HRS.

[16] All wealth measures are computed on a household basis, and converted to individual wealth levels using an equivalence scale approach. We assume an equivalence scale of 1.25, where 1 implies perfect economies of scale and 2 implies no economies of scale in household consumption. The existing literature (Citro and Michael 1995; Jorgenson and Slesnick 1997) generally finds higher equivalence scales. Our assumption is thus conservative, in that it biases up an individual's "effective wealth" and thus our estimate of willingness to pay for private long-term care insurance.

[17] These figures report results starting at the 30th percentile of the wealth distribution. This is because at lower points in the wealth distribution, the welfare effect of a forced purchase of long-term care is worse than losing all of the individual's limited financial wealth.

[18] At very low levels of wealth, Table 2 indicates that willingness to pay falls with increasing risk aversion. This reflects the fact – as will be discussed below – that Medicaid provides fairly complete insurance for these households. Forcing these households to pay premiums for private insurance while out of care may actually worsen

To get a sense of the willingness to pay estimates, consider the estimate for a male at the 50th percentile of the wealth distribution with risk aversion of 3. He has a willingness to pay (over and above the required premiums) of -$11,400. This means that if the individual were forced to purchase the given policy at existing prices, it would reduce his welfare the same amount as a loss of $11,400 in financial wealth. This is a significant welfare loss, both relative to the individual's total wealth (approximately $222,500) and relative to the expected present discounted value of premiums paid by this individual for this policy (approximately $16,260).

There are several indications in even these basic results of a large effect of Medicaid on the demand for private long-term care insurance. First, willingness to pay is negative for women for most of the wealth distribution *despite* prices that are lower than actuarially fair (i.e. negative loads). This suggests that Medicaid is severely curtailing at least the women's demand for private long-term care insurance, because in the absence of Medicaid, we would expect a risk averse individual to be willing to pay something above actuarially fair prices for insurance. Consistent with this, we show below that due to the structure of Medicaid, many of the benefits provided by private policies are redundant of benefits that Medicaid would have provided anyway. This results in an effective (or "net") load on these policies that is substantially above the gross load (as measured by the ratio of the EPDV of (gross) benefits to the EPDV of premiums), and substantially worse than actuarially fair for women.

Second, for a given risk aversion level, willingness to pay becomes positive for men and women at basically the same point in the wealth distribution. This finding of the model is consistent with the empirical evidence that long-term care insurance coverage rates are comparable for men and for women (Brown and Finkelstein, 2004, HIAA 2000). Similar coverage rates and willingness to pay might both seem surprising, given that, as discussed, unisex pricing results in substantially higher loads on policies for men than for women. We will show below however that, the structure of Medicaid is an offsetting

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their ability to consumption smooth out of their limited resources, and this is more costly for more risk averse individuals. At higher levels of wealth, where Medicaid is less complete insurance and the individual has more wealth to flexibly allocate across states, Table 2 shows the more standard relationship whereby the value of private insurance is increasing in risk aversion.

factor that decreases the willingness to pay for women relative to men. Because their expected lifetime utilization of long-term care is greater, women are even more likely than men to end up on Medicaid with or without private insurance. Thus, we find that the implicit tax Medicaid places on private insurance payments is substantially larger for women than for men.

Finally, the results in Table 2 indicate that willingness to pay rises monotonically with wealth for both men and women. Again, this finding of the model is consistent with the empirical distribution of long-term care insurance coverage, which also rises substantially with wealth (Brown and Finkelstein, 2004, HIAA 2000). However, in the absence of Medicaid, CRRA utility implies that willingness to pay to insure against a fixed loss distribution should be decreasing with total wealth.[19]

4.2 The crowd-out effect of Medicaid on private insurance demand

In addition to the role of Medicaid, another factor in our model that may be limiting willingness to pay for private insurance is the structure of the private insurance contract. In particular, the $100 daily benefit cap results in an insurance policy that is far from comprehensive. In addition, at least for men, there is an enormous load (i.e. markup) on the contract. As we discussed at the outset, there are a variety of supply-side market failures – such as asymmetric information and imperfect competition – that could be responsible for limited comprehensiveness and high loads. In order to isolate the effect of Medicaid from such private market failures, in this section we examine the willingness to pay for alternative, counterfactual private insurance contracts that are not subject to any market failures, i.e., that provide fully comprehensive coverage at actuarially fair prices.

We begin in Table 3 by replicating the analysis in Table 2 of the willingness to pay for policies with a $100 daily benefit, except that we now make the policies actuarially fair. There are two different ways to think about making premiums actuarially fair. Recall that policies are currently priced on a unisex basis,

[19] The existence of Medicaid suggests that the relationship between willingness to pay and wealth should in fact be an inverted U-shape; those at the low end of the distribution may not find it valuable due to the existence of Medicaid while those at the high end may be able to self insure. We believe this pattern is not observed in empirical survey data or in the results from our model simply because the "peak" in insurance value occurs in practice extraordinarily high up in the wealth distribution. For example, we have confirmed that willingness to pay for insurance is still rising with wealth – albeit at a diminishing rate – at total wealth levels as high as $3 million.

so that they are substantially worse than actuarially fair for men (load of 0.50) but actually slightly better than actuarially fair for women (load of –0.06). One approach is to keep the pricing on a unisex basis but lower the premium so that it is actuarially fair on average. Specifically, we assume – consistent with the existing data – that equal proportions of men and women buy the policy, and thus the premium is lowered from $151 per month (at current loads) to $117 per month so that the average (or unisex) load is 0. Both men and women therefore have their load reduced from current levels; for men it falls from 0.50 to 0.36, for women it falls from –0.06 to –0.36. The resulting willingness to pay is shown in the top panel of Table 3. Of course, compared to the results in Table 2, willingness to pay rises for each individual due to the reduction in loads. However, willingness to pay remains negative for most individuals. Indeed, even with risk aversion of 3, it is not until the 60th percentile of the wealth distribution that men or women have a positive willingness to pay for long-term care insurance; this is quite similar to the results at current market loads shown in Table 2.

Panel B of Table 3 shows the results when we instead make the results actuarially fair separately by gender. Thus both men and women face a 0 load. Of course, for women, willingness to pay goes down, since the current market loads used to calculate willingness to pay in Table 2 are actually better than actuarially fair for women (i.e. –0.06 rather than 0). We therefore focus on the more interesting results for men. Here, we have reduced the load substantially – from 50 cents on the dollar to 0 – thus cutting monthly premiums in half from $151 to $76. Now the median male is just willing to pay for private insurance, but only at risk aversion of 3, and the value of the insurance contract is quite low (only $800).

The 50 cent reduction in load needed to get the median male with risk aversion of 3 willing to pay for a typical private policy is substantially greater than what public policy is likely to accomplish. By way of comparison, we estimate that, even under generous assumptions, the 1996 Federal tax subsidies which make employer-provided long-term care insurance not counted as taxable income to the employee (Wiener et al., 2000) could only reduce the load on the policy to 0.17 for men and -0.76 for women.[20] At

[20] This assumes that the employer pays all of the premiums, that the incidence of the subsidy is fully on the employee, a 15.3 percent payroll tax, and that the median individual has a marginal tax rate of 27.5 percent.

these loads, willingness to pay remains negative for both the median male and female, even at risk aversion 3.

Of course, although we have made the policies actuarially fair in Table 3, they provide very little insurance. Because of the $100 daily benefit cap, which is typical of purchased policies (HIAA 2000), the policy covers only about 45 percent of the expected present discounted value of long-term care expenditures. This is because at the expected age of entry into care (see Table 1), $100 is only two-thirds of daily assisted living facility costs and one-third of daily nursing home costs. Since the value of an insurance contract stems from its ability to improve consumption smoothing by reducing uncertainty, the limited coverage offered by the policy studied may not provide enough consumption smoothing to be welfare enhancing, especially given above-actuarially fair pricing. An important question therefore is whether individuals would be willing to pay for more comprehensive contracts if they were made available.

Table 4 therefore repeats the analysis in Table 3 for actuarially fair policies with no daily benefit cap. These "uncapped" policies offer comprehensive, full insurance. Again, Panel A shows the results when the policies are actuarially fair on average, while Panel B shows the results when the policies are actuarially fair for each gender.

