Why is the Market for Long-Term Care Insurance So Small?

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Abstract: Long-term care represents one of the largest uninsured financial risks facing the elderly in the United States. We present evidence of supply-side market failures in the private long-term care insurance market. In particular, the typical policy purchased exhibits premiums marked up substantially above expected benefits. It also provides very limited coverage relative to the total expenditure risk. However, we present additional evidence suggesting that the existence of supply-side market failures is unlikely, by itself, to be sufficient to explain the very small size of the private long-term care insurance market. In particular, we find enormous gender differences in pricing that do not translate into differences in coverage, and we show that more comprehensive policies are widely available, if seldom purchased, at similar loads to purchased policies. This suggests that factors limiting demand for insurance are also likely to be important in this market. Our evidence also sheds light on the likely nature of these demand-side factors.

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1. Introduction

Long-term care expenditures represent one of the largest uninsured financial risks facing the elderly in the United States. At $135 billion in 2004, expenditures on long-term care represent 8.5% of total health expenditures for all ages and about 1.2% of GDP (Congressional Budget Office 2004). These expenditures are unevenly distributed among the elderly population (Dick et al. 1994, Murtaugh et al., 1997). Standard insurance theory suggests that the random and costly nature of long-term care makes it precisely the type of risk for which risk averse individuals would find insurance valuable.

Yet most of the expenditure risk is uninsured. Only 4 percent of long-term care expenditures are paid for by private insurance, while one-third are paid for out of pocket (CBO, 2004). By contrast, in the health sector as a whole, private insurance pays for 35 percent of expenditures and only 17 percent are paid for out of pocket (National Center for Health Statistics, 2002). The limited insurance coverage for long-term care expenditures has important implications for the welfare of the elderly, and potentially for their adult children as well. Its importance will only become more pronounced as the baby-boomers age and as medical costs continue to rise.

An extensive theoretical literature has proposed a host of potential explanations for the limited size of the private long-term care insurance market. On the demand side, limited consumer rationality – such as difficulty understanding low-probability high-loss events (Kunreuther, 1978) or misconceptions about the extent of public health insurance coverage for long-term care – may play a role. Demand may also be limited by the availability of imperfect but cheaper substitutes, such as the public insurance provided by the means-tested Medicaid program, financial transfers from children, or unpaid care provided directly by family members in lieu of formal paid care (Pauly, 1990). On the supply side, market function may be impaired by such problems as high transactions costs, imperfect competition, asymmetric information, or dynamic problems with long-term contracting. Norton (2000) provides a detailed review of this theoretical literature.

Yet despite this extensive theoretical literature, we have extremely little empirical evidence on the nature of the private long-term care insurance market, let alone on which of the various theories for its limited size may be empirically relevant. For example, concerns about perceived high prices in this market have recently motivated the introduction of generous tax subsidies to long-term care insurance at both the federal and state level (Wiener et al., 2000; Cohen and Weinrobe, 2000). Proposals to further expand these subsidies are under discussion (Lewis et al., 2003). Yet we know of no evidence on whether prices are substantially above actuarially fair levels in this market, let alone the role of prices in explaining the market's limited size.

In this paper, we therefore provide what are to our knowledge the first empirical estimates of the pricing and benefit structure of long-term care insurance policies. We also show how this evidence can be used to shed light on what factors may be limiting the size of this market. We begin with the insight that it is possible to learn about the existence of supply side market imperfections by studying the characteristics of the insurance policies that are offered and purchased in the private market. In particular, we argue that the major potential supply side market failures have at least one of two empirical implications. First, prices will be higher than actuarially fair levels. Second, available contracts will offer a constrained set of benefit options that are less than fully comprehensive; we refer to this as "quantity rationing."

We find that prices are marked up substantially above actuarially fair levels, which indicates the existence of supply side market imperfections. Our central estimate is that this typical policy purchased by a 65-year old (about the average age of purchase) and held until death has a load of 0.18; in other words, the buyer will on average get back only 82 cents in expected present discounted value benefits for every dollar paid in expected present discounted value premiums. This load is substantially higher than the typical load of 0.06 to 0.10 on purchased acute health insurance policies (Newhouse, 2002). The load is even higher if one accounts for the fact that many policies are not held until death. Individuals often stop paying premiums at some point after purchase, and therefore forfeit any right to future benefits. Because the premium profile of these policies is heavily front-loaded, especially relative to benefit payments, accounting for the tendency to forfeit policies raises our estimate of the average load considerably, from 18 cents on the dollar to 51 cents on the dollar.

Although these high loads indicate the presence of supply-side market failures, we present additional evidence that suggests that these market failures are not sufficient to explain the limited market size. We find enormous differences in loads based on gender, yet these large pricing differentials do not translate into differences in coverage. For example, from the perspective of an individual who holds the policy until death, our central estimate is that the load for a man is almost 50 cents higher, per dollar of premium, than the load for a woman. Yet men and women are virtually indistinguishable in their typical insurance coverage. This cannot be explained solely by high within-household correlation in coverage decisions, as less than half of policies are held in married households in which both spouses are insured. We suggest that the similarity in coverage by gender despite dramatically different loads points the existence of important demand-side factors that reduce the demand for insurance for women relative to that for men. We discuss the implications of this insight for the potentially large role of the public Medicaid program in constraining demand for long-term care insurance by imposing a larger "implicit tax" on private insurance purchases by women than by men.

With regard to benefit quantities, we estimate that the typical policy purchased by a 65-year old and held until death covers only about one-third of the expected present discounted value of long-term care expenditures. However, we also find that insurance companies offer more comprehensive policies, at similar loads to less comprehensive policies, which cover over 90 percent of all long-term care expenditures. This suggests that "quantity rationing" is not a significant problem in this market.

The paper proceeds as follows: In section 1, we show how information on the pricing and comprehensiveness of policies can provide information on the extent of supply-side market failures. Section 2 provides descriptive statistics on the structure and pricing of long-term care insurance policies. Section 3 describes the analytical framework we develop for estimating the pricing load and the benefit comprehensiveness of private long-term care insurance contracts. Section 4 describes the data actuarial data on long-term care expenditure risk and the market-wide survey data on the characteristics of typical policies that we use to implement these frameworks. In section 5, we provide our central empirical estimates of loads and comprehensiveness of typical policies purchased. In section 6, we provide suggestive evidence that, despite the existence of supply side market imperfections, they are unlikely to be sufficient to explain the limited the size of the market. We also briefly discuss the implications of our findings for the types of demand-side factors that are likely to be important in limiting demand for private insurance. Section 7 concludes.

1. Empirical Tests for Supply-Side Market Failures

There are four major supply-side market failures that have been proposed as candidates to explain the limited size of the private long-term care insurance market: transaction costs, imperfect competition, asymmetric information, and dynamic contracting problems. We draw on the insight that each one has at least one of two empirical implications. First, the price of private insurance will exceed actuarially fair levels. Second, policies will be quantity-rationed through some form of benefit limitation. In other words, individuals may be willing to purchase more comprehensive policies at existing loads, but such policies are not offered. Of course, anything that raises prices above actuarially fair levels may, by reducing the quantity demanded, contribute to an equilibrium with limited quantities. However, we reserve the term "quantity rationing" for situations in which individuals demand more comprehensive benefits at existing prices but such policies are not available in the market.

Both transaction costs and imperfect competition can raise prices above expected benefits. Transactions costs may stem from the unavoidable costs of insurance sales and claim processing. They may be exacerbated by imperfection competition (e.g., a form of X-inefficiency) or by the cost of gathering and verifying detailed health information to try to reduce any information asymmetries. While transaction costs or imperfect competition, by raising prices, may reduce the quantity of insurance demanded in equilibrium, neither will produce quantity rationing per se.

