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

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Abstract: We examine the interaction of the public Medicaid program with the private market for long-term care insurance and show that the provision of even very incomplete public insurance can substantially crowd out private insurance demand. We estimate that 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, even if comprehensive, actuarially fair private policies were available. However, 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. Medicaid's large crowd out effect stems from the very large implicit tax (on the order of 60 to 80 percent for a median wealth individual) that Medicaid imposes on private insurance purchases. An implication of our findings is that public policies designed to stimulate private insurance demand will be of limited efficacy unless Medicaid is significantly altered to reduce this large implicit tax.

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Most insurance in the United States is provided by a mix of public and private sources. In this paper, 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). Private insurance reimburses only 4 percent of long-term care expenditures. Approximately 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 review 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 an imperfect – but "free" – substitute for private long-term care 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 not having 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 role of Medicaid in affecting willingness to pay for long-term care 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 – individuals throughout most of the wealth distribution would still not be willing to purchase such policies. We find that at least two-thirds –and as much as 90 percent – of the wealth distribution still does not want to buy comprehensive insurance even when offered at actuarially fair prices. 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 comprehensivness would not substantially increase private insurance coverage for long-term care. More generally, our finding indicates that public insurance programs can have a much larger crowd-out effect on private insurance markets than merely looking at eligibility for the program at a point time -- or the expenditures of the public program – might suggest.

Of course, we recognize that there are a variety of other factors that are not in our model – such as individual myopia or the potential to rely on support for one's children –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.

Second, 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. Taken together, these first two 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.

Third, we use the model to explore the reason behind Medicaid's large crowd-out effect on private insurance. We show that this crowd out effect is not a necessary condition of providing catastrophic coverage through Medicaid per se, as 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. Rather, the crowd out 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 (77 percent) of the benefits from a private policy are redundant of benefits that Medicaid would otherwise have paid. Medicaid's implicit tax derives both from its means-tested eligibility – which means that private insurance reduces the chance of Medicaid eligibility since it protects assets – and Medicaid's status as a secondary payer – which requires private insurance to pay first, even if the individual is eligible for Medicaid. 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.

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 and 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. Section four demonstrates the impact of Medicaid on the willingness to pay for private insurance, and the implications of this crowd-out for total insurance coverage. Section five investigates the mechanism behind the large crowd-out effect of Medicaid. Section six 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 more 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 utilization differences are partly – but not fully – explained by women's longer longevity.

There is a considerable right-tail to the distribution of nursing home utilization. Of individuals who 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.

Most of this substantial risk is uninsured. As a result, over one third of long-term care expenditures are paid for out of pocket, nearly double the proportion of expenditures in the health sector as a whole that are paid for out of pocket (CBO 2004, National Center for Health Statistics, 2002). The remainder of this section provides some information on private and public insurance coverage for long-term care.

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 have private long-term care insurance have policies that cover only a very limited proportion of expected long-term care expenditures. 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; maximum daily benefits are typically constant in nominal terms, and thus declining in real terms over time.

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. In addition to marking up prices, a variety of private market problems may prevent 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 pooling idiosyncratic risks) results in the specification of binding dollar daily benefit caps which do not expose the insurance companies to this aggregate risk.

[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.

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 are also introducing tax subsidies for private 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. In contrast, Medicare's coverage of home health benefits has evolved to cover genuine long-term care, although Medicare's coverage of home health constitutes only 7 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.

Medicaid is likely to be an imperfect substitute for private insurance. For 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 (AARP, 2000). In order to make it more difficult for individuals to "hide" assets from Medicaid by transferring them to a spouse or children, state Medicaid programs impose a 3 to 5 year look back period on assets (Congressional Research Service, 2002). The

fact that such a large fraction of long-term care expenditures are paid for out of pocket points to limits to individuals' ability to "game" the Medicaid system.

An imperfect 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 insurance coverage is an open question. While there is evidence that Medicaid has a substantial crowd-out effect in the market for acute private health insurance (e.g., Cutler & Gruber 1996), 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 many 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. Moreover, there is little evidence that other forms of public insurance have substantial crowd out effects on private insurance for the elderly. For example, Mitchell et al. (1999) find that the presence of publicly-provided annuities through Social Security is not sufficient to explain the limited demand for private annuities, and Finkelstein (2004) finds that 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 relative role of private market failures and 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. Here 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. As will be explained in section 5, this same model will be used to construct our measure of the "implicit tax" that Medicaid imposes on a private policy.

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 their new optimal consumption path, the individual achieves the same level of expected lifetime utility that they had when they were insured.[2]

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.