The results are striking and represent a key finding of our paper: *even if we eliminate all potential market failures and make fully comprehensive policies available at actuarially fair prices, most individuals would still be unwilling to pay for these policies in the presence of Medicaid*. For example, Panel B shows that when policies are made actuarially fair by gender, willingness to pay for an actuarially fair comprehensive policy is not positive, even with risk aversion of 3, for men until the 60th percentile and for women until the 70th percentile; at risk aversion of 1, willingness to pay does not become positive for either men or women until the 90th percentile. Thus our results suggest that, even absent any market failures, Medicaid is capable of explaining the lack of private insurance purchases for at least two-thirds – and as much as 90 percent – of the wealth distribution. A related implication of these findings is that correcting whatever supply-side market failures exist in the private long-term care insurance market

would not induce most individuals to purchase private insurance coverage for long-term care.

Our results also shed some initial light on the reason for Medicaid's large crowd-out effect. They indicate that, at actuarially fair premiums, not only are most individuals not willing to pay for an uncapped full insurance policy, but they are less willing to pay for an uncapped policy than for a more limited (capped) policy. For example, we find that for the median female with risk aversion 3, willingness to pay is not only negative at all positive daily benefit levels, but it decreases monotonically in the benefit level (results not shown); it is thus highest (although still negative) at the smallest daily benefit level and lowest for an uncapped policy. Similarly, while the results in Table 3 Panel B indicate that at a 0 load the median male with risk aversion 3 has a positive willingness to pay for a $100 daily benefit policy, the results in Table 4 Panel B indicate a negative willingness to pay by the same individual for the version of this policy without a daily benefit cap. Moreover, at 0 load, the preferred policy (where willingness to pay peaks) is a $55 per day constant nominal benefit cap; such a policy covers less than one-third of expected present discounted value of expenditures (results not shown).

The intuition for our finding that the median individual prefers smaller to larger benefit policies, even at actuarially fair prices, is that Medicaid is duplicative of a larger fraction of benefits paid by the more comprehensive policy. In other words, conditional on being eligible for the benefits offered by a comprehensive (uncapped) policy but not by a limited (capped) policy, the individual has to have substantial long-term care expenditures; but it is precisely in such catastrophic cases that Medicaid will be likely to provide coverage. By contrast, a more limited private insurance policy is more likely to offer benefits that, in the absence of this policy, would be paid for out of pocket rather than by Medicaid. To formalize this notion, and to provide a way of quantifying the redundancy of private insurance benefits for Medicaid benefits, we now introduce the concept of Medicaid's "implicit tax" on private insurance policies.

5. Why Does Medicaid Crowd-Out Private Insurance?

There are two possible reasons that Medicaid reduces the demand for private insurance. First, by

providing catastrophic coverage as a payer of last resort, Medicaid effectively provides a consumption floor below which individuals cannot fall. It therefore reduces the risk exposure faced by an individual and reduces the marginal utility from (and hence willingness to pay for) additional private insurance. The second reason that Medicaid reduces demand for private insurance is that a substantial part of the benefits of any private policy will cover expenditures that, absent the private policy, Medicaid would otherwise have paid for. We refer to the fact that private insurance premiums must in part pay for benefits that are redundant of Medicaid benefits as the "implicit tax" that Medicaid imposes on the benefits paid from private insurance policies. In contrast, a policy that purely supplements benefits that Medicaid would have paid anyway – in other words, if payments from Medicaid are independent of whether the individual has insurance or not – does not face this implicit tax. In practice, individuals are not able to purchase such a policy, and in fact, such a policy is not feasible under current Medicaid rules. In this section, we show that Medicaid's implicit tax is substantial and can explain why most individuals do not purchase private coverage.

5.1 Medicaid's Implicit Tax

Two aspects of Medicaid's design contribute to the implicit tax by linking Medicaid payments to the level of private insurance benefits. First, the means-tested nature of Medicaid eligibility means that private insurance – by protecting assets against negative expenditure shocks – reduces the likelihood that an individual will meet the asset-eligibility test for Medicaid coverage of long-term care expenditures. Second, Medicaid is by law a secondary payer when the individual has private insurance. This secondary payer status means that if an individual has private insurance, the private policy pays first, even if the individual's asset and income levels make him otherwise eligible for Medicaid. In this situation, Medicaid will only pay for any expenditures not reimbursed by the private policy.

Table 5 provides estimates of the implicit tax imposed by Medicaid at different deciles in the wealth distribution. To conserve space, we report results only for risk aversion of 3. In results not shown, we find that the implicit tax rates are even larger at lower risk aversion levels. This is because at lower levels of risk aversion, the individual is relatively less concerned with consumption smoothing, and therefore

more willing to spend down their own asses quickly in order to qualify for Medicaid. As a result, Medicaid covers a larger fraction of their total long-term care expenditures.

A comparison of columns 1 and 2 of Table 5 indicates the substantial decrease in Medicaid expenditures associated with having a private insurance policy with a $100 daily benefit cap.[21] Combining these estimates, column 3 reports Medicaid's implicit tax on private insurance, defined as the percentage of EPDV benefits from the private policy that are redundant of benefits that Medicaid would otherwise have paid. In other words, it represents the difference between the gross and net benefits from the private policy, as a percentage of the gross benefits.[22]

The implicit tax associated with Medicaid is quite high, particularly at the lower end of the distribution. For example, at the first decile, the implicit tax is close to 100 percent for men and women, meaning that the individual is paying premiums for a policy that provides nearly nothing in terms of net benefits. Even for the median male (female), three-fifths (three-quarters) of the expected present discounted value of expenditures from the private long-term care insurance policy are redundant of expenditures that Medicaid would have otherwise covered. The implicit tax declines with wealth, as wealthier individuals' expenditures are less likely to be eligible for Medicaid coverage even in the absence of insurance. The fact that the implicit tax declines with wealth explains why willingness to pay increases with wealth (see e.g. Table 2) even though, in the absence of Medicaid, our CRRA utility assumption implies that willingness to pay to insure against a fixed loss distribution should be decreasing with total wealth.

As a result of the implicit tax, the effective load on the policy from the individual's perspective is substantially higher than that from the insurance company's perspective. Up until this point, we have referred to the "load" of a policy as one minus the ratio of the expected present value of benefits to the expected present value of premiums. This load is an accurate measure of the load from the perspective of

[21] Medicaid expenditures are calculated assuming that the individual follows his or her optimal consumption path; the consumption choices in turn affect when the individual will satisfy Medicaid's income and asset disregards.

[22] $$\text{Implicit Tax} = \frac{\Delta \text{ (EPDV of Medicaid Expenditures)}}{\text{EPDV(Gross Benefits from LTC Insurance Policy)}}$$

the insurance company because the company is required to make these payments irrespective of whether these benefits are redundant of what Medicaid would otherwise have paid. However, from the individual's perspective, this "gross load" measure does not include the large implicit tax that Medicaid imposes on the purchase of a private policy, and thus it understates the effective, or net, load that individuals face.

The fourth column of Table 5 reports the estimates of this net load, which is calculated by omitting any benefits paid by the private policy that simply replace what Medicaid would have paid had the person not insured. [23] The net loads are much higher than gross loads. This explains the ostensible puzzle we saw earlier that even at prices that are lower than actuarially fair from the company's perspective, so few women wish to purchase private insurance. The results also provide an explanation for why men and women in our model value insurance similarly (and in the data purchase insurance in roughly equal proportions), despite facing such different gross loads. The net loads for men and women are in fact much more similar than the gross loads. Because women have much higher expected long-term care expenditures than do men, and thus, for any given level of wealth, have a much higher proportion of their expenditures covered by Medicaid, the fraction of private insurance benefits that end up being duplicative of Medicaid is higher for women than for men.

In the fifth column of table 5 we show that it is the implicit tax, and not the provision of catastrophic coverage per se, that limits demand. We report the willingness to pay for a hypothetical, actuarially fair private policy that provides fully comprehensive coverage, but for which the individual only has to pay for those benefits that "top up" what Medicaid would have paid in the absence of such insurance. [24] Nearly the entire wealth distribution would find such a policy welfare enhancing. For example, for the median male (female), the welfare gain associated with buying such a policy is equivalent to an increase

[23] $$\text{Net Load} = 1 - \frac{\text{EPDV(Benefits) - (EPDV Mcaid Expend w/o Private Ins - EPDV Mcaid Expend w/ Private Ins)}}{\text{EPDV(Premiums)}}$$
$$= \text{Gross Load} + \frac{\Delta\,\text{(EPDV Medicaid Expenditures)}}{\text{EPDV(Premiums)}}$$

[24] This is calculated by i) finding the value, in dollar terms, of the individual's utility gain if he or she were provided with a free comprehensive policy, and ii) subtracting off from this gain the incremental cost of providing such a policy, relative to existing Medicaid expenditures.

in their total financial wealth of nearly $20,000 ($30,000). Only in the bottom two deciles, where Medicaid is already a fairly comprehensive insurance policy, would individuals not have substantial gains from the ability to purchase such a policy. Moreover, in results not shown, we estimate that even if men had to face current market loads of 0.5 (rather than 0 load) for this supplemental coverage, even the 40th percentile male would have a positive willingness to pay.[25] By contrast, at current market loads, male willingness to pay for a standard policy with a $100 daily benefit cap does not become positive until the 70th percentile (see Table 2).

