Lapse of Long-Term Care Insurance Coverage in the US

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Abstract

Despite significant financial loss and implicit cost associated with a long-term care insurance (LTCI) policy lapse, cancellation of a LTCI policy prior to becoming eligible for benefits is a common phenomenon in this market. Using data from the 1996-2012 Health and Retirement Study (HRS), I investigate why do individuals let their LTCI policy lapse and suffer a financial loss of premium paid with the resumed risk of long-term care expenditures in the future. In this paper, I show that individuals could let their LTCI policies lapse due to competing financial needs within household, expected utilization of long-term care services and poor financial decision resulting from cognitive impairment. I predict individuals' lapse decision based on the present discounted value of expected utility of retaining LTCI coverage versus dropping the coverage. I also examine the characteristics of individuals for whom a suspect choice can be identified under incomplete information. I find that individuals with higher competing financial needs within household and less wealthier are more likely to lapse their LTCI policies and make suboptimal decision regarding maintaining the coverage. Individuals with lower cognitive status are more likely to drop their policies while individuals with longer expected utilization of home health care and higher risk of needing nursing home care are less likely to drop the policy. Finally dynamic analyses of *ex-post* risk of using long-term care suggest that individuals who drop their LTCI coverage are more likely to use nursing home care than individuals who were otherwise equivalent at the time of purchase but maintained their coverage. This finding contradicts earlier evidence that inefficiencies in the private LTCI market in the US is primarily due to reclassification risk and the market is adversely selected.

JEL Classification: I13; C11; C18

Keywords: Long-term care insurance; Policy Lapse; Adverse selection, Consequences of lapse

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1 Introduction

Expenditures for long-term care and support services (LTSS) represent a significant financial uncertainty for the elderly with approximately $320 billion in aggregate spending in 2011, or about 14% of all healthcare spending in the US (Colello *et al.*, 2013).[1] Going forward, long-term care expenditures are predicted to continue to increase due to combined effects of longer life expectancies and the numbers of "very old" who will disproportionately be the intensive users of LTSS (Brown & Finkelstein, 2011). For an individual after age 65, the present discounted value of expected LTSS cost was estimated about $50,000 with a 5% risk of incurring long-term care costs greater than $260,000 (Kemper *et al.*, 2005; Webb & Natalia, 2010).The majority of these costs are driven by nursing home care, where the average daily rate for a private room was $248 or $90,520 annually in 2012 (Congressional Budget Office, 2013; MetLife, 2012).The financing of long-term care expenditure in the US represents a significant challenge to the public sector as well as to consumers. Medicaid, the largest public payer, accounts for 44% of total long-term care expenditures (Frank, 2012), while Medicare accounts for about 25% of the long-term care spending, Medicare reimbursement for long-term care is limited in scope.[2]

While a growing strand of literature investigates individuals' decisions to purchase private long-term care insurance (LTCI) as a vehicle to finance LTSS , a largely neglected issue is why do people let their LTCI policies lapse even after several years of paid premium. Unlike acute care insurance policies, LTCI policies are financial contracts between individuals and an insurer that are designed to pay a fixed benefit amount in the future when a person requires assistance with "activities of daily living" due to physical and/or cognitive impairment, whether this assistance be at home or at a designated institution such as a nursing home. A typical long-term care policy is purchased around age 65; however, services are often not commenced for several years (possibly decades) in the future, making these policies heavily front-loaded in nature. LTCI policies have been marketed since 1970, the market for private LTCI is limited with less than 10% individuals purchasing a private LTCI plan to finance long-term care expenses (Brown & Finkelstein, 2007; Munnell *et al.*, 2009). Private LTCI is often considered as one way to finance long-term care that could offset some of the burden on publicly funded programs (mainly Medicaid) while ensuring that the elderly can insure some of expenditure risk of LTSS. Based on the Americas Health Insurance Plans (AHIP) report, a total of 9.2 million LTCI policies had been purchased by the end of 2002 and only 6.4 million policies were in force in 2002 (AHIP, 2004), meaning that there is a high rate of policy dropping (a policy purchase followed by a period of policy lapse). Furthermore, the most recent AHIP report indicates that the industry currently serves 7.4 million policyholders (AHIP, 2014). Despite its small market size, a LTCI policy lapse also contributed to the extremely limited private coverage for long-term care expenditure.[3] There is a wide variation of existing estimates of LTCI policy lapse rates. For example, Scanlon (2000) estimates lapse rates as high as 20-30% while an industry group estimates the lapse rate as 5.4% based on 14 of the largest companies (Purushotham *et al.*, 2004).