Asymmetric information – in the form of adverse selection or moral hazard – may produce marked up prices, quantity rationing, or both. If the population of insured individuals is above-average risk relative to the general population, asymmetric information will raise the price of insurance above the actuarially fair price for the population as a whole. Quantity rationing may take the form of an unraveling of the insurance market for which no interior equilibrium price exists (e.g. Akerlof, 1970, Stiglitz and Weiss

1981); it may also occur on the intensive margin through the use of co-payments and deductibles that limit the amount of insurance provided to at least some individuals (e.g. Rothschild and Stiglitz, 1976).

One type of dynamic contracting problem that may raise prices is if individuals learn new information about their risk type over time. Absent the ability of individuals to commit to not renegotiate, this produces dynamic selection of good risk types out of a contract over time (Hendel and Lizzeri, 2003). Since insurance contracts therefore on average retain an adversely selected risk pool, this type of dynamic selection can also raise prices above the actuarially fair price for the population as a whole.

Another type of dynamic contracting problem arises if there is a component to the insured risk that cannot be diversified cross-sectionally through the pooling of idiosyncratic risk. Cutler (1996) has argued that a substantial component of long-term care expenditure risk is the intertemporal aggregate risk of increased long-term care costs. This aggregate risk may raise prices if companies charge a risk premium to cover the cost of bearing this aggregate risk (Froot, 1999). Aggregate risk could also lead to quantity rationing as a way of limiting the insurer's exposure; for example, companies may limit policies to cover only the idiosyncratic component of long-term care expenditure risk by capping the dollar amount of payment per day in care (Cutler, 1996).

2. Descriptive Statistics on the Long-Term Care Insurance Market

2.1 Ownership and structure of private insurance contracts

Table 1 presents statistics on private long-term care insurance ownership rates among individuals aged 60 and over from the 2000 Health and Retirement Survey. Only 10.5 percent of these individuals have private long-term care insurance. Coverage rates are slightly higher for women than men (10.7 percent vs. 10.1 percent) and higher for married than single individuals (11.8 percent vs. 8.4 percent). Coverage rates increase substantially with wealth, from 2.8 percent in the bottom wealth quartile to 19.6 percent in the top quartile, which may be due in part or in whole to the means-tested eligibility requirements of Medicaid, which make it a better substitute for private insurance for lower wealth individuals. There is no clear ownership pattern by age. These basic ownership patterns also emerge in other survey data (see HIAA, 2000a and Cohen, 2003).

A survey of buyers conducted by LifePlans Inc. in 2000 indicates that the average age of buyers is 67, and is similar for men and women (68 and 66 respectively). The gender-mix of buyers (55 percent female) is the same as the gender-mix of the population in the relevant age range. Like owners, buyers are more likely to be married and are of substantially higher socio-economic status than the general population of their age.[1]

The buyer survey also provides information on the characteristics of typical policies purchased in 2000. These characteristics are similar for men and women, or if anything provide slightly less comprehensive coverage for women. Over three-fourths of purchased private policies are designed to cover expenditures on home care as well as nursing home care. Most policies have a deductible that specifies the number of days, typically from 30 to 100, that the individual must be receiving care before benefit payments can begin. Policies also specify a maximum "benefit period" which limits the total number of days the individual may receive benefits for expenditures during the lifetime of the policy. Limits of 1-5 years are often specified, although almost one-third of all policies have unlimited "lifetime" benefit durations.

A feature of long-term care insurance contracts that distinguishes them from other health insurance contracts is the use of a maximum daily benefit that the policy will pay per day in covered care. The average maximum daily benefit purchased for nursing home care in 2000 was $109; the modal benefit was $100. About 60 percent of policies specify a constant nominal maximum daily benefit, while the remainder specify that it will escalate at a pre-set nominal rate such as 3 or 5 percent.

The vast majority (about 80 percent) of private long-term care insurance contracts are sold through the individual, non-group market (HIAA 2000b).[2] Policies are written for a single individual. "Joint" policies that insure both members of a couple are not offered in the non-group market.

[1] For more details on the buyer survey see the description in HIAA (2000a). This contains all of the statistics referred to except the average age of purchase by gender, which is based on a custom tabulation done by LifePlans, Inc. at the request of the authors.
[2] All of the statistics in this paper are based on the non-group market, with the exception of the statistics from the HRS (which does not distinguish the source of the insurance) and national estimates from the CBO (2004).

Regulation is minimal. In particular, there are no restrictions on the characteristics that may be used in pricing, the level of pricing, or who must be offered insurance. The only significant regulations, which we discuss in more detail below, are designed to reduce the chance that premiums will need to be raised in the future to cover claims (NAIC 2002a, 2002b, Lewis et al., 2003).

2.2 The pricing of long-term care insurance contracts

We have market-wide premium data for long-term care insurance policies in 2002. The data were collected in March 2002 by Weiss Ratings, Inc, in their annual survey of all known companies in the United States that sell long-term care insurance. The responding companies include, among others, all of the top five sellers of long-term care insurance policies; these sellers alone account for two-thirds of industry sales (LIMRA, 2002). We use these data to calculate the loads and comprehensiveness of typical purchased policies and other widely available policies.

Policy premiums vary at purchase only with age, and with one of three broad, health-related rate categories: preferred, standard or extra-risk. The majority of buyers tend to quality for the “standard” rate (ALCI, 2001; Weiss, 2002). Premiums do not vary by gender. Policies are guaranteed renewable and are not experience rated for the individual if he experiences a change in health. Premiums are paid on a periodic (usually annual) basis and are pre-specified at a constant, nominal level.

Weiss asks each company to report the “standard” premium for four common policy “scenarios” which they choose to be representative of the entire range of products available. All policies pay a $100 daily benefit and all cover facility care (i.e. nursing home and assisted living facilities). They differ in whether they cover home health care, their deductible, and the length of the benefit period. For each scenario, Weiss reports premiums for policies with a constant maximum daily benefit of $100 per day, and policies whose maximum daily benefit starts at $100 but escalates at 5% per year in nominal terms.

Table 2 presents descriptive information on annual median premiums in 2002 by age for scenarios 1 through 4 (benefit generosity increases with scenario number). The scenario 2 policy – which covers facility and home care with a constant nominal $100 daily benefit, a 60-day deductible, and a 4 year benefit period – is slightly more comprehensive than the typical policy purchased.[3] The median annual premium for this policy for a 65-year old is nearly $1,200. The same policy costs $2,140 annually if the maximum daily benefit escalates at a nominal rate of 5% per year. Premiums also rise sharply with age, with over a ten-fold premium increase from age 55 to age 85.

There is evidence of substantial price dispersion across companies, as is common in many other insurance markets (e.g. Dahlby and West 1986, Brown and Goolsbee 2002 and Mitchell et al., 1999). For example, for the scenario 2 policy with constant nominal benefits, although the median annual premium for a 65 year old is nearly $1,200, premiums range from a low of $1,016 to a high of $2,010 (not shown).

3. Analytical Framework for Estimating Loads and Comprehensiveness

We define the load, or price, on an insurance contract as the difference between unity and the ratio of the expected present discounted value (EPDV) of benefits to the EPDV of premiums. The higher the load, the lower the expected return for the premium; an actuarially fair policy has a load of 0.