These findings demonstrate that – even in the presence of the existing Medicaid system – the demand for private insurance would still be quite strong if individuals could purchase such "top up" policies that are not subject to the implicit tax. "No implicit tax" means that the amount that Medicaid pays is independent of whether the individual purchases insurance or not, as opposed to current Medicaid rules under which the purchase of a private policy reduces the amount paid by Medicaid.

5.2 The Implicit Tax and Public Policy Interventions

In practice, consumers cannot currently purchase policies to "top up" Medicaid. For one thing, such policies simply do not exist because Medicaid rules require that private policies pay first, i.e., Medicaid serves as a secondary payer. Even if this program rule were changed, however, there is another reason that the idea of "topping up" Medicaid is difficult to implement. It is that the very act of purchasing a private policy changes the individual's income and wealth trajectory, thus indirectly affecting the individual's eligibility for Medicaid. For example, suppose that an individual with income and assets above the Medicaid thresholds begins receiving home health care. In the absence of private insurance, the payments for home health care diminish the individual's assets, making it more likely they will qualify for Medicaid in the future. However, a private insurance policy that pays for home health care expenses leaves the person with more wealth and reduces the probability they will end up on Medicaid in the future. Thus, while the analysis in section 5.1 makes clear that reducing the implicit tax is a necessary

[25] Since current market loads for women are better than actuarially fair, the results in Table 5 indicate that all woman would have a large willingness to pay for such a private supplemental policy at current market loads.

condition for stimulating long-term care insurance demand, the actual implementation of such a policy is not easy.

In this section we briefly explore the likely efficacy of alternative public policy interventions in reducing the implicit tax imposed by Medicaid on private insurance and stimulating private insurance demand. We begin by showing that recent state and federal programs designed to increase the size of the private insurance market are unlikely to achieve sufficient reductions in this implicit tax to have much of an impact on demand. We then explore several alternative policies.

We showed in Section 4.2 that even generous estimates of the impact of the recently-enacted federal tax subsidy for long-term care insurance on prices would be insufficient to get the median individual to purchase private insurance. The explanation lies in the fact that although the subsidies reduce the (gross) load from 0.50 to 0.17 for men and from -0.06 to -0.76 for women, the net loads remain high due to the implicit tax; we estimate that even with these subsidies, the net load for men (women) is still as high as 0.69 (0.64). Moreover, the fact that the federal tax subsidy increases as we go up the wealth distribution – since marginal tax rates increase – while the implicit tax increases as we go down the wealth distribution – since Medicaid covers even more – points to the difficulty of using federal tax subsidies to effectively reduce the implicit tax imposed by Medicaid.

As an alternative (or addition) to tax subsidies for insurance premiums, several states, including New York and California, have experimented with reforming Medicaid to make the asset disregards less stringent if the individual purchases private insurance. For example, the New York policy eliminates Medicaid's asset test for individuals who purchase a minimum specified amount of insurance (Weiner, 2000). Since Medicaid's means testing is an important component of its implicit tax, such a policy has potential to have a large effect on willingness to pay. However, we find that this policy is unlikely to provide a major stimulus to demand. For example, for our base case policy with a $100 daily benefit, eliminating the asset test for individuals who buy private insurance only raises the median male's

willingness to pay at current market loads from -$11,400 to -$8,000.[26] Consistent with these findings, only a handful of private insurance policies have been sold to individuals through these state-run reform programs (Wiener et al., 2000).

The limited efficacy of this policy intervention arises from the fact that the individual still ends up paying for insurance that is largely duplicative of what Medicaid would have otherwise paid. Even though the elimination of the asset test for those who purchase private insurance makes it easier to qualify for Medicaid at a given level of resources, the private insurance policy still pays first and is thus duplicative of what Medicaid would have otherwise covered.

Since Medicaid's status as a secondary payer is also an important contributor to the implicit tax, structuring Medicaid to provide coverage as a *primary* payer relative to the private policy would eliminate one component of the implicit tax. However, our estimates also suggest that making Medicaid a primary payer – while it does increase willingness to pay – is not sufficient to substantially increase the private long term care insurance market. For example, at current market loads, the willingness to pay for the median male for a policy with a $100 daily benefit cap rises considerably (from -$11,400 to -$4,300) but still remains negative when Medicaid is a primary payer instead of a secondary payer. The explanation is due to the means tested nature of Medicaid; the private insurance policy protects an individual's financial resources, and therefore reduces the chance that one spends down low enough to become eligible for Medicaid in the first place. As a result, even when Medicaid is a primary payer, the net load still remains substantially above the gross load (0.68 compared to 0.50 for the median male with risk aversion of 3).

In general, to completely eliminate the implicit tax, it is necessary to structure the Medicaid program so that the expected present discounted value of Medicaid payments to an individual are not reduced when the individual buys private insurance. One way that such an approach might be implemented is to allow individuals who purchase private insurance to receive a tax credit equal to the amount of the Medicaid benefits that the private insurance policy replaces. While this would eliminate the implicit tax,

[26] We also altered the income test for those who purchase private insurance so that interest income from assets does not negatively affect Medicaid eligibility.

the amount of such a subsidy would need to vary based on wealth and expected care utilization. It would thus be difficult to implement, and raise concerns about selection of the healthiest individuals out of the public program.

While the "optimal" design of Medicaid is a topic well beyond the scope of the current paper, our findings raise the possibility – and also point to the difficulty - of restructuring Medicaid in a manner that would reduce its crowd out effect on private insurance demand without reducing the public provision of catastrophic coverage for those who choose not to purchase private policies. We consider analysis of the optimal design of Medicaid an important area for further research.

6. Medicaid's impact on total long-term care insurance coverage

The above results suggest that Medicaid has a substantial depressive effect on demand for private long-term care insurance. Should we be concerned about such a crowd out effect? After all, if Medicaid is efficiently providing comprehensive insurance to individuals, then simply substituting public for private provision of care would not be important for *total* (public plus private) insurance coverage (although it could have important implications for public expenditures).

In this section, however, we demonstrate that the current Medicaid system in fact is a poor substitute for comprehensive insurance for all but the poorest of households. Crucially, this finding does not require that individuals desire to protect their assets for bequest purposes. Rather, we show that even in the absence of a bequest motive, Medicaid provides very incomplete insurance coverage. This is because its income and asset spend-down requirements impose severe restrictions on an individual's ability to engage in optimal consumption smoothing across care states and over time. In particular, when an individual is receiving Medicaid-financed care, the means testing imposes very tight limitations on the resources available for non-care consumption. In addition, these spend-down requirements substantially reduce the wealth out of which the individual can consume if he recovers and exits from care, or that he can bequeath upon death.

Figure 3 provides an illustration of the substantial limitations imposed by Medicaid on an individual's

ability to consumption smooth – even in the absence of a bequest motive. This figure shows the optimal consumption path followed by a 65 year-old male who enters a nursing home at age 83 (the average age of nursing home entry for a 65 year old male, conditional on entry) and who stays in the nursing home until he dies at age 85. This individual is at the median of the wealth distribution, has a coefficient of relative risk aversion of 3, and does not own private insurance.[27]

Figure 3 illustrates that this individual's optimal consumption path is initially following a gradual decline, reflecting the fact that his financial wealth is not fully annuitized and that the sum of his discount rate and mortality rate exceed the rate of interest. At age 83, he enters a nursing home. The underlying health event associated with the nursing home entry has the effect of increasing his subsequent mortality probability as well as the probability of needing additional care in the future. In addition, entering a nursing home without private insurance imposes a substantial expenditure shock on the individual that must now be financed out of his financial assets. Because the individual knows that he can rely on Medicaid to finance future expenditure needs once he meets the income and asset tests, the optimal response to both these effects is therefore to immediately boost consumption levels so as to generate some utility from his financial wealth before exhausting his resources on care expenditures. However, after only three months in a nursing home, his financial resources are completely exhausted, he goes onto Medicaid, and his consumption falls nearly 40 percent from its pre-nursing home level.[28]

This sharply discontinuous consumption pattern illustrates the inadequacy of Medicaid as a consumption-smoothing device. Medicaid requires the individual to spend down all his assets in the nursing home before beginning to cover expenditures, and thus provides very poor consumption smoothing benefits. The inadequacy of Medicaid is even more severe than Figure 3 suggests because there is a non-trivial chance that the individual will exit from care while still alive. Recovery from care is