Although purchasing a LTCI policy appears to be an alternative way to finance long-term care costs, significant rates of policy dropping raise concerns about how to solve the financing challenge associated with long-term care expenditures. Cancellation of a LTCI policy is generally considered intentional from a policyholder's perspective as significant legal

[1] Excluding Medicare expenditures, O'Shaughnessy (2013) estimates total spending for LTSS of $220 billion in 2011, or 9.3% all U.S. personal healthcare spending

[2] Medicare reimburses for short stays up to 100 days in a skilled nursing facility following a qualifying hospital admission, but does not reimburse explicitly for long-term care

[3] Only 4% of total LTCI expenditures are paid by private policies, while about one-third are paid from out-of-pocket (Congressional Budget Office, 2004)

safeguards are in place to avoid accidental lapse (Finkelstein *et al.*, 2005). Recent research has examined some of the factors that could potentially contribute to a policy lapse including consumer awareness of LTCI policy features and long-term care services, financial stability, and risk reclassification related to future long-term care utilization. Finkelstein *et al.* (2005) examined the *ex-post* risk type of individuals who dropped their policies relative to those who retained policies. The analysis was based on the theory of reclassification of risk by (Hendel & Lizzeri, 2004) which indicates that if premiums are actuarially fair at the time of purchase and are paid over time, individuals may drop their policies if they reclassify themselves into a lower risk category in later years compared to when they bought the policy. Lapse therefore is considered as a mechanism for *ex post* adverse selection which creates a dynamic inefficiency in the market followed by a higher premium rates for those remaining in the risk pool. Authors found that respondents who had ever let a LTCI policy lapse were less likely to have a nursing home stay within five years than individuals who bought and continually insured, which supported risk reclassification hypothesis of market inefficiencies. However, other potential facotrs that contribute to the LTCI policy lapse remain unexplained.

Recently, Konetzka & Luo (2011) examined factors including wealth, income in predicting lapse behavior and revisited the issue of ex post adverse selection in the private LTCI market. The authors found that the lapse of LTCI is more of an issue of financial constraint than reclassification of health risks. Also, poorer, less educated, less healthy and people with racial and ethnic minorities are more likely to lapse their policies. The likelihood of LTCI lapse also increases with a lack of knowledge about the policy benefit provisions and prior encounter with the long-term care system, suggested by Li & Jensen (2012). However, none of the recent studies accounted for expected utilization risk of LTSS in the future, expected costs of that care which are important for an individual to make the decision to renew an existing LTCI policy by comparing expected utility of retaining the policy with expected cost of dropping the coverage. Furthermore, some unexplained factors including competing financial needs within household making LTCI less affordable, poor financial decision-making resulting from cognitive impairment may contribute to the policy lapse rather than reclassification of health risks. More importantly, in presence of heterogeneity in consumer beliefs the standard revealed preference logic of discrete choice model of policy lapse becomes inefficient and there might be a good reason to suspect that the choice may not reveal consumers preferences for the policy lapse decision.

An important consequence of the policy lapse is the subsequent use of LTSS in the future. Economic theory suggests that individuals with a high risk of requiring long-term care in the future are most likely to retain their policies and those with lower risk should drop. In fact, Finkelstein *et al.* (2005) found that subsequent use of nursing home care was lower for those who dropped their coverage compared to those retained their policies. However, author measured the lapse using a direct survey question on "ever lapsing LTCI" which was clearly subject to measurement error and the question was dropped from the survey in later years due to this error. For example, author mentioned that of those who reported "ever lapsing a LTCI policy in 1996, only 20% again reported "ever lapsing" in 1998. Furthermore, Konetzka & Luo (2011) found little evidence of *ex post* adverse selection and one recent brief report (Hou *et al.*, 2015) found the opposite of what economic theory predicts and earlier evidence from Finkelstein *et al.* (2005). This brief report shows that people who subsequently use the care were more likely to lapse. However, the analysis does not account for a central issue of defining the sample of individuals who are "at risk" of letting a LTCI lapse (Finkelstein *et al.*, 2005). It is important to define the universe of the "potential lapsers" in order to examine the consequences of lapsing on subsequent care use. Therefore, the second objective of this article is to examine consequences lapsing on subsequent nursing home care use (the major source

of long-term care expenditures) using the point-in-time lapse measure following the similar sample construction used by Finkelstein *et al.* (2005). The consequences of lapsing is important to know because if people who lapse their policies are more likely to use long-term care, insurance could actually be counterproductive but dropping the policy results in substantial financial loss as well as resumed risk of financing long-term care expenditures.

Examining the impacts of potential factors contributing to LTCI policy lapse as well as consequences of lapsing are important, as limited market for private LTCI along with a higher rate of policy lapse have been the subject of increasing research and policy attention to solve financing challenges of long-term care due to population aging. Using Health and Retirement Study (HRS) data, I first simulate long-term care expenditure and utilization based on the care transition model of Friedberg *et al.* (2014), which is a modified version of Robinson (1996) actuarial model. I then predict optimal lapse decision based on differences in expected utilities of retaining the LTCI versus letting the policy lapse assuming that observed individual characteristics are consistent with the optimal lapse decision. The model was then extended to idnentify suspect choices analogues to Handel (2013) and Ketcham *et al.* (2015) and use three indicators of suspect choices related to the lapse decision.