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

[2] While our base case models a unitary decision maker, an alternative specification described in detail in Appendix B considers the case of a household utility function that models the joint consumption decisions of a husband and wife and calculates the utility gains from having each spouse purchase insurance relative to not purchasing insurance. We find that within-household risk sharing and more generous Medicaid rules for married couples lead to an even lower valuation of private long-term care insurance than in our base case.

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 $F_{s,t}$. While Pauly (1989, 1990) was primary concerned with institutional care, our model also allows for the possibility that some portion of the expenditures spent on home health care (e.g., help with shopping and cooking) also provides direct consumption value.

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, and that this should increase their willingness to pay for private long-term care insurance. 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 $0 \leq \alpha_s \leq 1$ when care is paid by Medicaid. A low value of α_s when care is paid for by Medicaid indicates a low consumption value of publicly-funded care relative to privately-funded care.

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. Our model also allows us to consider utility from bequests at death, defined as a function of non-annuitized wealth remaining at the time of death.

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 financial wealth at time t, and A is a Tx1 vector of 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, i.e., a bequest function.

Formally, the recursive Bellman equation is:

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

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 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:

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

In other words, wealth next period is simply wealth this period plus inflows (income and insurance payments) minus outflows (consumption, care expenditures, and premium payments) plus interest. 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.

Constraint (2) shows how financial wealth evolves in a world where the individual is solely

responsible for his own care. In practice, however, if an individual is receiving paid care and meets certain state-specified income and asset tests, his care will be paid for by Medicaid. These payments alter the wealth accumulation equation (2) above. Medicaid, as discussed, is a secondary payer that covers care once an individual has met certain income and asset tests. To be eligible for Medicaid reimbursement, the individual must be (i) be receiving care, (ii) meet the asset test (i.e., must have $W_t < \underline{W}$, where $\underline{W}$ is the asset test cutoff), and (iii) meet the income test. 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 $X_{s,t} - (A_t - \underline{C}_s) - \min(B_{s,t}, X_{s,t}) - \max(W_t - \underline{W}, 0)$. In words, Medicaid pays for all 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:

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

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 required be used for period t care ($\max(W_t - \underline{W}, 0)$), plus any saving the individual does out of their income disregard level $(\underline{C}_s - C_t)$.[3] 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 ($q_{t+1}^{s,\sigma}$)

[3] 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.

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 health care (HIAA 2000a). 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).[4] 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.[5] 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.

[4] Readers interested in a more detailed description of the model are encouraged to consult Brown and Finkelstein (2004) and especially Robinson (1996).

[5] 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.

The Robinson model has a very strong pedigree. Versions of the 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 possible, that the model produces estimates that are broadly consistent with other published estimates. Appendix Table A1 summarizes the results of this validation exercise.

To make the estimates relevant for the long-term care insurance purchase decision, the estimates in this paper are based on 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 they have no limitations to activities of daily living and not be cognitively impaired (over 98 percent of 65 year olds meet this requirement). It also counts 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 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). 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. Medicaid imposes similar types of benefit triggers (Congressional Research Service 2002).

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).[6]

3.2 Estimates of Current and Future Long-Term Care Costs

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 only one-quarter of total long-term care expenditures (US Congress, 2000). 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 multiply estimated home health care costs by 0.65 to reflect that fact that Medicare reimburses 35 percent of these home health care costs (see Brown and Finkelstein, 2004). 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).[7] 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

[6] 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).

[7] 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."

completely exhaust one's resources is $1.55 million.[8]

3.3 Initial Medicaid Parameterization

For our base Medicaid parameterization, we choose eligibility rules that are strict in terms of their income and asset requirements for eligibility.[9] By doing so, we make Medicaid a less attractive substitute for private insurance and bias ourselves against finding a substantial crowd-out effect of Medicaid. 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, as expected, using the most generous state rules exacerbates Medicaid's crowd out effect, while doing very little to enhance the consumption-smoothing properties of Medicaid.[10] 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.[11]

Our base parameterization thus represents a more restrictive set of Medicaid rules than typically apply. However, in one respect we may be overstating 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

[8] 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.
[9] All of the information in this section is from AARP (2000).
[10] In Section 6 and Appendix B, where we examine willingness to pay in a household decision-making framework that permits financial risk sharing among family members, we discuss and incorporate the much more generous asset disregards for community based spouses.
[11] 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.

home health care – and that individuals may prefer receiving care at 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 all equal to 0.03 annually.[12]

We initially examine a private insurance policy that covers all three types of care and offers a constant nominal maximum daily benefit of $100. This is broadly consistent with the typical policy purchased in 2000 (HIAA 2000a). 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.[13] It is ostensibly puzzling why insurance companies would voluntarily offer substantially different loads for men and women; this pricing practice cannot be

[12] These are all 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).

[13] 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.

explained by the within-couple correlation in purchasing (Brown and Finkelstein, 2004). One possible explanation raised by the subsequent results in this paper (see especially Section 5) is that 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.