[27] It is worth emphasizing that this particular realized path of care and consumption one of many trillions of possible paths that the individual may face when the optimization process begins at age 65. The utility-based calculations take all of these paths into account when calculating the value of long-term care in the presence of Medicaid.
[28] Even if he did not increase consumption upon going into a nursing home, this individual would still exhaust his resources by the end of three months in care and end up on Medicaid anyway. Thus, the increase in consumption immediately upon entering care increases utility, since all of this increased consumption is financed out of resources that would be implicitly taxed away by the end of three months of care anyway.

not uncommon; for example, Table 1 indicates that almost two-thirds of individuals who enter a nursing home will at some point leave the nursing home alive. This is consistent with other studies (e.g. Dick et al. 1994) that indicate a substantial amount of recovery from nursing home care. If the individual recovers after spending down assets to the Medicaid-eligibility level, he would now have essentially only annuity income to live on because virtually all of his non-annuitized resources would have been exhausted due to Medicaid's spend down rules. Moreover, Medicaid's inadequacy as a consumption smoothing device would be further exacerbated if the individual also valued bequests or if the quality of care funded by Medicaid were lower than the quality of care funded out of private resources. Of course, the importance of Medicaid as a consumption smoothing device would diminish if the marginal utility of consumption is lower when an individual is in a nursing home, perhaps because they are no longer be able to consume many of the goods that they consumed while at home. We examine bequests, lower quality Medicaid care, and state dependent utility in our sensitivity analysis (Section 7) and find that Medicaid continues to crowd-out private insurance demand while providing incomplete insurance.

The results from table 5, already discussed in the prior section, provide another way to quantify the incomplete nature of Medicaid's insurance. The first column of table 5 shows the fraction of total long-term care expenditures covered by Medicaid. For those at the very bottom of the wealth distribution, Medicaid is reasonably comprehensive, covering all but a tiny fraction of expenditures. For most of the wealth distribution, however, individuals still face substantial out of pocket expenditure risk.

The last column of table 5 reports the willingness to pay for a fairly priced contract when there is no implicit Medicaid tax on the benefits. The results suggest that the utility gains from being able to buy additional insurance at an actuarially fair "net" price are substantial, and nearly the entire wealth distribution would be willing to do so. Because such policies are unavailable, however, most consumers forego private insurance entirely and rely on Medicaid's incomplete insurance to cover expenditures. Thus, these utility gains from buying a supplemental policy to reduce risk exposure are never realized.

Of course, as we noted in Section 3, we parameterized the Medicaid program to be among the least generous of state programs. It is possible that a more generous state program would substantially

improve the consumption-smoothing properties of Medicaid, without engendering much in the way of additional crowd out. In practice, we do not find this to be the case. We find that moving from the current least-generous of state programs ($\underline{W} = \$2000$, ($\underline{C}_{alf}, \underline{C}_{nh}$) = \$30) to the most generous of parameters available across the states ($\underline{W} = \$10{,}000$, ($\underline{C}_{alf}, \underline{C}_{nh}$) = \$75) (Association of State Medicaid Directors, 2001) does little to improve the comprehensiveness of Medicaid's coverage. For example, for the median male, Medicaid now pays for 64 percent of long-term care expenditures rather than 60 percent under the old rules. Moreover, Medicaid crowd-out is exacerbated by this increase in asset disregard; for our median male example, willingness to pay for an actuarially fair (i.e. 0 load) policy with a \$100 daily benefit cap is now negative (at -\$2,000) where it was positive (\$800) under the old rules.

Our results thus indicate that there is a considerable net welfare cost from the risk not insured by the existing Medicaid program. The Medicaid program is providing insurance that is substantially inferior to what a comprehensive policy would provide, and yet existence of Medicaid makes private insurance undesirable. The net result is a reduction in overall insurance coverage. More generally, our findings indicate that a public insurance system can substantially crowd-out private insurance, even when the public insurance itself provides only limited reductions in risk exposure.

7. Sensitivity Analysis

We have carefully investigated the sensitivity of our results to alternative modeling assumptions. Our primary concern is whether reasonable alternative modeling assumptions could alter any of our core findings. In particular, we are interested in whether alternative assumptions can substantially increase the willingness to pay for a private insurance policy, make Medicaid a more complete form of coverage, and/or lower the implicit tax that Medicaid imposes on private insurance policies.

We therefore concentrate on factors that the base case model does not account for and that might serve to increase willingness to pay for private insurance even in the presence of Medicaid. For all of the alternative specifications, we investigate whether Medicaid has a substantial crowd out effect, how

complete Medicaid coverage is, and how the Medicaid implicit tax is affected. We find that all of these results are very robust to the alternative specifications. We discuss, in turn, three major sets of factors that we consider.

First, we consider the possibility that individuals may view being in an institution as worse than residing at home. To allow for this possibility, we allow for state-dependent utility where the marginal utility of consumption is lower in a nursing home than in home care. As an alternative approach, we allow for the possibility that the provision of home care might provide some direct consumption value (e.g. help with shopping and cooking).

Second, we consider the possibility that Medicaid may be a less attractive substitute for privately funded care than we have modeled it. For example, the quality of Medicaid-funded care may be lower than care provided by privately funded providers, or individuals may feel some stigma associated with receiving Medicaid.[29]

Our third set of alternative specifications considers several different ways that other family members may increase willingness to pay for long-term care insurance. These include: the presence of bequest motives, the possibility that family members may provide an *in-kind substitute* for private insurance through the provision of unpaid care, the possibility that family members may provide a *financial substitute* for private insurance, and the possibility that individuals receive substantial *dis*utility from family provided care (i.e. aversion to "being a burden"). In addition, the utility consequences of Medicaid's asset and income tests could be more important to an individual entering long-term care if he is concerned about the resources available to his community-based spouse. To investigate this possibility, we develop and calibrate a household decision-making model and incorporate the joint distribution of the two spouse's long-term care utilization.

Appendix B provides a detailed description of the modeling approaches taken in each alternative specification as well as their effect on willingness to pay, the share of expenditures covered by Medicaid,

[29] Empirically, the evidence on whether Medicaid patients receive lower quality care is mixed. See for example Nyman (1988a), Nyman (1988b), and Ettner (1993).

and the implicit tax for median wealth households. We continue to find that the median household does not wish to purchase a private long-term care insurance policy, that Medicaid's share of overall expenditures is not significantly altered, and that the implicit tax remains well over 50 percent for men and women. In short, our results about the impact of Medicaid on the market for private long-term care insurance are remarkably robust to all of these alternative specifications.

8. Conclusions

This paper has examined the extent of and mechanism behind Medicaid's impact on the demand for private long-term care insurance. To do so, we developed an analytical framework for estimating a risk averse individual's willingness to pay for a long-term care insurance contract. We calibrated the model using detailed actuarial data on long-term care expenditure risk, information on the current structure of the public Medicaid program, and characteristics of existing private insurance policies. Our model produces results that are broadly consistent with the empirical patterns in survey data in terms of the limited fraction of the elderly who buy insurance, and the patterns of coverage by gender and by wealth.

The model produces three main findings. First, given the presence of Medicaid, individuals throughout most of the wealth distribution prefer not to purchase private insurance *even if it is available at actuarially fair prices*. Thus even if we eliminate potential supply-side market failures so that comprehensive insurance policies are available at actuarially fair prices, most individuals would still not want to buy these policies given the existing Medicaid program. This finding underscores the fundamental role played by Medicaid in limiting demand for private insurance. It also suggests that correcting whatever supply side market failures may exist in the private long term care insurance market will not substantially increase private insurance coverage.

Second, we demonstrate that Medicaid's large crowd out effect stems from the fact that – due to its design (specifically its means testing and its status as a secondary payer) – a large portion of the premiums for private insurance for most individuals in the wealth distribution would go to pay for

benefits that are redundant of what Medicaid would have paid if the individual had not bought private insurance; we refer to this as the "implicit tax" that Medicaid imposes on private insurance and estimate that it is quite large. For example, for the median male (female), Medicaid imposes an implicit tax rate of about 60 (75) percent.

Third, we show that since Medicaid itself provides far from comprehensive insurance, reliance on public insurance alone leaves most individuals exposed to substantial out-of-pocket expenditure risk. For a median male (female), for example, we find that Medicaid leaves approximately 40 (30) percent of expected expenditures uninsured; more importantly, Medicaid's eligibility rules make it difficult for an individual to engage in optimal consumption smoothing across states and time. Our findings thus indicate that a public insurance system can substantially crowd-out private insurance, even when the public insurance itself provides only limited coverage against risk exposure.