The load for a simple policy with no deductible and an unlimited benefit period is given by:

$$\text{Load} = 1 - \frac{\text{EPDV(Benefits)}}{\text{EPDV(Premiums)}} = 1 - \frac{\sum_{t=0}^{T}\sum_{s=1}^{5}\left(\dfrac{Q_{t,s}\min\{X_{t,s}, B_{t,s}\}}{\prod_{j=0}^{t}(1+i_j)}\right)}{\sum_{t=0}^{T}\sum_{s=1}^{5}\left(\dfrac{Q_{t,s}P_s}{\prod_{j=0}^{t}(1+i_j)}\right)} \qquad (1)$$

All financial inputs are specified in nominal terms. The index *t* denotes calendar time in monthly increments, with purchase occurring at *t=0*. The index *s* denotes the state of care that the individual is in; we allow for five states of care: 1) receiving no paid care, 2) receiving paid home care, 3) residing in an assisted living facility, 4) residing in a nursing home, and 5) dead. The middle three states involve long-term care expenditures. $Q_{t,s}$ denotes the probability of being in health state s at time t, given that the

[3] Data on typical purchased policies in 2000 are based on the LifePlans buyer survey and on the policies sold by a large long-term care insurance company, which is described in Finkelstein and McGarry (2006).

individual was out of care at the age of purchase (a requirement of most policies).[4] The per-period benefits are the minimum of per-period care expenditures $(X_{t,s})$ and the maximum per-period benefit amount $(B_{t,s})$. Per-period nominal insurance premiums are denoted by P_s; these vary with the state of care (s) because an individual does not pay premiums when receiving benefits, but are constant over time. Finally, i denotes the nominal short-term interest rate used to discount from period t back to period t-1 (with $i_0 = 0$). While equation (1) omits deductibles and maximum benefit periods from the formula for notational simplicity, we account for such features when calculating the loads for actual policies below.

The comprehensiveness of a policy measures the expected share of long-term care expenditures that it covers; we therefore define comprehensiveness as the ratio of the EPDV of benefits from a policy to the ratio of the EPDV of total care expenditures for which the individual is at risk. For a simple policy with no deductible and an unlimited benefit period, the comprehensiveness formula is therefore:

$$\text{Comprehensiveness} = \frac{\displaystyle\sum_{t=0}^{T}\sum_{s=1}^{5}\left(\frac{Q_{t,s}\min\{X_{t,s},B_{t,s}\}}{\prod_{j=0}^{t}(1+i_j)}\right)}{\displaystyle\sum_{t=0}^{T}\sum_{s=1}^{5}\left(\frac{Q_{t,s}X_{t,s}}{\prod_{j=0}^{t}(1+i_j)}\right)} \tag{2}$$

Once again, this is easily adapted to account for deductibles or benefit duration limits.

4. Data Sources

We use the 2002 Weiss data described in Section 2.2 for information on premiums $(P_{t,s})$ and benefits $(B_{t,s})$. This section describes the data for the remainder of the necessary inputs.

4.1 Data on care utilization $(Q_{t,s})$

[4] In practice, we use age- and gender-specific care utilization probabilities but for notational simplicity we have suppressed the gender subscript and use calendar time *t* to reflect the aging of the individual.

One of the most important inputs for our analysis is the distribution of long-term care utilization risk. We require information not only on nursing home utilization – for which there currently exist many published studies (e.g. Dick et al. 1994, Kemper and Murtaugh, 1991, Murtaugh et al. 1997) – but also information on utilization of assisted living facilities and home health care, both of which are covered by most private insurance policies. We must also be able to distinguish between episodes of care that would be eligible for insurance reimbursement, based on the health of the individual, and those that would not.

To meet these requirements, we use an actuarial model of health and care utilization transition probabilities that is widely used by insurance companies to price long-term care insurance policies, as well as by insurance regulators, state agencies administering public long-term care benefit programs, and the Society of Actuaries LTC Valuation Methods Task Force (Robinson, 2002). Appendix A provides a more in-depth discussion of the data and estimation methods behind the actuarial model. It also shows that, where comparisons are possible, the model produces estimates similar to those in the literature. It is our belief that this model is the best source of available information on utilization to use in examining the pricing and comprehensiveness of private policies.[5]

For our analysis, we consider only reimbursable care utilization, which means that the individual must satisfy the health-related "benefit triggers" used by Medicaid and the vast majority of private policies; these require that for care to be reimbursable, the individual must either need substantial assistance in performing at least 2 of 6 activities of daily living (ADLs) and assistance must be expected to last at least 90 days, or the individual must require substantial supervision due to severe cognitive impairment (Wiener et al., 2000, LIMRA 2002, Stone 2002). We also limit the sample of 65 year olds to the over 98 percent who have no limitations to ADLs and are not cognitively impaired, and therefore would be eligible to purchase private insurance (Murtaugh et al. 1995, Finkelstein and McGarry, 2006).

The model produces utilization probabilities that are representative of the entire population. We do not make adjustments for differences between the insured and general population because their long-term

[5] This was corroborated by conversations with numerous actuaries in consulting firms, insurance companies, and the Society of Actuaries who confirmed that the model is widely used.

care utilization rates are quite similar (Society of Actuaries 2002, Finkelstein and McGarry 2006). The estimates are therefore representative of the insured population as well. Also, consistent with standard practice for the industry (e.g. Tillinghast-Towers Perrin 2002, and conversations with several actuaries) as well as for academic research (e.g. Wiener et al. 1994), the estimates do not incorporate any projected changes in morbidity or care utilization.[6]

We use this model to generate age and sex specific probabilities of being in each of the five states of care (no care, home health care, assisted living facility, nursing home, or death) for each month from age 65 to age 105. These are the $Q_{t,s}$ inputs in equations (1) and (2); for home health care episode, the model also produces estimates of the number of hours in care each week. Table 3 shows these unconditional probabilities of being in each type of care (and meeting the benefit-triggers) at different ages and genders for an individual who begins at 65 out of care and healthy enough to be eligible to purchase private insurance.[7] Utilization rates are substantially larger for women than for men. For example, a 65-year old woman has a 44 percent chance of ever using nursing home care during her lifetime, compared to a 27 percent chance for a 65 year old man. Women (men) who enter a nursing home spend on average 2 (1.3) years there. Gender differences for home health care or assisted living facility utilization are comparable.[8]

These gender differences in part reflect the fact that women on average live longer than men, and conditional on survival, care utilization increases sharply with age (see Table 3). However, there are also differences in utilization conditional on longevity; for example, we estimate that among individuals who survive until age 80, women have about a 40 percent higher chance than men of having used a nursing home by age 80. Such differences likely reflect underlying health differences between men and women, as well as the lower probability for an elderly woman than an elderly male of receiving unpaid care from a spouse in lieu of formal, paid care (Lakdawalla and Philipson, 2002).

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[6] This practice may reflect 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., 2004) or in care utilization conditional on morbidity (compare e.g. Lakdawalla and Philipson 2002 to CBO 1999).

[7] For ease of exposition only, we report these utilization probabilities in 5-year increments rather than the monthly estimates that we use for greater precision in our calculations.

[8] See Brown and Finkelstein (2004a) for these and other summary statistics not reported in Table 3.

4.2 Other inputs

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 data (MetLife, 2002a; MetLife, 2002b).[9] The average daily cost of nursing home care in 2002 is $143 per day for a semi-private room. Average costs for an assisted living facility are about half that, at $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 (U.S. Congress, 2000). Using the data on hours of home health care use described above, 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 project forward these estimates of 2002 long-term care costs using the general consensus that, since the primary cost for all of these types of care is the labor input, they will grow at the rate of real wage growth (Wiener et al., 1994, and conversations with industry officials). We use the Wiener et al. (1994) and Abt (2001) assumption of 1.5 percentage point annual real growth in care costs for our base case, although we also examine the sensitivity of our findings to assumptions about higher real cost growth (the 3 percent assumption used by Mulvey and Li, 2002 and CBO, 1999) and lower real cost growth (the 0.75 percent "lower bound" assumption used by Abt, 2001). To put cost growth into nominal terms, we apply expected rates of inflation as of March 2002, the date of the Weiss pricing survey, calculated using the yield differential between nominal U.S. Treasury securities and TIPS.

For the nominal interest rates (i_t), we use the term structure on yields of U.S. Treasury strips from this same date in our base case. In the analysis below we examine the sensitivity of our findings to using the corporate term structure instead of the Treasury term structure for discounting.