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 checks in Section 6 and Appendix B, we relax each of these assumptions in turn and conclude that all our core findings are robust to these alternative models.

3.5 Basic findings from the model

We present the findings of the model with the parameterization described above, for various points in the wealth distribution. Specifically, we calculate the willingness to pay for 65-year old men 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).[14] 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

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

Security benefits and defined benefit pension wealth, which are calculated using the Social Security and pension calculators from Coile & Gruber (2000). All wealth measures are computed on a household basis, and converted to individual wealth levels using an equivalence scale approach.[15] The results are shown for men and for women in Figures 1 and 2 respectively.[16] 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 model, most individuals throughout the wealth distribution do not have a positive willingness to pay for this 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, at 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. At lower levels of risk aversion, the negative willingness to pay extends much farther up the wealth distribution; indeed, with log utility (CRRA = 1), even a male or female at the 90th wealth percentile would find the purchase of the policy welfare reducing.

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 -$11,412. 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 $11,412 in financial wealth. This is a significant welfare loss, both relative to the individual's total wealth (approximately

[15] 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 and individual's "effective wealth" and thus our estimate of willingness to pay for private long-term care insurance.

[16] 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.

$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. 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 benefits to the EPDV of premiums.

Second, willingness to pay becomes positive for men and women at a given risk aversion level 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 2000a). 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 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 2000a). 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.[17]

4. The impact of Medicaid on private and total long-term care insurance coverage

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

Two main features of the model may contribute to the limited willingness to pay for private insurance seen in Table 2: the Medicaid program and the structure of the private insurance contract. In this section we assess the relative role of Medicaid by looking at the willingness to pay for alternative, counterfactual private insurance contracts. In particular, there are two aspects of the private insurance contract studied in Table 2 that may be reducing the individual's willingness to pay. First, the $100 daily benefit cap results in an insurance policy that is far from comprehensive. Second, 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 this limited comprehensiveness and the high loads. We do not specify the particular market failure(s) that may be involved. Rather, we examine the willingness to pay for hypothetical contracts that might be available in the absence of such failures, namely, *actuarially fair* contracts, and *comprehensive* private insurance contracts.

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, 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

[17] 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 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 – as total wealth levels as high as $3 million.

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.

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 is quite low.

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 recently-introduced federal tax subsidies for employer-provided long-term care insurance (Wiener et al., 2000) could only reduce the load on the policy to 0.17 for men and -0.76 for women.[18] At 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, 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

[18] 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.

care (see Table 1), $100 is only two-thirds of daily assisted living facility costs and one-third of daily nursing home costs.[19] 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*. 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 substantially increase private insurance coverage for long-term care.

More generally, our findings indicate that public insurance programs can have a much larger crowd-out effect on private insurance markets than merely looking at the "size" of the public program would indicate. As noted, Medicaid pays for only about one-third of long-term care expenditures. However, we

[19] Nonetheless, it is slightly *more* comprehensive than typical policies bought in 2002 which tend to have similar daily benefit levels but also some deductibles and limited benefit durations that further reduce the comprehensiveness to about one-third (Brown and Finkelstein, 2004).

estimate that it crowds out insurance demand for a substantially greater proportion of the elderly population.

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, we find that a load of 0 can only induce a positive willingness to pay for this individual for policies with less than a $125 nominal 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 reduces the value of larger benefit policies relative to smaller benefit policies because a larger policy provides coverage for expenditures that are mot likely to be redundant of what Medicaid would have otherwise covered. 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 provide coverage. By contrast, a limited private insurance policy is more likely than a comprehensive policy to offer benefits that, in the absence of this policy, would be paid for out of pocket rather than by Medicaid. In Section 5, we provide a way of quantifying the redundancy of private insurance benefits for Medicaid benefits as an "implicit tax" and explore this phenomenon in more depth.

4.2 The Impact of Medicaid on Total 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.[20]

The substantial limitations imposed by Medicaid on an individual's ability to consumption smooth – even in the absence of a bequest motive – is illustrated in Figure 3. 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 then who 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.[21]

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

[20] Recovery from care is 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.

[21] It is worth 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.

rate and mortality rate exceed the rate of interest. When he enters a nursing home at age 83, there are two immediate effects. First, entering a nursing home increases his mortality probabilities, as well as the probability of needing additional care in the future. Second, 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 four 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.

This sharply discontinuous consumption pattern illustrates the inadequacy of Medicaid as a consumption-smoothing device for this individual. 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. Indeed, the inadequacy would be even more severe if the individual exits from care while still alive, as he would now have only annuity income to live on, as all of his non-annuitized resources would have been exhausted.