Our findings also suggest that recent state and federal reforms designed to stimulate demand for private insurance are unlikely to have much impact. In contrast, we find that policy changes that substantially reduce or eliminate Medicaid's implicit tax are necessary conditions for stimulating the private market. In light of our findings, we consider the "optimal" design of Medicaid an important topic for further research.

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Table 1: Descriptive Statistics of Care Utilization for 65 year old, from Robinson Model

Type of Care		Prob Ever Use	Among Users: Average Age of First Use	Average Years Spent in Care	Prob use more than 1 year	Prob use more than 3 years	Prob use more than 5 years	Prob ever exit to non-death state	Avg # of spells
Nursing Home (NH)	Men	0.27	83	1.3	0.33	0.12	0.05	0.65	1.28
	Women	0.44	84	2.0	0.42	0.22	0.12	0.66	1.39
Assisted Living Facility (ALF)	Men	0.12	82	0.58	0.16	0.04	0.01	0.90	1.18
	Women	0.20	85	0.48	0.13	0.04	0.01	0.93	1.26
Home Health Care (HHC)	Men	0.29	79	1.9	0.52	0.22	0.09	0.67	1.45
	Women	0.35	81	2.3	0.52	0.28	0.15	0.77	1.68
Any Care (NH, ALF, or HHC)	Men	0.40	80	2.9	0.77	0.37	0.17	0.33	1.20
	Women	0.54	82	4.2	0.85	0.53	0.31	0.35	1.27

Note: All statistics are based on an individual who at 65 is medically eligible to buy private long-term care insurance (i.e. has no limitations to activities of daily living and is not cognitively impaired). Care utilization is measured as care utilization by individuals who satisfy the health-related benefit triggers required for care costs to be reimbursable by insurance contracts. See Section 3.1 for further details.

Table 2: Willingness to pay for policy with $100 maximum daily benefit at current market loads

Wealth Percentile	Total Wealth	Percent Annuitized	Men Risk Aversion 1	Men Risk Aversion 2	Men Risk Aversion 3	Women Risk Aversion 1	Women Risk Aversion 2	Women Risk Aversion 3
10th	58,450	98	*	*	*	*	*	*
20th	93,415	91	*	*	*	*	*	*
30th	126,875	82	-17.4	-18.0	-18.2	-19.6	-20.3	-20.7
40th	169,905	70	-17.2	-17.1	-16.2	-19.1	-19.2	-18.9
50th	222,570	60	-16.2	-14.5	-11.4	-17.3	-15.4	-11.5
60th	292,780	52	-14.6	-10.8	-3.0	-14.2	-8.9	1.5
70th	385,460	41	-13.4	-6.5	6.4	-11.4	-1.3	14.4
80th	525,955	35	-10.9	0.2	17.7	-6.3	9.9	29.8
90th	789,475	26	-8.2	6.8	25.6	-0.1	21.0	41.6

* Denotes disutility from policy exceeds value of starting financial wealth

Notes: All willingness to pay estimates are in thousands of dollars. Positive willingness to pay results are shaded gray. Table reports a 65 year old's willingness to pay for a policy that covers all three types of care, has an unlimited benefit period, and pays a (constant nominal) maximum daily benefit of $100. The load on the policy is 0.50 for men and –0.06 for women (providing both with an equal monthly premium of $151). All other assumptions are described in the text.

Table 3: Willingness to pay for a $100 maximum daily benefit at actuarially fair premiums

Wealth Percentile	Men Risk Aversion			Women Risk Aversion		
	1	2	3	1	2	3
Panel A: Actuarially fair on average (0 Load on average. Load = 0.36 (men), -0.36 (women)						
10th	*	*	*	*	*	*
20th	*	*	*	*	*	*
30th	-13.4	-13.7	-13.8	-15.2	-15.7	-16.1
40th	-12.7	-12.3	-11.0	-14.3	-13.9	-13.5
50th	-11.6	-9.5	-6.1	-12.3	-10.0	-5.6
60th	-9.9	-5.7	2.6	-9.1	-3.3	7.3
70th	-8.6	-1.3	11.8	-6.3	4.1	20.0
80th	-6.0	5.4	22.9	-1.1	15.1	34.9
90th	-3.2	12.0	30.6	5.0	26.1	46.6
Panel B: Actuarially fair by gender (Load = 0 for both men and women)						
10th	*	*	*	*	*	*
20th	*	*	*	*	*	*
30th	-8.0	-8.1	-7.9	-20.7	-21.4	-21.8
40th	-7.0	-6.2	-4.4	-20.4	-20.6	-20.3
50th	-5.7	-3.2	0.8	-18.6	-16.9	-13.1
60th	-3.9	0.9	9.7	-15.6	-10.4	0.02
70th	-2.4	5.2	18.5	-12.8	-2.7	12. 9
80th	0.2	11.9	29.3	-7.7	8.5	28.4
90th	3.1	18.6	36.9	-1.5	19.7	40.3

* Denotes disutility from policy exceeds value of starting financial wealth

Notes: All willingness to pay estimates are in thousands of dollars. Positive willingness to pay results are shaded gray. In panel A, the average (or unisex) load is 0; it is 0.36 for men and -0.36 for women. In Panel B, the gender-specific load is 0. Otherwise, all parameters are as specified in the notes to Table 2.

Table 4: Willingness to pay for an uncapped policy at actuarially fair premiums

Wealth Percentile	Men Risk Aversion			Women Risk Aversion		
	1	2	3	1	2	3
Panel A: Actuarially fair on average (Load = 0.36 (men), -0.36 (women)						
10th	*	*	*	*	*	*
20th	*	*	*	*	*	*
30th	*	*	*	*	*	*
40th	-27.7	-28.0	-27.2	-30.4	-31.0	-31.2
50th	-25.9	-23.6	-18.6	-26.2	-22.5	-15.6
60th	-22.8	-16.0	-2.4	-19.3	-7.0	15.4
70th	-20.1	-7.2	16.4	-12.3	12.2	51.8
80th	-14.7	7.0	43.4	-0.1	41.0	103.3
90th	-7.9	25.1	72.9	15.9	78.6	158.2
Panel B: Actuarially fair by gender (Load = 0 for both men and women)						
10th	*	*	*	*	*	*
20th	*	*	*	*	*	*
30th	-16.8	-17.4	-17.7	*	*	*
40th	-15.5	-14.6	-12.7	-44.2	-46.1	-47.1
50th	-13.1	-9.2	-2.7	-41.1	-39.7	-35.8
60th	-9.6	-1.2	14.8	-34.6	-24.8	-6.2
70th	-6.6	7.8	33.0	-27.7	-5.7	30.7
80th	-1.1	22.1	59.5	-15.7	23.6	84.2
90th	6.0	40.3	88.7	0.6	61.7	140.9

* Denotes disutility from policy exceeds value of starting financial wealth

Notes: All willingness to pay estimates are in thousands of dollars. Positive willingness to pay results are shaded gray. Private policies have an unlimited daily benefit. In panel A, the average (or unisex) load is 0; it is 0.36 for men and -0.36 for women. In Panel B, the gender-specific load is 0. Otherwise, all parameters are as specified in the notes to Table 2.

Table 5: Medicaid: Implicit Tax and Completeness of Coverage

Wealth Percentile	Share of EPDV of Expenditures paid by Medicaid		Implicit Tax on Private Insurance	Net Load on Private Insurance	WTP for actuarially fair (0 load) policy to "Top Up" Medicaid
	No Private Insurance	With Private Insurance			
	(1)	(2)	(3)	(4)	(5)
Panel A: Men					
10th	0.98	0.52	0.998	1.00	0.0
20th	0.88	0.44	0.952	0.98	0.0
30th	0.80	0.41	0.840	0.92	3.3
40th	0.71	0.37	0.737	0.87	9.8
50th	0.60	0.32	0.594	0.80	19.6
60th	0.46	0.26	0.426	0.71	35.2
70th	0.32	0.20	0.272	0.64	51.0
80th	0.17	0.12	0.107	0.55	74.1
90th	0.07	0.05	0.036	0.52	100.9
Panel A: Women					
10th	0.99	0.55	0.999	1.00	0.0
20th	0.93	0.50	0.993	0.99	0.0
30th	0.88	0.46	0.946	0.94	2.3
40th	0.80	0.43	0.855	0.85	11.5
50th	0.72	0.38	0.767	0.75	29.7
60th	0.56	0.33	0.617	0.59	58.3
70th	0.45	0.24	0.470	0.44	86.3
80th	0.24	0.15	0.194	0.15	122.8
90th	0.08	0.06	0.054	-0.003	166.3

Note: All estimates are for risk aversion of 3. Estimate for private insurance always pertain to a policy with a $100 daily benefit cap. Implicit tax on private insurance is the percentage of long-term care insurance benefits that are redundant of Medicaid; it is defined as the decrease in Medicaid expenditures associated with having private insurance, as a percentage of the private insurance benefits. Net load is equal to the gross load (for which we take current market loads) plus the ratio of the decrease in the EPDV of Medicaid expenditures associated with having private insurance to the EPDV of the premiums of this private policy. For all calculations, the EPDV of total long-term care expenditures is $43,750 for women, and 17,510 for men. The EPDV of benefits (premiums) from a private policy for women are approximately $19,110 ($18,030) and for men are $8,130 ($16,260), corresponding to gross loads on private policies of 0.5 for men and –0.06 for women.