4.3 The impact of public insurance on load and comprehensiveness estimates

[9] These data were collected in order to determine pricing for the new federal long-term care insurance program. They cover all 50 states and the District of Columbia. We use national average costs because insurance companies do not vary premiums with location. Using a restricted access version of the 2000 Health and Retirement Survey (HRS) that includes each individual's state of residence, we found no evidence of a statistically or substantively significant correlation between the average daily nursing home cost in the state and the probability of holding long-term care insurance.

Medicaid, the public health insurance program for the indigent, pays for about one-third of long-term care expenditures (CBO, 2004). However, Medicaid has no effect on our estimates of policies' loads or comprehensiveness, since it is a secondary payer; if the individual has private long-term care insurance, the private policy pays whatever benefits it owes before Medicaid makes any payments. Our load estimate therefore captures the *gross* return on the policy to the individual. This is also the relevant load from the insurance company's perspective for calculating expected profits from the sale of a policy. However, the *net* return to the individual will be lower than the gross return to the extent that the policy premium pays for benefits that would otherwise have been covered by Medicaid; we return to this point in section 6.3 below.

Medicare, the public health insurance program for the elderly, pays a much smaller portion of long-term care expenditures. Because Medicare is a primary payer, any care that is eligible for Medicare is not reimbursed by private insurance and is therefore not included in our estimate of per-period care expenditures $(X_{t,s})$. Specifically, we adjust home health care expenditures downward in estimating equations (1) and (2) to account for the fact that Medicare pays an estimated 35% of home health care costs.[10] Although Medicare covers some skilled nursing home care expenditures, very little of it would be otherwise eligible for private long-term care insurance benefits; it therefore does not affect our estimation of comprehensiveness or of loads, which are based on insurable expenses.[11]

5. Estimates of Loads and Benefit Comprehensiveness of Typical Purchased Policies

5.1 Basic results

Table 4 reports the estimated load and comprehensiveness of the typical policy purchased by a 65 year old. As discussed, this is a "scenario 2" policy with $100 constant nominal daily benefits, covering all three types of long-term care with a 60 day deductible and a 4 year maximum benefit period. The

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[10] Our estimate of 35% is based on the fact that Medicare covers 30% of all home health care expenditures (U.S. Congress, 2000), which is equivalent to 35 percent of benefit-eligible home health care.

[11] Medicare will cover up to 100 days in a nursing home (with a substantial co-pay after 20 days) *only* if they occur in a *skilled* nursing home within 30 days of hospital discharge. These criteria are designed to ensure that Medicare only covers stays that are for recovery from acute illness; by contrast, as discussed earlier, long-term care insurance benefit triggers require that there be little likelihood of recovery within 90 days (U.S. Congress, 2000).

results are shown using a unisex actuarial table because policies are sold on a unisex basis. The results are based on the "base case" assumptions discussed above.

The first row shows the results under the assumption that the policy is held (and therefore premiums are paid) until death. These indicate a load of 0.18. In other words, a 65 year old who purchases this policy receives, in expectation, only 82 cents in expected present discounted benefits for every dollar he pays in expected present discounted value premiums. This estimated load is roughly comparable to that found for life annuities which, for 65 year olds, are in the range of 13 to 15 percent (Brown, Mitchell and Poterba, 2002); like long-term care insurance, life annuities are also sold by life insurance companies to elderly consumers and have a relatively small market. The load for long-term care insurance is higher than the typical 6 to 10 percent load on acute group health insurance, although lower than the 25 to 40 percent loads on (much less commonly purchased) non-group acute health insurance (Newhouse, 2002).

Reasoning mainly by exclusion, we conclude that the 18 cent average load on a long-term care insurance policy is likely due to administrative costs and / or imperfect competition. If the aggregate risk of increased medical costs were a substantial contributor to the load (through an "uncertainty premium" imposed by insurance companies), we should expect to see loads decreasing with age since, at older ages, the time horizon for the contract – and hence the risk of an aggregate shock – is lower. Figure 1 however indicates that loads rise with age. Similarly, although there is evidence of adverse selection in the long-term care insurance market (Finkelstein and McGarry, 2006), selection effects cannot, on net, contribute to high loads relative to what would be actuarially fair for a typical person in the population since, as discussed, the average utilization of insured individuals is similar to that of the population as a whole.[12] By contrast, administrative costs are potentially large enough to explain all of the 18 cent load; although reliable estimates of administrative costs for long term care insurance do not exist, estimates of

[12] As discussed by Finkelstein and McGarry (2006), two types of individuals select into the long-term care insurance market: those with private information that they are higher risk than the insurance company would expect, and those with private information that they have high preferences for insurance. The latter are, ex-post, lower risk than the insurance company would expect. As a result of this offsetting selection effect, asymmetric information does not distort average prices above what would be actuarially fair for the population as a whole, although it may induce substantial allocative inefficiency relative to the first best, symmetric information benchmark.

administrative costs in the health insurance industry as a whole range from as low as 15 percent (Cutler and Zeckhauser, 2004) to as high as 40 percent for individual / small group policies (Council of Economic Advisers, 1994). Imperfect competition may also contribute to the estimated loads, as the market for long-term care insurance is fairly concentrated; the top company (G.E.) accounts for one-quarter of market sales and the top five companies account for two-thirds of the market (LIMRA, 2002).

The results in Table 4 also indicate that the typical policy purchased by a 65 year old and held until death will cover only about one-third (34 percent) of the individual's expected present discounted value of long-term care expenditures. The limited coverage is due primarily to the presence of the $100 constant nominal daily benefit cap. This is because, at $143 per day for a semi-private room, current nursing home costs already exceed the $100 daily benefit cap. Moreover, by the average time of care utilization almost 20 years hence for a 65 year old purchaser, the $100 daily benefit cap will cover only one-third of his daily nursing home costs. We estimate that removing the daily benefit cap on reimbursements increases the comprehensiveness estimate to two-thirds. By contrast, eliminating both the deductible and maximum benefit period while keeping the $100 daily benefit cap increases comprehensiveness to only one-half.

We have thus far estimated loads and comprehensiveness from the perspective of an individual who buys a policy and pays premiums until death. In practice, however, about 7 percent of policies each year terminate (a.k.a. "lapse") due to failure to pay the regularly scheduled premiums, resulting in the forfeiture of any future benefits (Society of Actuaries, 2002, Merlis, 2003).[13] We therefore also estimate loads and comprehensiveness under the assumption that the individual faces the insured-population average probability of terminating the policy each year. For this calculation, we use the time-profile on termination-rates for non-group policies from the Society of Actuaries' (2002) survey of the experiences of major long-term care insurance companies.

The second row of Table 4 shows the results. Accounting for this termination activity raises the estimate of the load to 0.51, almost a 3-fold increase over the base case, and reduces the comprehensiveness to 0.13. The large effect of termination behavior on the load arises because premiums

[13] Fewer than 3 percent of the policies in the Weiss data provide any benefits after a policy lapses

are constant over time in nominal terms (therefore falling in real terms) while the probability of care use among surviving individuals is rising over time with age, as is the real cost of nursing home care.

The reasons for these policy terminations are not well understood. Market failures may play role; (Finkelstein et al., 2005) find evidence that terminations in part reflect dynamic selection out of the insurance market of individuals who turn out to be lower risk than expected at purchase.[14] Terminations may also reflect sub-optimal behavior from consumers of limited rationality, as well as uninsured income or expenditure shocks that make individuals unable to meet their premium obligations.