Table 5 provides two ways of quantifying the incomplete nature of the insurance provided by Medicaid. To conserve space, all results are shown for risk aversion of 3, although the results are qualitatively similar at other levels of risk aversion. The first column shows the proportion of the expected present discounted value of long-term care expenditures covered by Medicaid when an individual follows his or her optimal inter-temporal consumption path in the absence of private long-term care insurance. The proportion of expenditures covered by Medicaid declines rapidly with wealth. For example, for men at the 1st decile in the wealth distribution, Medicaid covers 98 percent of their EPDV of long-term care expenditures, compared to 60 percent at the 5th decile and 7 percent at the 9th decile. The results for women show a similar pattern. These results indicate that Medicaid leaves all but the poorest individuals exposed to substantial out-of-pocket expenditure risk.

The second column reports how much an individual would be willing to pay for an actuarially fair policy that covers the expenditure risk that is not already covered by Medicaid. In other words, it is the willingness to pay for a fairly priced contract when there is no implicit Medicaid tax on the benefits.[22] One way of viewing what we mean by "no implicit tax" is 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. The results suggest that the nearly all of the wealth distribution would be willing to purchase such a "no implicit tax" policy. For example, for the median male (female), the welfare gain associated with buying such a policy is equivalent to an increase 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.

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) has little effect on the results. 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.

[22] 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.

These results 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.

5. Why does Medicaid Crowd-out Private Insurance Coverage?

5.1 Does provision of catastrophic coverage necessarily entail crowd out?

By providing catastrophic coverage as a payer of last resort, Medicaid effectively provides a consumption floor below which individuals cannot fall. It thus reduces the risk exposure faced by an individual and therefore reduces the marginal utility from (and hence willingness to pay for) additional private insurance. However, our results indicate that the provision of catastrophic coverage *per se* is not sufficient to reduce demand for private insurance to zero throughout most of the wealth distribution. The results in Table 5 indicated that – even given the existence of this catastrophic coverage – essentially all individuals are willing to pay for actuarially fair insurance to cover the expenditures not covered by Medicaid. Moreover, in results not shown, we estimate that even if men had to face current market loads of 0.5 (rather than actuarially fair prices) for this supplemental coverage, even the 40th percentile male would have a positive willingness to pay.[23] 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).

What accounts for this large difference in willingness to pay? It is that, in practice, 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 private

[23] 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.

insurance policies. The 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. However, in practice, individuals are not currently able to purchase such a policy, and in fact, such a policy is not feasible under current Medicaid rules.

Two aspects of Medicaid's design contribute to this implicit tax by linking Medicaid payments to the presence of private insurance. First, the means-tested nature of Medicaid eligibility means that private insurance – by protecting assets against negative expenditure shocks – reduces the likelihood that one will be eligible 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. Thus a portion of private insurance benefits are *redundant* of what Medicaid would have paid for if the individual did not have private insurance both because private insurance makes the individual less likely to meet the Medicaid asset limits and because private insurance must pay first even if the individual has reached the Medicaid asset limits.

We estimate that the implicit tax imposed by Medicaid is substantial, and that accounting for this implicit tax sheds light on several of the ostensible puzzles about willingness to pay for private insurance both in our model and in survey data. Table 6 illustrates this for an individual with risk aversion of 3.[24] A comparison of columns 1 and 2 indicates the substantial decrease in Medicaid expenditures associated with having a private insurance policy with a $100 daily benefit cap.[25] 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.

[24] 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 about consumption smoothing, and therefore is more willing to spend down their own assets quickly in order to qualify for Medicaid. As a result, Medicaid covers a larger fraction of their total long-term care expenditures.

[25] 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.

In other words, it represents the difference between the gross and net benefits from the private policy, as a percentage of the gross benefits.

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 both 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 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 6 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.[26] 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.[27]

5.2 The Implicit Tax and Public Policy Interventions

In this section we briefly explore the likely efficacy of alternative public policy interventions in stimulating demand for private insurance. The above results point to the importance of reducing the implicit tax imposed by Medicaid on private insurance in order to stimulate private insurance demand. Here, we show 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 showed in Section 4.1 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; 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

[26] $\text{Net Load} = 1 - \frac{\text{EPDV(Benefits) - (Mcaid Expend w/o Private Insurance - Mcaid Expend with Private Insurance)}}{\text{EPDV(Premiums)}}$

[27] The implicit Medicaid tax is also higher on an uncapped policy than on a policy with a $100 daily benefit. This helps explain why we found that the willingness to pay for more comprehensive policies was more negative than their willingness to pay for less comprehensive policies (see Section 4.1).