Figure 1: Willingness to Pay: 65 Year old Male
Current Market Loads; $ 100 Daily Benefit

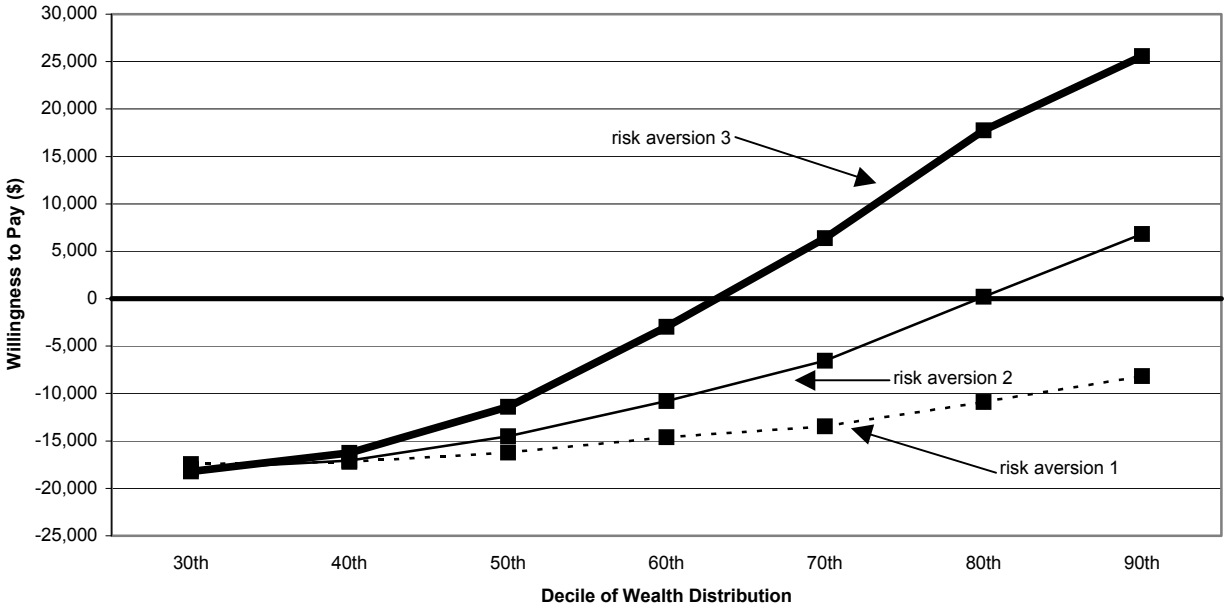


Figure 2: Willingness to Pay: 65 Year old Female
Current Market Loads; $100 Daily Benefit

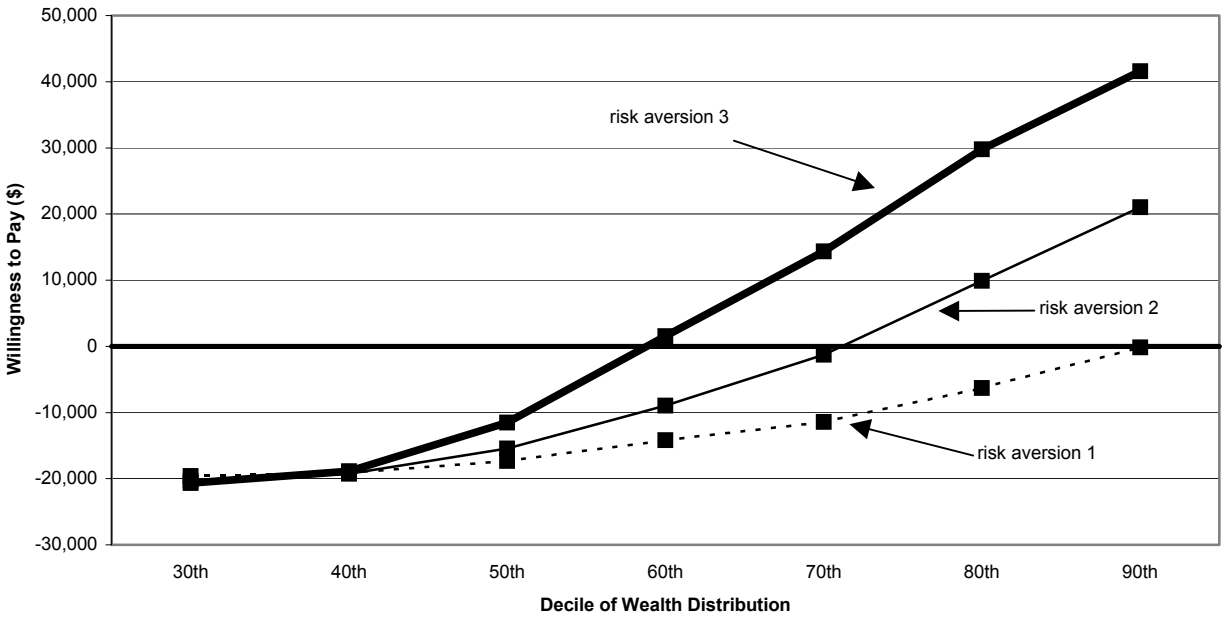
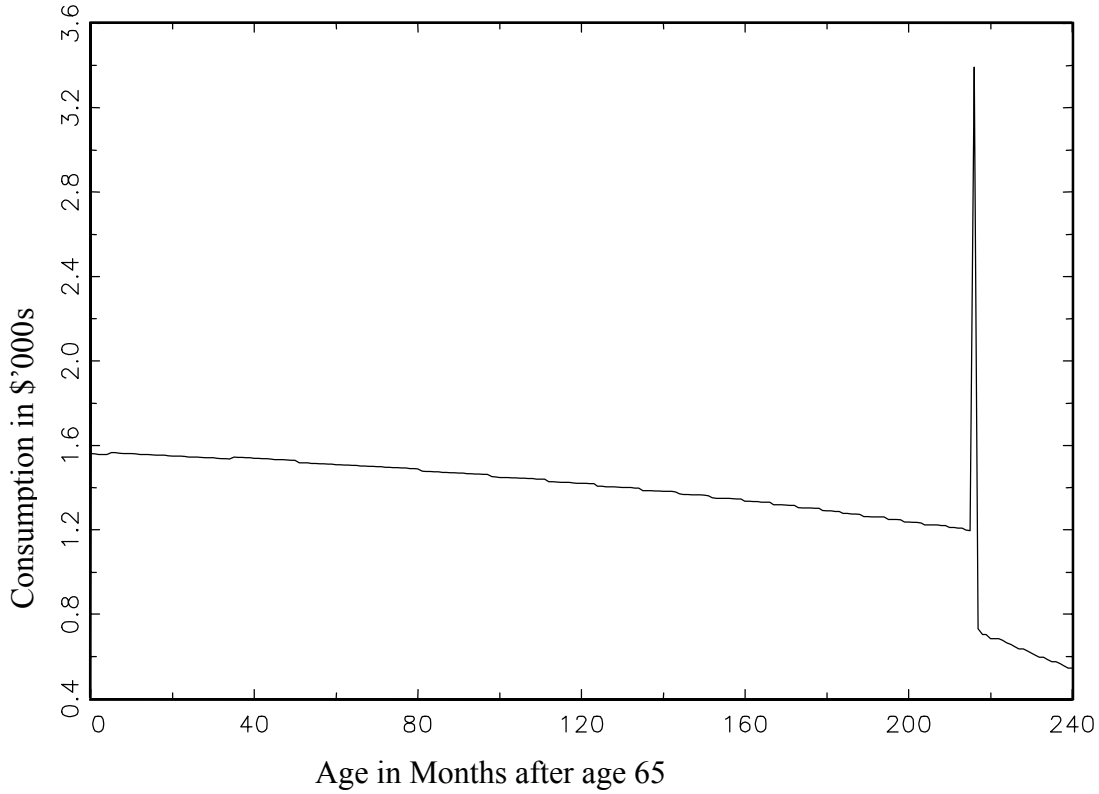


Figure 3: Optimal Consumption Path for Median Male,
Risk Aversion 3, in Absence of Private Insurance
(Enters Nursing Home at age 83 and Dies 2 Years Later)



Appendix Table A1: Comparison of nursing home (NH) utilization estimates: Robinson model and other published studies (65 year old).