5.2 Sensitivity to alternative assumptions

Table 5 reports the sensitivity of our load and comprehensiveness estimates to alternative assumptions. Under any of the alternative assumptions, the basic finding remains that loads are substantial and the comprehensiveness is far from complete. Depending on the assumption, loads on policies held until death range from 11 to 27 cents, while loads that account for empirical termination probabilities range from 48 to 55 cents; comprehensiveness on policies held until death ranges from 28 to 38 percent. While we therefore hesitate to put too much emphasis on any given point estimate, the results of the sensitivity analysis increase our confidence in our fundamental conclusion that the typical policies purchased exhibit above-actuarially fair pricing and substantially limited benefits.

Our estimates change in a predictable manner as we change various assumptions. Use of the higher term structure from BAA corporate bonds instead of U.S. Treasury strips (row 2) increases the load because, as discussed, premiums are front-loaded relative to benefits; comprehensiveness increases because factors such as a fixed nominal daily benefit mean that the ratio of insured to total expenditures is higher in earlier years. Higher real cost growth (row 3) lowers the load and the comprehensiveness; the reverse is true for lower real cost growth (row 4). The effect of the cost growth assumption is tempered however, by the presence of the $100 constant nominal benefit cap, since cost growth above the cap does

[14] Because the data indicate that insure individuals have the same utilization rates as the general population (Society of Actuaries 2002, Finkelstein and McGarry 2003), and because our estimates of loads and comprehensiveness are based on the population that retains their insurance, we make no further adjustments to the utilization probabilities to account for selective termination.

not affect the load estimates. Given the evidence of price dispersion discussed above, we also estimated loads based on the median premium offered by the top five companies (row 5); the load is essentially the same for this more limited sample. Finally, since many companies provide a 10 percent spousal discount if both members of the couple purchase a policy, the last row shows the estimated impact of such discounts on loads. The impact is substantially below 10 percent since, even under the generous assumption that all policies held in households in which both spouses are covered received the discount, just under half of policies would receive the discount. The load for a policy held until death falls to .14 for policies held for life, and .48 once lapse rates are considered.

One factor that is not explored in Table 5 that would raise the effective load about our estimates is the risk that premiums on existing policies may be raised in the future (or relatedly, that the company may go out of business). Companies can raise premiums on an entire block of business if actuarially warranted. There have been several well-publicized cases of dramatic rate increases (and at least one class action suit). These motivated new regulations designed to reduce the risk of rate increase; however, by 2002 less than half of the states had adopted them and the extent of enforcement is unclear (Lewis et al. 2003, Kofman and Thompson, 2004, NAIC 2002b, Lutsky et al. 2002). Unfortunately, reliable data are not available on the historical prevalence of such rate increases, let alone their predicted future incidence.

6. Are Supply Side Problems Alone Sufficient to Explain the Limited Private Market?

The preceding results indicate that most policies purchased in the private market are priced well in excess of actuarially fair levels and provide only very limited coverage. As discussed, these results are suggestive of private market failures. In this section, however, we present several pieces of evidence suggesting that such private market failures cannot, by themselves, explain the limited private market.

6.1 Can above actuarially fair pricing by itself explain the limited market size?

Thus far we have estimated the loads on a unisex basis. Although pricing does not vary by gender, long-term care utilization does (see Table 3). As a result, Table 6 indicates a striking disparity in loads by gender. Under our base case assumptions, we estimate that the typical load for a 65 year-old male is 44 cents on the dollar, which means that the typical male who purchases a long-term care insurance policy can expect to receive only 56 cents in benefits for every dollar spent in premiums. By contrast, the premiums are actually better than actuarially fair for the typical woman, with loads of -0.04. In other words, a 65 year-old woman would receive $1.04 in EPDV benefits for every dollar paid in EPDV premiums.[15]

The other rows in Table 6 show the results under alternative assumptions. The base case finding that the premiums are better than actuarial fair for the typical woman hold under many, but not all, alternative assumptions. We therefore hesitate to place too much emphasis on the "better than actuarially fair" result for women. However, a very robust relation is the substantial *difference* in loads between men and women, which persists under *all* of the alternative assumptions. This difference ranges from 25 cents to 50 cents depending on the exact assumption.

Despite the enormous differences in loads by gender estimated in Table 6, coverage rates are remarkably similar by gender. As discussed above in section 2.1, the probability of having insurance is only slightly higher for women than for men and policies purchased by women tend to be slightly less comprehensive than those purchased by men. The substantial gender disparities in loads combined with substantial similarities in coverage patterns by gender suggest that above actuarially fair pricing cannot by itself fully explain the small size of the private long-term care insurance market. It also suggests that there must be some other demand side factor that raises the *effective load* faced by women relative to that faced by men, otherwise we would expect to see such large load differences translate into large differences in coverage. We will discuss one possible such demand-side factor below.

We consider several possible alternative explanations, other than demand-side factors that raise the effective load for women, for the similarity in coverage by gender despite substantial differences in loads and find that they are not compelling. One possibility is that since loads increase with age, if women tend to purchase at later ages than men, they might conceivably face more similar loads than we have estimated. However, evidence from the LifePlans buyer survey indicates that age of purchase is similar –

[15] The average unisex load is not simply the average of the male and female load because the unisex pricing approach implicitly places more weight on woman, due to her higher rates of utilization and survival.

and if anything slightly higher – for men than women (68 compared to 66). Another possibility is that, as discussed above, the risk of future rate increases, while difficult to quantify, may increase the effective load substantially above our estimates. However, this risk should not differentially affect the estimates of load by gender, particularly since men and women purchase at approximately the same age, and average age of care use (conditional on any use) is also similar.

Finally, there may be high within-household correlation in coverage decisions (even though policies are sold separately on each life). However, our reading of the data is that while there is positive within-household correlation in ownership, it is not sufficient to explain the similarity in coverage that we observe by gender. We looked in the 2000 HRS among individuals of prime buying ages (60 to 70). In married households in which one spouse has purchased insurance, the probability that the other spouse purchases insurance is only 60 percent. While this is substantially higher than the 11 percent probability of any married individuals having insurance, it also indicates that many married individuals make different purchase decisions than their spouse. Moreover, since only about 80 percent of policies are held by married (as opposed to single) individuals, overall just under half of all policies held in households in which both spouses are covered. In addition, in the 40 percent of married households in which one spouse has long-term care insurance and the other doesn't, just under half of the time the covered spouse is female, despite the fact that women face substantially lower loads than men. Finally, while it is hard to draw conclusions from the coverage patterns of most single individuals – since they might have been married when they purchased insurance – the evidence from the select sub-sample of never married individuals (just over 3 percent of the sample of 60-70 year olds) shows no evidence of higher ownership rates among women, even after controlling for the individual's wealth and age.

6.2 Are quantities rationed?

We discussed in Section One how several different market imperfection may produce quantity rationing instead of or in addition to marked up pricing. Of course, high loads may themselves limit demand for more comprehensive policies among those who purchase. However, we emphasize that the mechanism by which high loads limit the demand for more comprehensive policies is qualitatively different from quantity rationing. By "quantity rationing," we refer to situations in which individuals wish to purchase more comprehensive insurance at the existing prices, but such policies are not offered by the market.

Table 7 investigates whether quantities are rationed by examining the comprehensiveness and loads for a typical 65 year old for eight different policies that are widely available according to the Weiss data. Moving down the rows, the policies are increasing in comprehensiveness. To conserve space, we report results under the base case assumptions only; in results not reported, we find that all of the patterns discussed below remain present under the various alternative assumptions from Table 5. The results in Table 7 indicate that policies covering over 90 percent of the expected present value of long-term care expenditures are available.[16] Moreover, loads do not rise systematically with the comprehensiveness of the policy. The lack of a systematic pattern in loads pattern by comprehensiveness is consistent with evidence that there are no systematic differences in subsequent utilization across individuals who purchase more or less comprehensive policies (Finkelstein and McGarry, 2006).