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 insurance only raises the median male's willingness to pay at current market loads from -$11,400 to -$8,000.[28] 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

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

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. For example, if individuals who purchase private insurance receive a tax credit equal to the amount of the Medicaid benefits that the private insurance policy replaces, this would eliminate the implicit tax. However, the amount of such a subsidy would need to vary based on wealth and expected care utilization, and thus would be difficult to implement. 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. 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, in turn, on three sets of 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.

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. We also allowed for the possibility that the provision of home care might provide some direct consumption value.

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.[30]

Third, our final 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, and the implicit tax for median wealth households. We continue to find that the median household does

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

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.

7. 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 and the current structure of the public Medicaid program and 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.

We have 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 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.

Third, 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. Our findings suggest that recent state and federal reforms designed to stimulate demand for private insurance are unlikely to have much impact. 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

				Duration of Use (Among Users)				Exit and reentry (among users)	
Type of Care		Prob Ever Use	Average Age of First Use (Among Users)	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 –0.058 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: How Complete is Medicaid Coverage?

Wealth Percentile	Men		Women	
	Share of EPDV of LTC Expenditures Paid By Medicaid (No Private Insurance)	WTP for Act Fair Insurance to Cover Expenditures Not Covered by Medicaid	Share of EPDV of LTC Expenditures Paid By Medicaid (No Private Insurance)	WTP for Act. Fair Insurance to Cover Expenditures Not Covered by Medicaid
10th	0.98	0.0	0.99	0.0
20th	0.88	0.0	0.93	0.0
30th	0.80	3.3	0.88	2.3
40th	0.71	9.8	0.80	11.5
50th	0.60	19.6	0.72	29.7
60th	0.46	35.2	0.56	58.3
70th	0.32	51.0	0.45	86.3
80th	0.17	74.1	0.24	122.8
90th	0.07	100.9	0.08	166.3

Note: All estimates are for risk aversion of 3. WTP is in thousands of dollars. For all calculations, the EPDV of total long-term care expenditures is $43,750 for women, and 17,510 for men.

Table 6: Medicaid's Implicit Tax on a policy with a $100 daily benefit cap

Wealth Percentile	Share of EPDV of Expenditures Paid by Medicaid		Implicit Tax on Private Insurance	Net Load on Private Insurance
	No Private Insurance	With Private Insurance		
	(1)	(2)	(3)	(4)
Panel A: Men				
10th	0.98	0.52	0.998	1.00
20th	0.88	0.44	0.952	0.98
30th	0.80	0.41	0.840	0.92
40th	0.71	0.37	0.737	0.87
50th	0.60	0.32	0.594	0.80
60th	0.46	0.26	0.426	0.71
70th	0.32	0.20	0.272	0.64
80th	0.17	0.12	0.107	0.55
90th	0.07	0.05	0.036	0.52
Panel B: Women				
10th	0.99	0.55	0.999	1.00
20th	0.93	0.50	0.993	0.99
30th	0.88	0.46	0.946	0.94
40th	0.80	0.43	0.855	0.85
50th	0.72	0.38	0.767	0.75
60th	0.56	0.33	0.617	0.59
70th	0.45	0.24	0.470	0.44
80th	0.24	0.15	0.194	0.15
90th	0.08	0.06	0.054	-0.003

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 –0.058 for women.