Model	Data Sources	Probability of ever entering a nursing home			Average age of first entry into nursing home (conditional on entry)			Expected time in nursing home (conditional on entry)	% of those who enter nursing home who spend more than	
		Male	Female	Unisex	Male	Female	Unisex	Unisex	1 year (Unisex)	5 years (unisex)
Robinson Model	NLTCS (1982, 1984, 1989 and 1994) and NNHS (1985)	0.30	0.48	0.39	83 (median)	84 (median)	83 (mean)	1.8 years	40%	11%
Dick et al (1994)	NLTCS (1982, and 1984) and NNHS (1985)	--	--	0.35	81 (median)	84 (median)	--	1.8 years	40%	12%
Kemper and Murtaugh (1991)	1986 National Mortality Followback Survey	0.33	0.52	0.43	--	--	83 (mean)	--	55%	21%
Murtaugh et al. (1997)	1985 NNHS	--	--	0.39	--	--	--	2.7 years	51%	20%
Wiener at al.	NLTCS (1982, 1984) and NNHS (1985)	--	--	0.49	--	--	--	2.2 years	45%	14%

Note: All estimates for Robinson model are based on a version that estimates care utilization without regard to whether the care satisfies policy benefit triggers and without regard to the health condition of the individual at age 65. This is done to make the Robinson estimates comparable to published estimates that do not make these restrictions. The Robinson estimates used in the analysis in the paper, however, do incorporate these important restrictions. See section 3.1 for further details.

Appendix B
Estimating Willingness to Pay Under Alternative Modeling Assumptions

In this section, we provide the results of the sensitivity analysis described in Section 7. In the interest of brevity, we focus on the median of the wealth distribution and risk aversion of 3 for both men and women. Results for other deciles and other risk aversion levels provide similar results, namely, that our overall findings are substantially unaffected by these alternative modeling assumptions. Moreover, they indicate that the various alternative assumptions described in this Appendix do not have a substantial effect on the point in the wealth distribution at which the willingness to pay turns positive.

Table B1 reports several key summary statistics for each sensitivity check. The results for our base case are shown in the first row. Subsequent rows report the results for alternative specifications. Each columns reports a different summary statistic. The first two columns report overall willingness to pay, for a typical policy, i.e., one with a $100 daily benefit at current market loads (as in Table 2), and for an actuarially fair, comprehensive policy (as in Table 4). The third column reports the implicit tax that Medicaid imposes on the purchase of a $100 daily benefit policy (as in table 5). The final two columns report on the extent to which Medicaid itself provides good insurance. Specifically, we report the share of total lifetime expected expenditures on long-term care that are covered by Medicaid, as well as an individual's willingness to pay for a policy that "tops up" these benefits (as in Table 5).

Overall, we find that our core results are remarkably robust to a wide range of alternative modeling assumptions. Specifically, even under these alternative assumptions, Medicaid's crowd-out of private insurance extends far up the wealth distribution, Medicaid itself provides incomplete insurance, and Medicaid imposes a large implicit tax on the purchase of private policies. Indeed, despite our attempt to focus on alternative specifications that might increase willingness to pay for private long-term care insurance, in several cases we find that willingness to pay is *lower* under the alternative specifications. Moreover, in general the specifications that increase willingness to pay do not have a quantitatively large effect.

We now discuss each of the alternative specifications in detail.

B.1 Utility from home health care

The first set of alternative specifications investigate the possibility that individuals may view being in an institution as worse than residing at home. The results are summarized in rows 2 and 3. The first approach we take – shown in row 2 – is to allow for state dependent utility. Following the findings of the empirical work of Viscusi and Evans (1990) and Evans and Viscusi (1991) we assume that both the level of utility and the marginal utility of consumption decrease as health declines (i.e. are lower in an institution than when at home). In particular, we report results for the case in which $U_{alf} = U_{nh} = 0.5 \cdot U_{nocare} = 0.5 \cdot U_{hhc}$.

A second approach – shown in row 3 – is to allow for the provision of home care to provide direct consumption value, which is not included in our base case. To investigate the maximum effect this might have on willingness to pay, we show the willingness to pay for private insurance when every dollar of expenditures on home health care $(X_{hhc,t})$ provides a dollar of consumption value.

Neither specification alters our core finding that median wealth individuals do not want to pay for either existing policies or uncapped actuarially fair policies. Indeed, both alternative specifications *lower* willingness to pay relative to the base case. Similarly, the share of expenditures covered by Medicaid in the absence of private insurance is largely unchanged, individuals are still willing to pay to top up Medicaid, and the implicit tax imposed by Medicaid on private insurance purchases is changed very little.[30]

[30] As an alternative approach to modeling state dependent utility, we tried *increasing* the marginal utility of consumption in institutional care while simultaneously decreasing the level of utility when in institutional care. This

In the case of state dependent utility, the decline in willingness to pay is because the marginal utility of consumption has declined in the major state of care (namely institutional) to which insurance allows you to transfer consumption. In the case of allowing consumption value from home health care, willingness to pay decreases in part because allowing individuals to get consumption value from home health care expenditures provides something of a consumption floor while in home care, thus effectively making the individual less risk averse. In addition, when the person places no value on the consumption of home care, then their consumption while on Medicaid and in home health care is effectively limited to the amount permitted by the income disregard, which may interfere with optimal consumption smoothing across states of care. However, if the individual also gets utility from the consumption of home care, then Medicaid's constraints on consumption in home care are essentially less binding, making such smoothing easier.

B.2 Medicaid-covered care may be very unattractive relative to privately funded care

Our second major set of specification tests concerns the potential that Medicaid may be a less attractive substitute for privately funded care than we have modeled it. There are several reasons why this may be the case. First, as noted above, Medicaid coverage of home health care is capped in many states; therefore an individual who needs home health care but lacks the private resources to pay for it may have to forgo this care and potentially suffer negative health consequences, or may have to go into a less appealing setting (e.g., a nursing home) to receive care. Second, the quality of care provided by Medicaid-funded providers may be lower than care provided by privately funded providers, thus reducing the consumption value of care for Medicaid-funded care recipients. Finally, individuals may feel some stigma associated with receiving Medicaid which reduces the consumption value from any care received.

We allow for these various possibilities in a reduced form way by allowing the consumption value from long-term care expenditures to differ based on whether this care is paid for by private payers (out of pocket or private insurance) or by Medicaid. To maximize the potential effect that this could have on willingness to pay for private insurance, we allow the individual to get consumption value equal to the full extent of home health care expenditures, plus our base case assumption that care from assisted living and nursing homes of $545 per month (i.e. the case already shown in row 3). We show how willingness to pay is affected by cutting these consumption values in half only when care is paid for by Medicaid (i.e., $\alpha_s = 0.5$). We show two separate cases, corresponding to only home health care quality being lower when on Medicaid (row 4) and all three types of care quality being lower while on Medicaid (row 5).

The results indicate that, not surprisingly, reducing the quality of care provided by Medicaid increases willingness to pay (i.e. compare rows 4 and 5 to row 3). However, for the specifications shown, most of the core findings remain. The willingness to pay for typical capped policies with a standard market load is still negative, the implicit tax is still high, and the extent to which Medicaid itself provides good insurance is now even lower (again, compare rows 4 and 5 to row 3). The only sign change we observe on willingness to pay is for the most extreme case (row 5) in which we have significantly reduced the consumption value of care in all states when on Medicaid. In this single case, men (but still not women) become willing to pay for an uncapped policy, if it were offered at actuarially fair prices. In other words, if we eliminated all private market failures that lead to high prices and limited benefits, *and* if Medicaid's care quality were severely inferior to privately provided care, then the median male would now be willing to buy.