The fact that nearly completely comprehensive policies are widely available at loads that are comparable to the much less comprehensive, commonly purchased policies is evidence against quantity rationing in this market. Nor is it likely the case that high loads simply limit demand more for more comprehensive policies. Were this true, we should see women purchasing more comprehensive policies than men. As discussed in section 2.1, however, available data by gender suggest that, if anything, women purchase less comprehensive policies than men.

There is, of course, a different form of quantity rationing that does exist in this market, namely, that individuals in observably poor health are often denied insurance coverage, at least by the larger insurance companies (Murtaugh et al., 1995; Weiss, 2002). The practice of denying individuals rather than offering them higher prices is interesting, especially given the absence of pricing regulation that would prevent

[16] Of course, as noted by Cutler (1996), a policy with a benefit cap of any sort does not cover the aggregate risk of dramatically increased nursing home costs. It is unlikely, however, that daily benefit caps primarily represent a means of rationing insurance coverage against such aggregate risk. The data indicate that older buyers – who due to the greater proximity of purchase age with expected care use face less aggregate risk than younger buyers –purchase lower daily benefit amounts than younger buyers (HIAA 2000a).

charging higher prices for these individuals. This practice is not unique to the long-term care insurance market and may reflect issues of reputation or brand name, or private market failures, such as asymmetric information, which may be more of a problem for people in observably worse health. However, this limited type of quantity rationing is unlikely to be a major factor in explaining the small size of the private long-term care insurance market. We estimate that only about 15 percent of individuals aged 60 to 70 in the 2000 HRS would be denied long-term care insurance if they applied.[17]

6.3 Implications for potential demand-side explanations

The existence of substantially different loads on long-term care insurance policies for men and women with no corresponding difference in insurance coverage provides a guide for distinguishing which potential demand-side factors are able to explain the limited size of the market. In particular, it suggests that either the price elasticity of demand for long-term care insurance is close to zero, or that demand-side factors must reduce the desirability of insurance for women substantially more than men to compensate for the very different loads.

We know of no evidence of the price elasticity of demand for private long-term care insurance, but it seems unlikely to be close to zero. Estimates of the price elasticity of demand for acute health insurance range considerably, from -0.6 to -1.8, but even the low end is bounded far from 0 (Cutler, 2002). Moreover, the very idea of relying on demand side factors to help explain the limited size of the private market requires that demand be responsive to the implicit price of insurance. The possible demand-side factors suggested by the theoretical literature – for example, underestimating the probability of needing care, the family as a source of unpaid care or informal insurance, or the public substitute offered by the Medicaid program – all reduce demand by increasing the effective, or net, price of insurance once these factors are accounted for.

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[17] This estimate is based on an examination of applications from the major long-term care insurance companies – as well as several of their underwriting guides – which indicates that insurance companies deny long-term care insurance coverage to individuals who have limitations with respect to activities of daily livings (bathing, eating, dressing, toileting, walking, and maintaining continence), use of mechanical devices (wheelchair, walker, crutches, quad cane, oxygen) or suffer from cognitive impairment. It is comparable to the ineligibility estimates found by other investigators using different data and methods. For example, Murtaugh et al. (1995) estimate that 12 to 23 percent of 65 year olds would be denied insurance if they applied.

One particularly promising demand-side explanation that has the potential to reduce the demand for women relative to men is the role of Medicaid. Medicaid may crowd out demand for private insurance by offering an imperfect but free substitute for private insurance. In separate work, we have estimated that Medicaid not only imposes a large “implicit tax” on the purchase of private insurance, but that this implicit tax is substantially higher for women than for men (Brown and Finkelstein, 2004b).

The Medicaid “implicit tax” arises because private insurance protect one’s assets, which in turn lowers the probability of meeting Medicaid’s means-tested asset eligibility threshold. In addition, even if an individual is Medicaid eligible, if he has private insurance the private insurance must pay first, with Medicaid only covering whatever expenses are not covered by the private policy. As a result, a large portion of the premiums paid for private insurance policies pay for benefits that simply replace benefits that would otherwise have been provided by Medicaid if the individual had not had private insurance. The implicit tax therefore raises the net, or effective, load on the policy about the gross loads we calculated above of the ratio of (gross) benefits paid out relative to the premiums paid in. However, from the perspective of individual demand what matters is the net load, which depends on the excess in benefits over the benefits that would have been received in the absence of the policy.

We estimate that Medicaid imposes a much larger implicit tax on private policies held by women than by men. This is because women have much higher expected lifetime utilization of long-term care, and thus, conditional on initial assets, have a higher probability of ending up on Medicaid and of receiving large amounts of Medicaid reimbursement. Medicaid therefore raises the net, or effective, load above the gross load more for women than for men. As a result, net loads are much more similar by gender than the gross loads reported in Tables 6 and 7.

Estimation of the Medicaid implicit tax and the net load on a policy depends on the consumption path chosen by the individual (since this consumption path will affect their assets and therefore their probability of Medicaid eligibility). It therefore requires specifying a utility function solving for the consumer’s optimal dynamic consumption behavior. Brown and Finkelstein (2004b) undertake such estimation and conclude that the net loads for women and men are very similar. For example, for a 65 year old at the median of the wealth distribution and a coefficient of relative risk aversion of 3, we estimate that starting from gross loads of 0.50 for men and -0.06 for women, the net loads are, respectively, 0.80 for men and 0.75 for women. Medicaid, therefore, emerges as an important potential explanation both for the limited demand for private insurance overall, as well as for the patterns by gender.[18]

Of course, there remains the puzzle of why the insurance company doesn't price differently for men and for women, given the differences by gender in the gross load (which are relevant from insurance company perspective). These differences indicate that insurance companies make substantially greater profits on policies sold to men than to women. We do not offer an answer here, except to note that this puzzle relates to a broader puzzle in many insurance markets are of why firms do not use readily available information about expected utilization in pricing insurance. Finkelstein and Poterba (2006) discuss other examples of this puzzle and review some potential explanations.

7. Conclusion

The limited size of the market for private long-term care insurance in the U.S. has spawned a number of theoretical papers exploring a variety of potential demand- and supply-side explanations. Yet very little evidence exists with which to answer even the most basic empirical questions about the nature of this market. This paper brings to bear new evidence on the existing market for long term care insurance policies. Our evidence suggests that supply side market failures have important effects on pricing in this market, but by themselves are insufficient to explain the limited size of the private market.

We begin with the insight that the main candidates for private market failures all have at least one of two empirical implications. First, prices should be higher than actuarially fair. Second, available policies should be limited in their benefit comprehensiveness ("quantity rationing"). We then show that, based on the characteristics of commonly *purchased* policies, both of these empirical predictions appear to hold.

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[18] Indeed, consistent with our conclusion from the evidence in this current paper that supply side factors are unlikely to be the primary cause of the small size of the limited market, in Brown and Finkelstein (2004) we estimate that even if we correct whatever market failures may exist and make comprehensive insurance policies available at actuarial fair prices, the existence of the Medicaid program is sufficient to explain why at least two-thirds, and as much as 90 percent under some scenarios, of the elderly do not buy private long-term care insurance.

While the exact estimates will vary with the assumptions made, a robust finding is that the prices on typical purchased policies are marked up relative to actuarially fair levels, and are marked up substantially more than in other private insurance markets. These policies tend to cover one-third or less of the long-term care expenditure risk.

However, we also provide evidence that neither the high loads nor the limited benefits of purchased policies appear capable of fully explaining the limited size of the market. We find enormous differences in loads between men and women yet virtually no difference in insurance coverage. We also find that more comprehensive policies are widely available at comparable loads to the more limited, purchased policies, suggesting that quantity rationing is not a primary factor behind the market's small size.