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

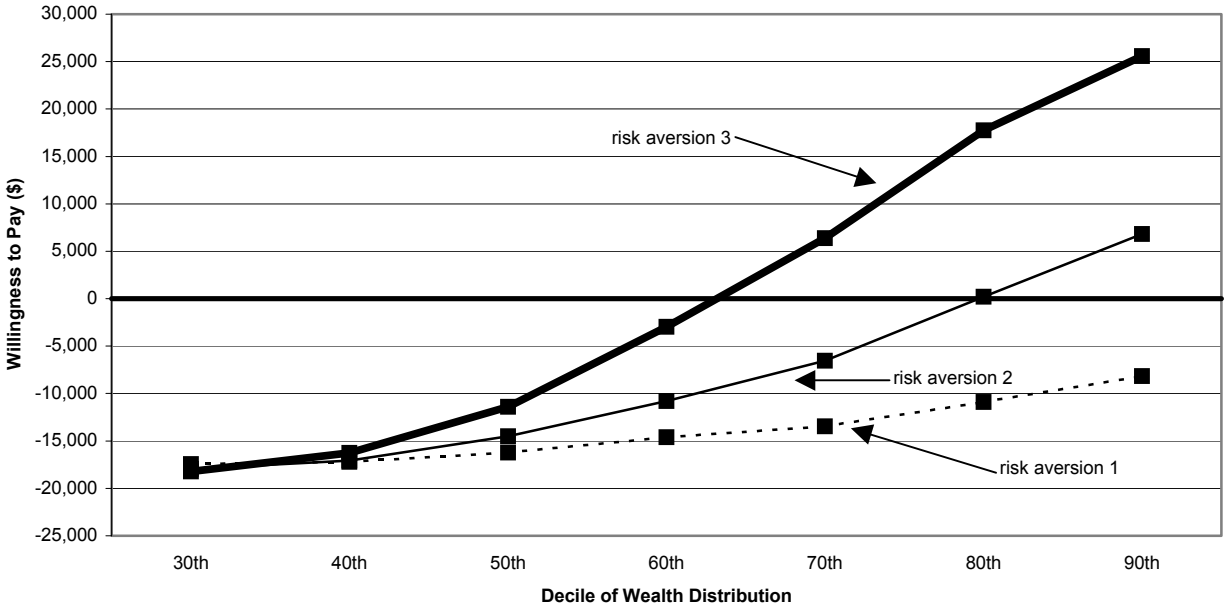


Figure 2: Willingness to Pay: 65 Year old Female
Current Market Loads; $100 Daily Benefit

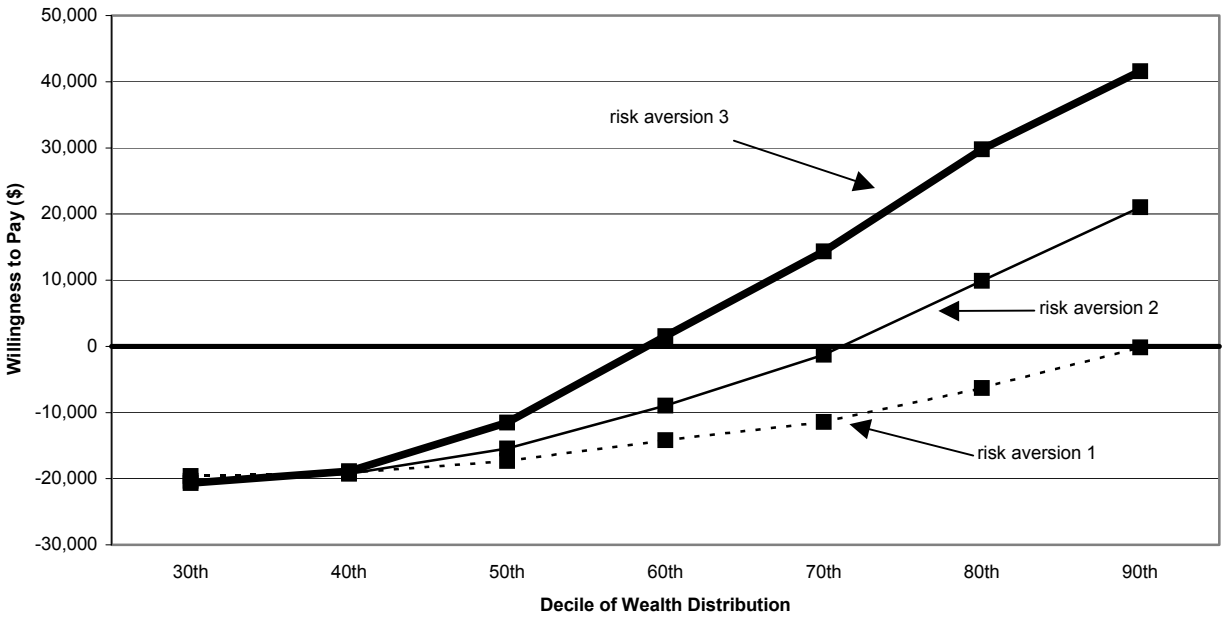
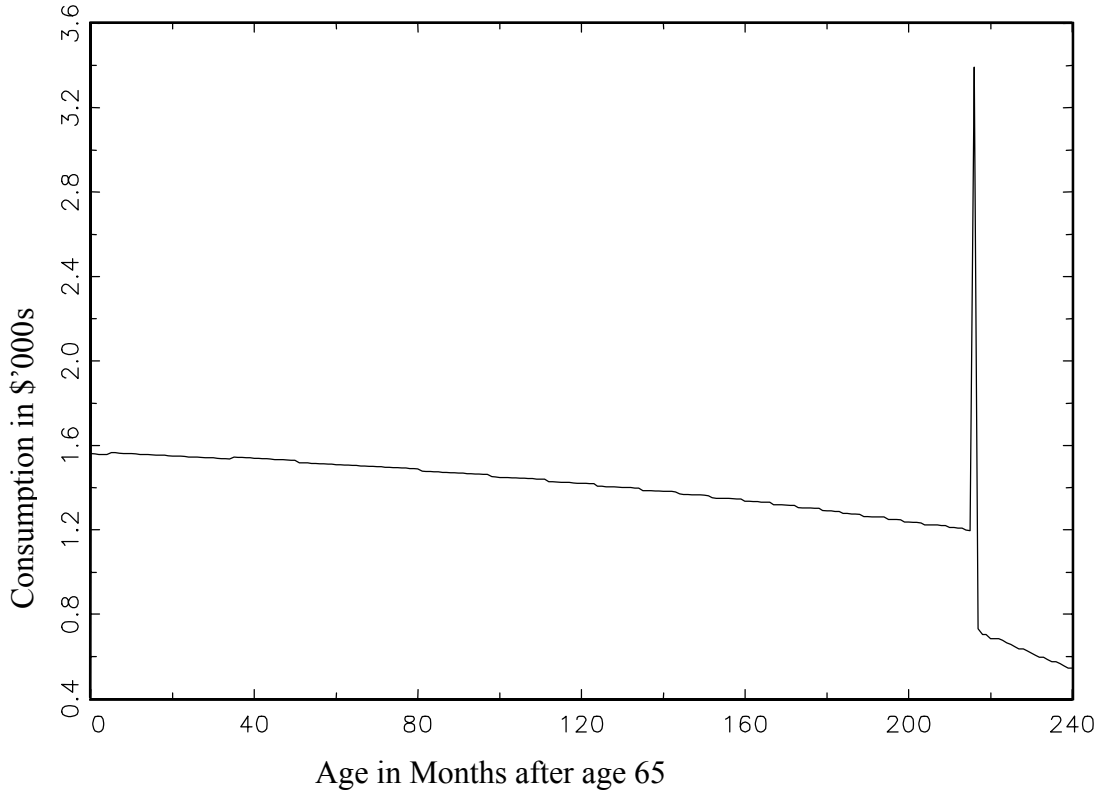