I find that individuals with higher competing financial needs and less wealthier are more likely to lapse their LTCI policies and make suboptimal decision regarding LTCI coverage. Poor financial decision-making resulting from lower cognitive status and expected use of long-term care services appear to be significantly associated with the policy lapse. The results are robust in regard to theory based two different suspect choice indicators. The consequences of lapsing are significant, as individuals who drop their coverage are more likely to subsequently use nursing home care compared to those who maintained their coverage. This observation contradicts earlier findings that inefficiencies in private long-term care insurance market in the US are due to reclassification risk and adverse selection.

Medicaid provides an important safety net for people who are unable to afford the high costs of LTSS. However, even people with private LTCI, any catastrophic out-of-pocket medical spending may make them more likely to be qualified for Medicaid means-tested welfare program for their future needs for LTSS. Therefore it is possible that people who were not originally poor to be eligible for Medicaid, may transition to Medicaid due to low levels of assets. It also suggests that even though people purchase private LTCI for financing their LTSS needs, spending for people transitioning to Medicaid may be a substantial portion of state Medicaid expenditures. In the current study I used the Medicaid spend-down measure developed by the Scan Foundation Report Weiner *et al.* (2013)to estimate the impact of Medicaid spend-down on an individuals decision to lapse a LTCI policy.

While looking into the supply side factors that could potentially influence individuals decisions to terminate an existing LTCI policy, counter-party risk identified by Brown *et al.* (2012) may play an important role. This is the risk of insurers exiting from the market due to poor financial performance. Therefore policyholders may have concerns that if insurers exit from the market due to financial instability then they will lose all the premiums paid for the LTCI policies before collecting any benefits in the future. In this study, I use the possibility of exiting from the market due to lack of profitability based on the Long-Term Care Experience Reports for 1998-2012 published by the National Association of Insurance Commissions (NAIC) [4].

The rest of the paper is organized as follows: Section 2 discusses the characteristics of LTCI market and the perceived sources of market inefficiencies, Section 3 describes lapse rates, potential reasons for the policy lapse and subsequent use

[4]These reports were purchased by the author directly from the NAIC as the archived reports are not publicly available at the NAIC website

of long-term care after dropping the policy, Section 4 outlines HRS data and long-term care utilization model, and Section 5 describes conceptual model of lapse decision and resulting estimating equation. Section 6 discusses the estimation approach and Section 7 details results of the primary specification, and Section 8 analyses a series of sensitivity tests for robustness of results presented in the article. The final Section 9 discusses potential implications for policies and concludes the paper.

2 Characteristics for Long-Term Care Insurance Contracts

Long-term care insurance helps to pay for a variety of nursing, personal or support services for individuals who experience difficulties in performing daily activities due to chronic illnesses, disability or dementia. The services typically covered by LTCI range from assistance with activities of daily living (ADLs) such as bathing, dressing or eating as well as instrumental activities of daily living (IADLs) such as medication management, grocery shopping or preparing meals. This assistance is provided at home or in an institution such as assisted living facility or nursing home. A majority (approximately two-thirds) of active LTCI policies is purchased on an individual basis, while only a small percentage (less than one-third) of policies are purchased as group coverage through employer sponsored arrangement. All LTCI contracts are front loaded and the extent of front-loading varies across contracts. LTCI premiums are paid on a periodic (usually annually) basis at a pre-specified fixed rate determined at the time of purchase. In general, all LTCI policies are renewable and the premium is unaffected by any subsequent change in health condition or likelihood of the use of long-term care services in the future. While this means that premiums decline over time in real terms, the expected value of one year of coverage increases as health deteriorates. Therefore, premiums that individuals pay are initially higher than actuarial costs, but as their risk of using long-term care increases, the ratio of premium to risk falls (Finkelstein *et al.*, 2005). However, insurers can and occasionally increase premiums for an entire class of customers, especially if they discover that overall claims experience is higher than estimated earlier (Kristof, 2009). In 2010, individuals aged between 55 and 64 years who purchased a LTCI paid an average annual premium of $2300. This average policy includes a daily benefit of about $150 for four to five years, a 90-day elimination period, and a 5% inflation protection (Ujvari, 2012).

Majority of long-term care policies pay a fixed amount when a person needs care despite dramatic variability in the cost of services over time. These policies have a daily (or monthly) benefit amount and the policyholder will get reimbursed for the covered long-term care expenses that he/she incur up to this amount. Given the long-term nature of the contract, policyholders of LTCI typically continue to make payments for quite a long period of time before the risk of needing care becomes substantial. This means that although some of the long-term care risks are covered but payments are made on an indemnity basis rather service basis (because of the intertemporal nature of the risk). Typical age for buying a private LTCI coverage decreased from 67 years in 2000 (AHIP, 2007) to 59 years in 2010 (Ujvari, 2012)-so on average, the policy is purchased substantially before the expected age of nursing home entry. For example, the average age of nursing home entry for a typical non-institutionalized 65 years old is 83 years (Friedberg *et al.*, 2014), which is about 20 years after the average age of the policy purchase. Therefore, dropping a LTCI policy is costly to the insured as majority of policies do not have any surrender value and lapse of current policies always result in the forfeiture of any future benefits (Brown & Finkelstein, 2004).