B.3 Presence of family members

Our final set of specification tests investigates several ways that the family may increase willingness to pay for insurance. We begin by examining the role of bequest motives. Bequest motives provide an individual with another reason to value the protection of wealth offered by long-term care insurance

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increases willingness to pay relative to the base case; however the magnitude of the effect is again quite small, and therefore does not alter our fundamental findings.

besides the reason in the base case that the insurance protects wealth that can be used to finance future consumption by that individual. Because there no consensus in the literature on how to model bequests, and even less on how to parameterize the bequest function, we examine a straightforward case of a constant relative risk aversion utility function over non-annuitized wealth remaining at death, using the same risk aversion coefficient for bequests as for consumption.[31]

The results, shown in row 6, indicate that a bequest motive slightly increases willingness to pay for insurance, but that the effect is quantitatively small. This is because bequest motives have several offsetting effects on the willingness to pay for long-term care insurance. On the one hand, if an individual is risk averse with respect to bequest size, the presence of bequest motives should increase the willingness to pay for long-term care insurance that reduces the volatility of bequests. On the other hand, in the presence of positive load factors (such as those that we estimate for men), the purchase of a long-term care insurance policy actually reduces the expected discounted value of resources available for consumption and bequests, thus reducing the willingness to pay for private insurance when there is a bequest motive relative to when there is not. Finally, as shown by Hurd (1986) and Jousten (2001), the presence of a bequest motive changes the shape of the optimal consumption path and thus affects the desirability of insuring against expenditure risk.

In addition to bequest motives, the family may also affect willingness to pay for insurance by providing a substitute for private long-term care insurance, either through the direct provision of unpaid care or through informal financial risk sharing among family members (i.e. a financial substitute for private insurance) (Kotlikoff and Spivak, 1981; Pauly 1990). We consider each in turn.

We confirm, in results not shown, that allowing family members to provide unpaid home health care in lieu of formal paid care lowers willingness to pay for private long-term care insurance that covers the remaining risk of institutional care expenditures. This is because the family care provision reduces the total expenditure risk facing the individual by removing variation in home health care expenditures. This analysis assumes that the individual was indifferent to receiving home health care from a family member or from a formal employee. If instead the individual receives substantial *dis*utility from family provided care (e.g., aversion to "being a burden"), this could increase the value of private insurance.

To investigate this latter case, we examine an extreme case that is most likely to increase the willingness to pay for private insurance. We assume that members of the family will provide all home health care that is not reimbursed by private insurance (i.e. would be paid for out of pocket or by Medicaid). We further assume that the individual receives lower utility from family-provided care than if the care is provided by formal employees. Thus we assume that the individual gets utility from home health care consumption equal to home health care expenditures (i.e. as examined in row 3) *only if* that care is financed by private insurance. The results are shown in Row 7. Comparing these results to those in row 3 (where there is consumption value from home health care and no issue of not wanting to be a burden), we see that the willingness to pay for long-term care insurance does increase. However, it still remains lower than the base case in which there is no consumption value from home health care. Again, the implicit tax imposed by Medicaid is not substantially affected by this assumption.

B.3.1 Modeling the joint decision making of a couple

Family members, particularly spouses, may also engage in *financial* risk sharing. It is therefore possible that the household may have a higher willingness to pay for private insurance than a unitary decision maker because the utility consequences of Medicaid's asset and income tests may be more onerous if one spouse continues to reside in the community. Offsetting this, however, are two factors. First, in practice, Medicaid rules allow a community-based spouse to retain substantially more assets and income, thus effectively making Medicaid a better substitute for private insurance than in the case of single individuals; for example, in 2000, all states allowed the community-based spouse to keep at least

[31] In results not shown, we also used a linear bequest motive with a bequest coefficient that is substantially stronger than that estimated empirically by Hurd (1989). As with the CRRA bequest motive, the willingness to pay remains negative at the median.

$16,824 in assets when an individual enters a nursing home in addition to the $2,000 allowed for the institutionalized individual (Stone 2002).[32] Second, as shown by Kotlikoff and Spivak, spouses who share a joint budget constraint can partially substitute for formal insurance markets by informally insuring one another, thus making private insurance less attractive.

A number of conceptual difficulties arise in determining how one should model decision-making within a couple. For example, there is no consensus in the literature on whether to model decision-making as if it were being done by a single decision-maker or as the outcome of a bargaining process (Lundberg and Pollak 1996 provide a useful survey of the literature on household bargaining). There are also widely divergent estimates of the extent of economies of scale of within household consumption, as well as other parameters.

While we recognize that modeling decision making by couples requires a number of arbitrary assumptions, we nonetheless estimate one particular model of household decision-making that is closely based on the model used by Kotlikoff and Spivak (1981) and Brown and Poterba (2000) to analyze the gains from annuitization for married individuals. In this model, the household utility function is simply the equally weighted sum of two spousal sub-utility functions. We assume no economies of scale in consumption within the household. We use a wealth distribution that is specific to married couples in the HRS. We also use the more generous state Medicaid rules that apply to couples when one spouse resides in the community, while retaining the individual Medicaid parameters when only one spouse is alive. This analysis is computationally quite burdensome as it involves 25 different states of care (i.e., 5 husband states times 5 wife states), rather than only the 5 states in our base case, unitary model.

Our results indicate that the net result of this specification is that allowing for within household financial risk sharing further *lowers* the willingness to pay for private insurance. For example, at risk aversion of 3, the combined willingness to pay for our base case private contracts ($100 daily benefit at existing market loads) covering both the husband and the wife at the median of the wealth distribution is estimated to be approximately -$42,900; by contrast, the results in Table 2 indicate a combined willingness to pay for the male and female in the base case of only -22,900. The finding that within-household risk sharing lowers the willingness to pay for private insurance is consistent with the findings of Brown and Poterba (2000), who find that the willingness to pay for life annuities is substantially lower when modeled in this way than when modeled using a unitary decision maker. The results also indicate that the implicit tax imposed by Medicaid is slightly smaller but still quite high in the joint decision model relative to the unitary model (0.562 for men versus 0.594 in the base case, and 0.671 for women versus 0.767 in the base case).

[32] $16,824 was the federal minimum in 2000, and 12 states used this minimum level. We choose the lower end of the range to be conservative. Even this low end understates the generosity of Medicaid rules since community-based spouses are allowed to keep an unlimited resource in the house (Stone, 2002). Our estimates are therefore biased toward finding a higher willingness to pay for long-term care insurance.

Table B1: Sensitivity analysis

Specification	Men					Women				
	WTP for $100 daily benefit current market load	WTP for un-capped daily benefit and 0 load	Implicit Tax (on $100 daily benefit policy)	Share of EPDV of LTC Paid by Mcaid (No Private Insur)	WTP for policy to cover expend. not covered by Medicaid (no load)	WTP for $100 daily benefit current market load	WTP for un-capped daily benefit and 0 load	Implicit Tax (on $100 daily benefit policy)	Share of EPDV of LTC Paid by Mcaid (No Private Insur)	WTP for policy to cover expend. not covered by Medicaid (no load)
1. Base Case	**-11.4**	**-2.7**	**0.594**	**0.60**	**19.6**	**-11.5**	**-35.8**	**0.767**	**0.72**	**29.7**
2. State dependent utility[1]	-12.1	-7.5	0.583	0.60	13.8	-12.5	-41.2	0.778	0.72	19.6
3. Consumption value from HHC[2]	-19.8	-12.5	0.668	0.62	8.9	-19.3	-45.3	0.827	0.72	14.3
4. Consumption value from Medicaid-funded HHC is half that from privately-funded HHC[3]	-18.4	-11.0	0.603	0.59	10.2	-17.7	-43.9	0.796	0.70	15.7
5. Above + cons. value of Medicaid-funded institutional care is also half that from privately-funded care[4]	-13.0	10.6	0.616	0.55	34.9	-10.3	-14.8	0.752	0.66	64.2
6. CRRA Bequest Motive	-10.9	-2.0	0.595	0.59	20.5	-11.1	-35.0	0.764	0.72	31.1
7. Do not want to be a burden on family members[5]	-17.0	-9.4	0.816	0.67	14.5	-12.7	-39.7	0.939	0.75	27.2

Notes: All results are for median wealth and risk aversion of 3. All willingness to pay estimates are in thousands of dollars. Otherwise, all parameters are as specified in notes to Table 2 except as indicated in the left hand column or column heading. Cases where willingness to pay is positive are shaded gray. Base case results are in **bold.**

[1] $U_{alf} = U_{nh} = 0.5 * U_s \forall s \neq alf, nh$

[2] $F_{hhc,t} = X_{hhc,t}$

[3] $F_{hhc,t} = X_{hhc,t}$; $\alpha_{hhc} = 0.5$; $\alpha_{alf} = \alpha_{nh} = 1$

[4] $F_{hhc,t} = X_{hhc,t}$; $\alpha_{hhc} = 0.5$; $\alpha_{alf} = \alpha_{nh} = 0.5$

[5] $F_{hhc,t} = X_{hhc,t}$ for expenditures paid by private insurance; $F_{hhc,t} = 0$ otherwise. See text for further details.