The evidence in this paper of substantially lower loads for women than for men which do not translate into gender differences in coverage points to a likely role for demand-side factors that reduce the demand for women relative to that of men in contributing to the very limited side of the private long-term care insurance market. We suggest that one such demand-side factor is the public Medicaid program which, we have found in other work, imposes a substantially higher implicit tax on private insurance policies for women than for men (Brown and Finkelstein, 2004b). More generally, our findings suggest that an important avenue for further research is exploring empirically the relative impact of various demand side factors on the size of the private long-term care insurance market. These include not only Medicaid but also the role of the family and of limited rationality.

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Table 1: 2000 Private long-term care insurance coverage rates among the elderly in the HRS (%)

		Wealth Quartile			
	Whole Sample	Top	Second	Third	Bottom
Whole Sample	10.5	19.6	11.3	6.0	2.8
Gender					
Men	10.1	18.4	9.5	5.9	2.1
Women	10.7	20.9	12.9	6.2	3.3
Marital status					
Married	11.8	19.4	10.6	6.4	2.8
Single	8.4	20.3	12.8	5.5	2.8
Age Group					
Age 60-64	8.2	13.9	8.5	5.7	2.5
Age 65-69	11.1	21.0	10.4	5.6	2.6
Age 70-74	13.1	24.7	14.2	7.4	3.4
Age 75-79	12.2	23.8	13.5	6.3	3.2
Age 80-84	8.9	19.7	9.6	4.1	2.6
Age 85+	8.1	11.3	12.8	6.8	2.7

Note: Sample consists of individuals in 2000 HRS aged 60 and over. Average age is 72. Sample size is 14,598. All means are weighted using household weights.

Table 2: Descriptive statistics on annual median premiums in 2002 (dollars)

	Age 55	Age 65	Age 75	Age 85
Scenario 1: Covers Facility Care Only, 90-day deductible, 2 year benefit period				
Constant Nominal Benefit	270	530	1,410	3,986
Benefits Escalate 5% / year	558	1,016	2,218	4,846
Scenario 2: Covers Facility and Home Care, 60-day deductible, 4 year benefit period				
Constant Nominal Benefit	597	1,192	3,232	7,707
Benefits Escalate 5% / year	1,271	2,140	5,038	10,189
Scenario 3: Covers Facility and Home Care, 30-day deductible, Unlimited benefit period				
Constant Nominal Benefit	912	1,872	5,004	10,411
Benefits Escalate 5% / year	1,910	3,450	7,843	13,857
Scenario 4: Covers Facility and Home Care, No deductible, unlimited benefit period				
Constant Nominal Benefit	843	1,698	4,345	10,071
Benefits Escalate 5% / year	2,007	3,326	6,613	12,327

Notes:

Policies: All policies have $100 maximum daily benefit for any covered care and use the HIPPA-specified benefit triggers required for the policies to be tax qualified (see text for further details). “Facility care” refers to nursing home and assisted living facilities. Deductible specifies the number of days in otherwise-covered care during which no benefits are paid toward the policyholder’s expenses. Benefit period gives the maximum length of time for which the policy will pay the daily benefit. The daily benefit gives the maximum amount paid by the company per day toward covered care. In all of the policies studied, the daily benefit is the same across covered care states.

Sample: For all ages below 85 and all scenarios except scenario 4, the sample includes at least 8 policies. The smaller sample size for Scenario 4 is not due to limited availability of these policies per se, but rather that Weiss gave the companies a choice to report either Scenario 3 or Scenario 4; the anomalous result that median premiums are lower for (more generous) Scenario 4 policies than (less generous) Scenario 3 policies arises from heterogeneity in the set of companies offering these different policies. Comparisons of premiums across ages between 50 and 75 are not subject to this difficulty since companies that offer a given policy will tend to offer it for all of these ages.

Table 3: Probability (x100) that 65 year old is in various care states at subsequent ages

	70	75	80	85	90	95
Men						
Alive, Not in Care	88.2	68.4	46.1	24.8	9.4	2.1
Home Health Care	1.6	2.7	3.3	2.9	1.8	0.7
Assisted Living	0.1	0.2	0.3	0.4	0.3	0.1
Nursing Home	0.4	0.1	1.5	1.7	1.4	0.7
Dead	9.8	27.8	48.8	70.1	87.2	96.4
Women						
Alive, Not in Care	91.9	77.4	58.7	37.3	18.1	5.7
Home Health Care	1.7	3.5	5.0	5.4	4.2	2.4
Assisted Living	0.1	0.3	0.6	0.7	0.8	0.4
Nursing Home	0.6	1.6	2.8	4.0	4.0	2.9
Dead	5.6	17.2	32.9	52.6	72.9	88.6

Note: Table reports unconditional probabilities of being in different care states at 5-year age intervals for an individual who at 65 is alive and out of care and healthy enough to be eligible for purchasing long-term care insurance. Care is counted only if it meets the benefit-triggers for reimbursement. State of care is assessed at first month of given age.

Table 4: Comprehensiveness and load on typical policy purchased by a 65 year old

Assumption	Load	Comprehensiveness
Policy Held Until Death	0.18	0.34
Accounting for termination probability	0.51	0.13

Note: Policy covers all three types of care (home health care, assisted living facility and nursing home), has a 60 days deductible, 4 year benefit period, and pays a $100 constant nominal maximum daily benefit; this is Scenario 2 from the Weiss data. All estimates are done using unisex transition probabilities. Load is calculated using median premiums. Results "accounting for termination probability" use the empirical termination probabilities in Society of Actuaries (2002). All assumptions are the "Base case" ones: Treasury term structure for the nominal interest rate, real cost growth of 1.5% per year, and all companies in the Weiss data.

Table 5: Comprehensiveness and load on typical policy purchased by 65 yr old, alternative assumptions

		Load	
	Comprehensiveness	Policy Held Until Death	Accounting for termination probabilities
Base Case	0.34	0.18	0.51
Alternative Assumptions			
Corporate interest rate	0.36	0.27	0.55
Real cost growth 3% / year	0.28	0.11	0.48
Real cost growth 0.75% / year	0.38	0.21	0.53
Top five companies	-----	0.19	0.52
Spousal Discount (10%)	-----	0.14	0.48

Notes: Policy covers all three types of care (home health care, assisted living facility and nursing home), has a 60 days deductible, 4 year benefit period, and pays a $100 constant nominal maximum daily benefit; this is Scenario 2 from the Weiss data. All estimates are done using unisex transition probabilities. Load is calculated using median premiums. Results "accounting for termination probability" use the empirical termination probabilities in Society of Actuaries (2002). "Base case" assumptions use the Treasury term structure for the nominal interest rate, real cost growth of 1.5% per year, and all companies in the Weiss data. Rows with "alternative assumptions" show estimates when an individual assumption from the "base case" is altered as specified in the left hand column.