3 Lapse of LTCI and Subsequent Care Use

Despite the implicit cost, dropping of existing LTCI policies is a common phenomenon in this market. Termination of a LTCI policy for reasons other than death is referred as voluntary lapse and about one-third of individuals who purchase LTCI policies at age 65, lapse their policies before death, forfeiting all benefits (Hou *et al.*, 2015). Based on authors calculation, the current lapse rates before death for men and women aged 65 years or older are 32 and 38 percent respectively, assuming that lapse rates remain at the same levels for observed recent cohorts. Figure 1 shows the trend in LTCI policy termination experience from 2013 Long-Term Care Intercompany Experience Study based on 20 private long-term care insurance companies conducted the Society of Actuaries. First-year lapse rate was about 6%, it decreased in the first 6-7 years of policy duration, lapse rates steadily increased during remaining time in policy duration (the percentage of policies still in force by the number of years the individual has held the policy). HRS-derived lapse rates in the current study appear to be higher than industry estimate of 4.2% (Ho & Muise, 2015). However, the industry estimates are based on data from only 20 largest LTCI carriers in the US, whose policies are more likely to be standardized and therefore lapse rates are likely to be lowest. Figure 2 and Figure 3 show lapse rates by HRS survey year and policy-in-duration from 1998 to 2012. Although HRS lapse rates may subject to measurement error (especially in the early years of 1996-2000 due to wordings of LTC questions asked), the true lapse rates are probably somewhere between HRS and industry average rates. Because of the substantial front-loading and the absence of nonforfeiture benefits of LTCI policies, letting the policy lapse can be quite expensive to consumers who purchase LTCI policies. Estimated average load on the typical long-term care insurance policy purchased by an individual 65 years old can increase from 18 cents on the dollar to 51 cents on the dollar due to increase in implicit cost of the policy lapse (Brown & Finkelstein, 2004). Despite observed lapse rate is quite high up to 12-15 years after a policy is purchased. This raises a concern why do people let their LTCI policies lapse.

An important consequence of policy lapse is the subsequent use of long-term care services after dropping the policy coverage. Evidence on this issue is inconclusive. For example, Finkelstein *et al.* (2005) found that individuals who dropped their coverage were less likely to enter a nursing home compared to those who retained their policies. Konetzka & Luo (2011) suggested little evidence of adverse selection by finding that lapse was associated with significantly lower likelihood of subsequent nursing home care use but not the home health care. However, one recent brief report by Hou *et al.* (2015) suggested that 23% of individuals who used nursing home after letting their LTCI policies lapse, compared to only 16% of non-care users lapsed. This observation contradicts the earlier evidence that those who let their LTCI policies lapse because they expected lower risk of needing long-term care (i.e. risk reclassification). It therefore remains important to better understand the connection between lapsing and subsequent long-term care use.

4 Data

4.1 Health and Retirement Study

The Health and Retirement Study (HRS) is a nationally representative biennial panel survey of Americans aged 50 years or older (Juster & Suzman, 1995). The survey included non-institutionalized individuals born between 1931 and 1941(original HRS cohort), as well as their spouses of any age. The survey began in 1992, individuals born between 1925-1930 (AHEAD and Children of the Depression Cohort) and 1942-1947 (War baby cohort) were added in 1998 wave,

with younger cohorts added in 2004 and 2010 to maintain the national representation of US population. The HRS collects a rich set of demographic and socioeconomic variables both at individual and household levels.

I use data from HRS waves 3 to 11 (1996-2012) examining why people lapse their LTCI policies and potential consequences of the lapse. These waves asked consistently worded questions about LTCI purchase. From 1996-2000 survey waves may be subject to some potential measurement error, however, later waves from 2002 onwards asked specific follow-up questions to make sure reported LTCI variables are correctly responded. Because the focus of this study on LTCI lapse over time, I use observations from respondents with at least two consecutive survey waves during the study period from 1996-2012, who reported having LTCI in the first year of any two-year transition (approximately 10% of all respondents) and responded LTCI questions at the second time period. Furthermore, I restrict analytic sample to individuals between ages 60 and 95. This sample restriction was for two reasons: first, this age range is relevant for a typical long-term care policy to purchase and therefore the possibility of the policy lapse and second, this is the age range for which transition probabilities of care utilization in different health states are available (Friedberg *et al.*, 2014). This results in a sample size of 3,608 unique HRS respondents and 10,118 person-year observations.