Figure 3: Optimal Consumption Path for Median Male,
Risk Aversion 3, in Absence of Private Insurance
(Enters Nursing Home at age 83 and Dies 2 Years Later)



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.

Appendix B
Estimating Willingness to Pay Under Alternative Modeling Assumptions

In this section, we provide the results of the sensitivity analysis described in Section 6. 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. In particular, it is the case that these extensions 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. First, we examine overall willingness to pay, both for a typical policy, i.e., one with a $100 daily benefit at current market loads (see Table 2), and for an actuarially fair, comprehensive policy (see Table 4). The next 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 (see Table 5). Finally, we report the implicit tax that Medicaid imposes on the purchase of a private policy (see Table 6).

Overall, we find that our results are remarkably robust to all of these alternative specifications. 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.

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.[31] 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

[31] 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 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.

of care, then their consumption while on Medicaid 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 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 Medicaid-funded care may be considerably less appealing than privately funded care. 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.[32] 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 (both unskilled and skilled), 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, and the implicit tax is still high. 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 concerns the role that the family may play in affecting willingness to pay for insurance. Here, we consider several ways that the family may increase willingness to pay for long-term care 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 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

[32] Indeed, in a survey of long-term care insurance purchasers, over half of those surveyed rank "freedom to choose" one's type of care as a very important reason for buying the policy (HIAA 2000a).

constant relative risk aversion utility function over wealth remaining at death, using the same risk aversion coefficient for bequests as for consumption.[33]

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 which 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 also 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.

To allow for *financial* risk sharing among family members, we estimate willingness to pay in a model where household decision-making is modeled under the assumption that a husband and wife maximize a joint utility function. It is possible that the household may have a substantially 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

[33] 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 willingess to pay remains negative at the median.

[36] $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 (Congressional Research Service, 2002). Our estimates are therefore biased toward finding a higher willingness to pay for long-term care insurance.

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 $16,824 in assets when an individual enters a nursing home in addition to the $2,000 allowed for the institutionalized individual (Stone 2002).[36] 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. As shown in row 8 of table B1, our results indicate that these latter two factors dominate, and that the net effect of allowing for within household financial risk sharing is to further *lower* 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 -$42,898. The finding that within-household risk sharing lowers the willingness to pay for private insurance is consistent with the findings of Brown and Poterba (2001), 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.

To generate these results for a household decision maker model required that we extend our basic model to allow for joint household decision making framework We use a model that is a natural extension of our model of a unitary decision maker, and follows closely the model used by Kotlikoff and Spivak (1981) and Brown and Poterba (2000) to analyze the gains from annuitization for married individuals. Specifically, we assume that the household utility function is simply the equally weighted sum of two spousal sub-utility functions:

$$U_{s,\sigma}^{couple}\left(C_{t,s}^{m}, C_{t,\sigma}^{f}, F_{t,s}^{m}, F_{t,\sigma}^{f}\right) = U_{s}^{m}\left(C_{t,s}^{m}, F_{t,s}^{m}\right) + U_{\sigma}^{f}\left(C_{t,\sigma}^{f}, F_{t,\sigma}^{f}\right)$$

where superscripts m and f denote the male and the female in the household, s subscripts the husband's care stat, and σ the wife's care state. We further assume that $U^m=U^f$, i.e., that the functional form of the sub-utility functions are both CRRA utility functions with the same risk aversion coefficient.