Table 6: Loads on typical policy purchased for 65 year old, by gender

	Policy Held Until Death		Accounting for Termination Probability	
	Male	Female	Male	Female
Base Case	0.44	-0.04	0.65	0.38
Alternative Assumptions				
Corporate interest rate	0.50	0.07	0.68	0.43
Real cost growth 3% / year	0.40	-0.12	0.63	0.34
Real cost growth 0.75% / year	0.46	-0.004	0.66	0.40
Top five companies	0.45	-0.03	0.66	0.39
Spousal Discount (10%)	0.41	-0.09	0.63	0.35

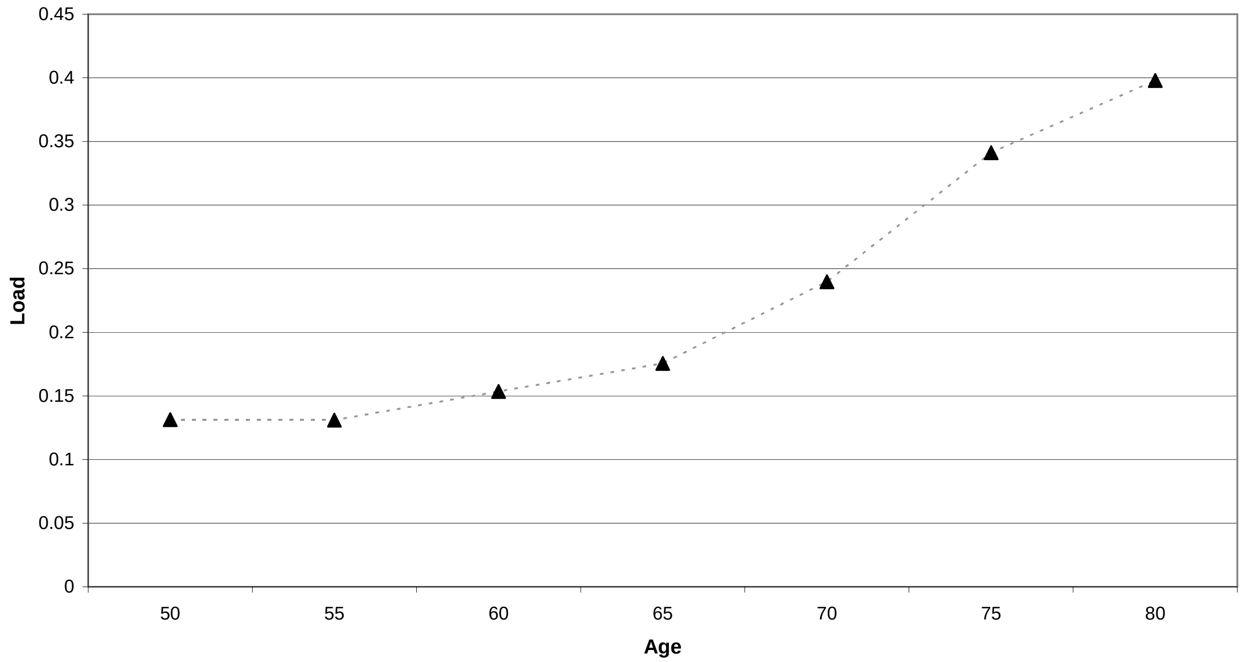
Note: Policy covers all three types of care (home health care, assisted living facility and nursing home), has a 60 days deductible, 4 year benefit period, and pays a $100 constant nominal maximum daily benefit; this is Scenario 2 from the Weiss data. All estimates are done using gender-specific transition probabilities. Load is calculated using median premiums. Base case estimates use the Treasury term structure for the nominal interest rate, real cost growth of 1.5% per year, and all companies in the Weiss data. Results "accounting for termination probability" use gender-specific lapse rates; in practice, lapse rates by gender are very similar (Society of Actuaries 2002). Rows with "alternative assumptions" show estimates when an individual assumption from the "base case" is altered as specified in the left hand column.

Table 7: Comprehensiveness and loads of available policies; estimates are all for 65 year olds.

	Male		Female	
	Comp	Load	Comp	Load
Constant Nominal Benefits				
Scenario 1	0.27	0.28	0.21	-0.22
Scenario 2	0.38	0.44	0.32	-0.04
Scenario 3	0.49	0.55	0.47	0.03
Scenario 4	0.51	0.48	0.48	-0.10
Benefits Escalate at 5% per year				
Scenario 1	0.58	0.20	0.49	-0.47
Scenario 2	0.68	0.45	0.59	-0.08
Scenario 3	0.88	0.56	0.91	-0.03
Scenario 4	0.92	0.52	0.94	-0.09

Note: All estimates are done using gender-specific transition probabilities. Load is calculated using median premiums. All estimates use the “base case” assumptions: Treasury term structure for the nominal interest rate, real cost growth of 1.5% per year, and all companies in the Weiss data. All policies have a $100 maximum daily benefit.
Scenario 1 is a facility only policy with 90 day deductible and two year benefit period. Scenario 2 covers all three types of care (home health care, assisted living facility and nursing home), has a 60 day deductible and a 4 year benefit period. Scenario 3 covers all three types of care, has a 30 day deductible and an unlimited benefit period. Scenario 4 covers all three types of care, has no deductible and an unlimited benefit period. It is worth noting that not all companies report prices for each scenario. As such, scenario 4 in particular represents a different set of companies than the other scenarios.

Figure 1: Loads By Age



Note: Policy covers all three types of care with 60 day deductible, 4 year benefit period, $100 constant nominal daily benefit . Loads calculated using median premiums, unisex transition probabilities, and base case assumptions.

Appendix A

The actuarial model used to generate the utilization probabilities for this paper was developed by Jim Robinson of the Center for Health Systems Research and Analysis at the University of Wisconsin. Readers interested in an even more detailed description of the model than we present here are encouraged to consult Robinson (1996).

The model, which has been widely used by insurance companies, regulators, and the Society of Actuaries long-term care task force, is known as the "Two-Stage Long-Term Care Model" because there are two primary components to the model. The first stage uses data from the 1982, 1984, 1989 and 1994 waves of the National Long-Term Care Survey to compute transition probabilities across different states of health, defined by the number of limitations to activities of daily living (ADLs), limitations to instrumental activities of daily living (IADLs), the presence or absence of cognitive impairment, and death. ADL's include activities such as eating and dressing, while IADL's include activities such as shopping and food preparation. Respondents were considered impaired if they were unable to perform the activity without continuous human assistance. Cognitive status was scored using the "Short Portable Mental Status Questionnaire," with five or more incorrect answers (out of ten questions) counting as a cognitive impairment (or if the respondent was unable to participate in the interview and was described by the proxy as senile). Respondents were then grouped by sex, health status, and age groups at the start of each observation period (1982 to 1984, 1984 to 1989 and 1989 to 1994). Annual transition rates across the various health states were then estimated using maximum likelihood estimation as a function of sex, age, starting health status, and ending health status.[19]

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[19] The parametric function used is: $r_{ij}(s,x) = \exp\{a_{ij} + b_{ij}(s-0.5) + c_{ij}(x-80)/100\}$ where $r_{ij(s,x)}$ is the annual transition rate from state i to state j for individual aged x of sex s (where s=0 for males and s=1 for females). There are 7 living health states (i=1 is healthy, with higher values of i signifying greater impairment). State 8 is death, implying that $r_{8j} = 0$ since death is an absorbing state. The values of a_{ij} are unconstrained, while the sex adjustment parameters b_{it} are constrained to three values – one for recovery (move to healthier state), one for j=8 (mortality), and one for other combinations of i and j (staying same or further impairment). The age slope parameters c_{ij} are constrained similarly to sex, except that distinct values are permitted when the starting state is healthy, i=1.

The second step in the model is to estimate the probability of using each type of long-term care (none, home health, assisted living, or nursing home), conditional on the underlying health status, age, and gender. This stage uses data from both the NLTCS and the National Nursing Home study. In addition to estimating probabilities of using care, the model also estimates the number of hours per week of skilled and unskilled home health care assistance required, as a function of health status, age and gender.

By combining the probability of being in a given health state with the conditional probability of needing care, conditional on one's health state, one can produce gender-specific probabilities of incurring long-term care expenditures at each age, conditioning on initial health status. For this paper, we used the model to produce utilization probabilities separately for men and women, conditional on being in sufficiently good health at age 65 to be eligible to purchase a private long-term care insurance contract. We also count care utilization only it the underlying health status of the individual satisfies the health-related benefit triggers necessary for the care to be reimbursed by private insurance.

However, for purposes of comparison of this model to other published estimates, we use a version of the model 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. The results of this validation exercise are shown in Table A-1. As discussed, published estimates exist for nursing home utilization, but not for home health care or assisted living. Table A-1 shows that the actuarial model used by the industry produces estimates of nursing home utilization that are broadly consistent with these existing published estimates.

Appendix Table A-1: 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.