4.2 Care Transition Model

One of the most important inputs for the analysis of potential explanation of LTCI policy dropping is the distribution of long-term care utilization risk which depends on one's expected long-term care utilization and transitional probabilities across different health states. To estimate future long-term care utilization, I utilized a modified version of the care transition model originally developed by Robinson (1996) and has been extensively used in the long-term care literature. However, the updated model developed by Friedberg *et al.* (2014) used data from the HRS and the most recent National Long-term Care Survey (NTLS) from 1999-2004 to estimate age and gender specific transition probabilities across different health states [5]. This model essentially estimates 5x5 transition probability matrices as a function of the individual's age and gender from 65 to 110 years. At each age, there are 5 possible health states an individual could possibly transition into: 1) healthy; 2) home health care; 3) assisted living care; 4) nursing home; and 5) death. This care transition matrix allows to estimate long-term care utilization (expressed in times spent in each health state) over a predetermined number of years which is specific to an individual's age and gender.

Recent research modeling the LTCI lapse decision ignores the role of expected utilization of long-term care based on one's transitional probabilities among different health states. Although Robinson's care transition model (Robinson, 1996) has been extensively used in the literature in estimating future expected utilization of long-term care, Friedberg *et al.* (2014) found that the Robinson's model may underestimate the probability of ever using nursing home care and correspondingly overestimate the mean duration of care conditional on nursing home admission. This is because Robinson's model focuses on whether individuals require long-term care determined by their ADL (activity of daily living) status, rather than whether they actually receive the care. This might play an important role in estimating expected utilization as the risk of requiring nursing home care is the single most common reason people purchase or retain their LTCI policies. I therefore, used updated care transition model to estimate expected utilization and costs of long-term care in the current study.

[5] I am grateful to Dr. Anthony Webb and colleagues for providing me the transitional probability matrices.

Expected utilization of long-term care services is estimated in terms of time spent in each health care state by gender and age ranges and associated present discounted value of expenditures of retaining LTCI or dropping it. The results are based on 1,000 simulated care pathway for each individual in the sample, where each simulation consists of monthly transitions and associated utilization and costs from current age for 30 years into the future (or until death). Expected utilization based on one's transitional probability across different health states is important because individuals may lapse their LTCI policies strategically if they remain in good health after the policy purchase and believe that their risk of requiring long-term care is lower than originally determined. This could lead them to drop their LTCI policies due to lesser risk of needing the care in the future.

Over time some policyholders may view expected benefit from the policy becomes less than expected cost of the policy (paying premium) and let their policies to lapse. Therefore, policyholders compare the expected present discounted value of benefits (if the coverage is maintained) to the expected present discounted value of cost of care (if the policy is dropped). Therefore, the model explaining potential predictors of lapse decision should include expected utilization of long-term care, estimated cost of that care in addition to other financial measures such as wealth or household income. To estimate long-term care expenditures, I combine estimates of long-term care utilization with cost data from the 2002 MetLife survey (MetLife, 2002) and the Department of Health and Human Services (Johnson *et al.*, 2007) and LTCI premium data from Genworth Fianancial Inc. The underlying data for nursing home care costs in Johnson *et al.* (2007) come from a national survey by the long-term care division of GE financial and LTCI premium data were extracted from a typical long-term care policy sold in the state of Texas by Genworth Financial Inc. in 2002. Based on a typical LTCI policy sold in 2002, an average 65 years old individual paid $1490 annual premium with a maximum daily benefits of $100 with 5% inflation protection benefits and 100 days elimination period with a lifetime maximum of $73,000. Table 2 shows average premium, expected long-term care utilization and costs based on age and gender.

4.3 Medicaid Spend-down measures

Medicaid eligibility status was determined using the RAND, HRS variable indicating whether the respondent is covered by the Medicaid insurance at the time of the HRS survey. To create an analytic spend-down measure, I examined changes in Medicaid eligibility status, as opposed to asset depletion due to LTSS. This is because in the context of policy lapse, asset depletion due to LTSS is not relevant as individuals do not pay premium when use LTSS, therefore, they will not likely to lapse the policy if they are using LTSS or believe will be using in the near future. However, if a lower level of assets is due to other catastrophic medical spending then transition to Medicaid may predict the policy lapse as individuals are more likely to qualify for Medicaid at that point.

In order for a respondent in the HRS to be defined as having spent-down, he/she must have experienced a transition from non-Medicaid to Medicaid stats during the 14 to 16 observation period, where Medicaid status was the respondents final or permanent insurance status. Another group of people who temporarily spend-down i.e. reported Medicaid status in one survey period (t) followed by non-Medicaid status in the next time period were not considered as Medicaid spent down because switching back and forth is likely to introduce measurement error rather than real differences in Medicaid status. Therefore, the measure of Medicaid spend down used in this study is conservative. Permanent spend-down measure was therefore calculated as the number of respondents who spent down permanently to Medicaid status divided by the

number of respondents who did not have Medicaid eligibility when they first entered the HRS during the study period.