The assumption of equal weighting and identical functions (e.g., same risk aversion for husband and wife) of the two sub-utility functions implies that couples will always try to divide household consumption equally when both spouses are alive. Following Kotlikoff and Spivak, we assume no economies of scale in consumption so that $1 of household consumption divided equally between the spouses results in $C_t^m = C_t^f = .5$. The exception is that consumption from care $F_{s,t}$ enters into the utility function only of the spouse receiving care. If, for example, the husband is in care where $F_{s,t}>0$, and the wife is at home receiving no care, then the household will optimally allocate all household consumption to the wife until she reaches a consumption level $C_t^f = F_{s,t}$, and then above this level, the spouses will evenly share any remaining consumption. When one spouse dies, the utility function of the couple reverts to that of the surviving spouse.

Because there are 5 states of care for each spouse, there are now effectively 25 states of care for the couple, and thus the Bellman equation (equation 1) must sum over all 25 possible transitions across states of care. The wealth accumulation equations with and without Medicaid (equations 2 and 3) are the same, except that all variables now refer to expenditures for the entire household. For example, $X_{s,\sigma,t}$ refers to total long-term care expenditures for the couple. Moreover, the Medicaid asset and income requirements ($\underline{C}_{s,\sigma}$ and $\underline{W}_{s,\sigma}$) will now vary depending on the care state of both spouses.

For the household model, Medicaid's rules depend on the joint care status of the husband and wife. If only one spouse is receiving Medicaid, the non-Medicaid spouse is permitted to keep an additional $2000 per month in income and $16,000 of financial wealth, over and above the amounts allowed in the case of a single individual. As such, the couple has an effective $\underline{W}$ of $18,000 and an effective $\underline{C}$ of $2,030 if one spouse is institutionalized and the other is receiving no care. If both spouses are receiving Medicaid, the effective asset and income limits are simply the sum of the two separate individual limits.

For this joint-decision making model, we use the wealth distribution constructed from the sample of married households with at least one spouse age 65 in the 1996, 1998 or 2000 Health and Retirement Survey (HRS). We consider the willingness to pay for the couple to have both of them insured. Empirically this seems to relevant case since empirically within-couple ownership is highly correlated; although only 10 percent of the elderly have long-term care insurance, 60 percent of individuals whose spouses have long-term care insurance also have this insurance (Finkelstein and McGarry, 2003).

As already noted, the net result of this alternative modeling approach is that our core findings remain. Specifically, 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.

Table B1: Sensitivity analysis

	Men					Women				
Specification	WTP for $100 daily benefit, current market load	WTP for no daily benefit and 0 load	Share of EPDV of LTC Paid by Mcaid (No Private Ins)	WTP for policy to cover expend. not covered by Medicaid (no load)	Implicit Tax	WTP for $100 daily benefit, current market load	WTP for no daily benefit and 0 load	Share of EPDV of LTC Paid by Mcaid (No Private Ins)	WTP for policy to cover expend. not covered by Medicaid (no load)	Implicit Tax
1. Base Case	**-11.4**	**-2.7**	**0.60**	**19.6**	**0.594**	**-11.5**	**-35.8**	**0.72**	**29.3**	**0.767**
2. State dependent utility[1]	-12.1	-7.5	0.60	13.76	0.583	-12.5	-41.2	0.72	19.63	0.778
3. Consumption value from HHC[2]	-19.8	-12.5	0.62	8.94	0.668	-19.3	-45.3	0.72	14.25	0.827
4. Consumption value from Medicaid-funded HHC is half that from privately-funded HHC[4]	-18.4	-11.0	0.59	10.17	0.603	-17.7	-43.9	0.70	15.69	0.796
5. Above + cons. value of Medicaid-funded institutional care is also half that from privately-funded care[5]	-13.0	10.6	0.55	34.85	0.616	-10.3	-14.8	0.66	64.21	0.752
6. CRRA Bequest Motive	-10.9	-2.0	0.59	20.53	0.595	-11.1	-35.0	0.72	31.05	0.764
7. Do not want to be a burden on family members[3]	-17.0	-9.4	0.56		0.528	-12.7	-39.7	0.61		0.567
8. Household Joint Decision Making Model	-42.9	-73.8				-42.9	-73.8			

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. For household model (row 8) results for men and women are the same as household includes one of each. 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] $F_{hhc,t} = X_{hhc,t}$ for expenditures paid by private insurance; $F_{hhc,t} = 0$ otherwise. See text for further details.

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

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