4.4 Supply side factor-Profitability Challenges of LTCI insurer

Data from the National Association of Insurance Commissioners (NAIC) Long-Term care Experience Reports from 1997 to 2012 were used to measure financial performance of LTCI insurers during the study period. Almost all insurers are required to file detailed data related to LTCI with the NAIC on an annual basis and these data are compiled and published in these annual reports. Data on key market parameters such as premium, claims, covered lives as well as historical performance indicators like actual-to-expected claims experience. The "loss ratio" can reasonably reflect the profitability challenges because higher the" loss-ratio", the greater are claims in relation to premiums and increases the risk of exiting from the market which may in turn influence policy lapse decision.

4.5 Outcome Variable- Definition of Lapse

There are two main approaches to measure LTCI lapse using HRS data. One is the direct question asked whether a respondent had ever let a LTCI policy lapse. Finkelstein *et al.* (2005) used this question to examine dynamic inefficiency in the LTCI market. The other approach is the "point-in-time" responses to whether an individual lapsed a LTCI policy and defining lapse as having a LTCI policy in one period and not having it the next time period. This is analogues to the definition of a LTCI purchase developed by Cramer & Jensen (2006). This "point-in time" response was used to define lapse by Konetzka & Luo (2011). There are some obvious inconsistencies in using "ever lapsing" question in the HRS data which is likely to lead to possible measurement error. For example, in 1996, of those who reported "ever lapsing, only 20% again reported "ever lapsing" in 1998 (Finkelstein *et al.*, 2005). This question was dropped after the HRS-2002 wave due to this inconsistency in responses. Although defining lapse based on "point-in-time" responses also possibly includes measurement error but it is arguably less subject to recall bias and it also provides a conceptual advantage over the "ever lapsing" question. When examining lapse pattern over time, it is impossible to determine whether the lapse was recent from the response of "ever lapsing" question. Therefore, it is also questionable whether to use respondent's current risk profile and outcomes at the time of lapse. When studying potential reasons for letting a LTCI policy lapse, it is important to match risk attributes to the timing of lapse decision because individuals can let their policy lapse strategically if they believe their risk of needing care is lower than originally expected.

I used the conceptual definition of lapse based on "point-in time" responses as this definition of lapse is less likely to suffer from potential measurement error as indicated by Konetzka & Luo (2011). Lapse of LTCI is based on the specific question regarding LTCI status (Not including government programs, do you have any LTCI which specifically covers nursing home for a year or any part of personal or medical care in your home?). Lapse is therefore defined as responding "yes" to this question in one wave and "no" in the next wave during any two-year transition. Starting from 2002 wave, a follow-up question was asked after the initial LTCI question to confirm that respondents correctly associated this question with LTCI policy and not any other government or public health insurance policy. All analyses were conducted for the full sample (from 1996-2012), and subsamples (from 2002-2012).

5 Methodological Framework

According to a standard expected utility model for demand for health insurance, a policyholder of a LTCI will make an optimal decision to renew or lapse the policy by comparing expected utility of retaining the LTCI policy against expected cost of the premium over the years before needing care. Consider that a typical policyholder i does not earn any period income, distributes wealth W_i between consumption and paying premium for a LTCI policy. Let's also assume that the policyholder can be in one of the 5 possible health states in the future: 1) receiving no care; 2) receiving paid home care; 3) receiving care in an assisted living facility; 4) nursing home care; and 5) dead. The 3 middle states (2-4) require LTSS. Consider at any given time, Q_{ts} is the probability that a policyholder is in a health state s at time t, given that the person was out of care at the time of purchase (the LTC policy requirement). The policyholder pays P_s as per-period premium which depends on the state of care because an individual do not pay premium if receiving care. After the initial purchase the policyholder may lapse the policy if the individual believes the risk of LTSS utilization is low and saves the money that would have been spent on premium otherwise. However, the individual is exposed to the risk of out-of-pocket LTSS expenditure in the next period, if needs care. Let's assume that X_{ts} is the total out-of-pocket costs for LTC services and B_{ts} is the maximum benefits payable by the insurer, when needing LTSS. At each point in time when the premium for a policy renewal is due, the policyholder is making the optimal lapse decision by comparing expected utilities of retaining LTCI and terminating (or lapsing) the policy, denoted by EU_i^R and EU_i^L respectively.

The expected utility of retaining the LTCI policy is writen as:

$$EU_i^R = \sum_{t=0}^{T} \beta \left[u_i \left\{ W_i - \sum_{s=1}^{5} Q_{t,s} \times P_s \right\} + \sum_{s=1}^{5} Q_{t,s} \left\{ u_i \left(W_i - max \left(X_{t,s} - B_{t,s}, 0 \right) \right) \right\} \right] \tag{1}$$

Similarly expected utility of terminating the LTCI policy can be written as:

$$EU_i^L = \sum_{t=0}^{T} \beta \left[u_i \left(W_i \right) + \sum_{s=1}^{5} Q_{t,s} \left\{ u_i \left(W_i - X_{t,s} \right) \right\} \right] \tag{2}$$

The policyholder will lapse the policy if and only if EU_i^L is greater than EU_i^R and will be indiffernt between two alternatives when

$$\triangle EU \equiv EU_i^R - EU_i^L = 0 \tag{3}$$

Assuming that an individual's propensity to lapse LTCI between any two time points, t to $t+1$ will depend on the latent net differences in expected utilities of retaining versus dropping the policy which is a function of one's expected cost and utilization of LTSS in the future, perceived risk of needing care, and other individual level characteristics including financial circumstances of the family. Denoting the observed indicator for LTCI lapse by l_i, where

$$l_i = \begin{cases} 1 & \text{if } \triangle EU_i \leq 0, \text{ and} \\ 0 & \text{otherwise.} \end{cases}$$

The reduced-form estimating equation will be

$$l_i^* = \alpha_i + \beta_i X_i + \epsilon_i \tag{4}$$

where X_i denotes a vector of individual and household characteristics and ϵ_i is a random disturbance term drawn from the normal distribution. The standard discrete choice probit model is used to examine the impacts of individual characteristics on the policy lapse, assuming that individuals are fully informed about their choices as well as the impact of the lapse decision.

Constructing observed lapse decision above based on differences in expected utilities of retaining the LTCI versus letting the policy lapse certainly depends upon the assumption that observed individual characteristics are consistent with the optimal lapse decision and people are making the choice of retaining or dropping the policy under full information. However, a growing literature on choice inefficiencies regarding health insurance plans claims that there exists a latent heterogeneity in people's beliefs regarding plan attributes which may not reveal consumers preferences due to incomplete information (Abaluck & Gruber, 2011; Bhargava *et al.*, 2015). This may imply that some individuals may be unable or unwilling to calculate the differences in expected utilities and therefore make suboptimal decisions under incomplete information.

To overcome this challenge, I adapt Bernheim & Rangel (2009) definition of a suspect choice assuming that individuals are making the lapse decision that cannot be rationalized in an expected utility framework and objective measures of individual and LTCI characteristics do not coincide with a policyholder's belief about retaining versus dropping an existing LTCI policy. I follow Ketcham *et al.* (2015) and use three indicators of suspect choices related to the lapse decision. First indicator is based on whether policyholders making the lapse decision that cannot be supported by a well behaved utility maximization preference under full information. It essentially means that a utility maximizing policyholder will never drop a LTCI policy if expected mean and variance of costs of future long-term care are higher after dropping a LTCI policy compared to retaining it, the decision is referred to as *dominated* choice. Therefore, a suspect choice occurs when a policyholder is making a *dominated* choice which may not reveal his/her preferences. The second suspect choice indicator is based on a survey question to test policyholders' knowledge about benefit provision of their LTCI policy. One of the important policy features is the benefit of inflation protection and various forms of inflation protection that are being offered by the insurers. Inflation protection is generally indicated by the increase in premium and daily benefits with inflation. For example, a 55 year old's application, a \$200 daily benefit will worth \$450 at age 80. Respondents in the HRS were asked to indicate whether *the LTCI plan increases payment with inflation*? Respondents who answered "do not know" to this question clearly demonstrate that they misunderstood this crucial feature of the LTCI policy which could cause a serious implication of benefits received under this policy. I use this survey question to create an indicator of incomplete information and therefore making a suspect choice in the optimal lapse decision. Third and the final indicator of suspect choice is an indicator for a deviation between the observed and predicted LTCI lapse status (i.e. whether observed lapse differs from the predicted lapse status). Specifically it means:

$$\tilde{l_i} = \begin{cases} 1 & \text{if } \triangle EU_i \leq 0 \text{ and } l_i = 0 \text{ or if } \triangle EU_i \geq 0 \text{ and } l_i = 1 \\ 0 & \text{otherwise.} \end{cases}$$

Consequence of lapsing is examined by the association between dropping the coverage and subsequent use of nursing home care. Similar to Finkelstein *et al.* (2005), I estimate the following regression equation:

$$NH_i = \beta_{1i} X_i + \beta_{2i} Lapse_i + \epsilon_i \tag{5}$$

The key coefficient of interest here is that on "Lapse", an indicator variable whether an individual lapsed the policy based on the "point-in-time" measure as described in the variable description section above. The vector X is comprised of control variables for risk classification of individuals' probability of needing long-term care in the future. The dependent variable in the above equation measures the subsequent use of nursing home care defined by the use of stay of one or more nights.

6 Estimation

The estimation strategy follows in two steps. First, I estimate expected utilization of long-term care services and cost of care (mean and variance of expenditures) using care transition data described in Section 4. Second, the estimation of the parameters of equation 4 and 5.

6.1 Expected Utilization and Expenditures

Estimation of expected utilization and expenditures was based on the assumption that the individual starts from the "healthy state [6]. The transition probability matrices developed by Friedberg *et al.* (2014) provide monthly probabilities of transitioning into each of the 5 health states from one month to the next. Individuals with LTCI policies are assumed to pay premium when healthy, policy is assumed to pay benefits up to $100 per day for nursing home care, 80% of daily care maximum for covered expenses ($100) and 90% of home health care costs following a 90 day elimination period (Genworth's LTCI policy sold in the State of Texas in 2002). Based on the unconditional care status transitional probabilities, a 70 year old female beginning in the healthy state has a 0.10% chance of transitioning to nursing home care in a given month, which increases in each year. Given the simulated care path, assume that she will transition to nursing home at some time at age 80. With LTCI she would have paid premium until age 80 and LTCI benefits will cover maximum of $100 of nursing home expenses per day after the 100 days of elimination period with a lifetime maximum of $73,000. However, if she dropped her LTCI policy any time before the age of 80, she will now have to cover the full cost of nursing home care, even though she already paid premium for LTCI policy for a long period of time. On the other hand, if she transitions out of nursing home into home health, she would be 90% covered with LTC but will have to pay the full cost if dropped the policy before the episode of care begins. Estimated expenditures and expected utilization are over the period from the persons current age to age 95 with 1000 replications for each individual assuming an annual discount rate of 3.5%.

6.2 Parameter Estimates

Because the goal of the current study is to examine the roles of important predictors of lapse including expected utilization of long-term care, perceived risk of needing the care and competing financial needs within the household, "population average" approach is considered an appropriate estimation strategy and equation 4 is therefore estimated using a binary

[6] I am grateful to Ian McCarthy for providing me the codes to calculate expected utilization and cost of LTSS.

probit regression while accounting for the non-independence of observations from the same respondents through clustered standard errors.[7] For this estimation each 2- year interval in the study period is considered as a transition from time 1 to time 2; i.e. 1996-1998 is one transition, 1998-2000 is another transition. The analytic dataset was created by pooling all 2-year transition and controlled for the calendar year in the regression. This estimation is based on the assumption that individuals make sensible lapse decision that can be supported by a utility maximizing choice under complete information. Alternatively, I examine suspect choice as defined in the Section 5 above. For the first indicator of suspect choice, differences in observed and predicted choice of the policy lapse was modeled. For the second indicator of suspect choice estimated mean and variance of costs between alternatives (retaining versus dropping LTCI) are compared and the estimating equation is identical to equation 4- the only difference being the identification of suspect choice. Third and the final indicator of suspect choice indicator is constructed if an individual responded "do not know" to this question for the wave, t, and change the LTCI ownership in the next wave, $t+1$ which would indicate that the individual makes the policy renewal decision without understanding this crucial feature of the policy benefit.

7 Results

7.1 Summary of Care Transition Model

Descriptive of expected utilization and expenditures of long-term care services are presented in Table 3. The table summarizes the time spent in each health states categorized by age and gender and expected discounted expenditures retaining LTCI versus dropping LTCI. The estimates are based on 1000 pathways for every individual in the sample. Each simulation consists of monthly transitional probabilities of each health care states and associated costs from the individual's current age for 30 years into the future. The summary statistics are averaged across individuals in all cases. For example, an average female between 60 and 70 in the sample will spend about 3 months in a nursing home, about 3 and half months in an assisted living facility and just over 7 months with home health care. Expected costs with retaining LTCI is about \$6033 compared to \$14,742 dropping LTCI. Considering the heavily skewed cost distribution without LTCI coverage in which individuals may spend over \$200,000 over the life-time, these numbers seem to be consistent that lapsing the current policy before benefits trigger will lead to higher expenditure when individuals actually require long-term care in the future. The table also reflects that compared to males, females have longer length of stay in each health care state and expenditures for females are higher.

7.2 Predictors of Lapse

To explain why individuals lapse, I first estimate reduced-form binary probit model and average marginal effects are presented in Table 4. Both full sample (1996-2012) as well as subsample (2002-2012) results are presented. Only full sample results are described here because subsample results are qualitatively similar with full sample findings. Column 1 presents results of financial burden on lapse decision, even though individuals may not have learned new information about their risk classification. Results are broadly consistent with existing literature that low-income and low-wealth individuals are more likely to lapse as their policies become unaffordable. Namely, individuals in lower personal savings

[7] All regression analyses incorporated HRS probability weights to reflect complex multistage sampling design for the HRS data

(i.e. higher competing financial needs) and lower wealth quartiles are more likely to let their policies lapse compared to the highest savings and wealth quartiles. In particular, relative to individuals at the highest personal savings quartile of the distribution, those at the lowest quartile are about 9% more likely to lapse. Similarly, individuals at the first or second wealth quartiles are, respectively, 12% and 4% more likely to lapse compared to individuals with the top wealth quartile. These findings support the hypothesis of financial lapse suggesting that the policy was either unaffordable to begin with or increase in competing financial needs within the household (as measured by personal savings) or wealth decumulation contribute to termination of current policy coverage for LTSS. An individual's transition to Medicaid status as a significant predictor of lapse indicates that worsening financial situation within household may make individuals dependent on Medicaid to cover long-term care expenses.

Column 2 presents results of expected care utilization and perceived risk of needing nursing home care on the likelihood of lapse. The result suggests that higher the perceived risk of individuals' expectation of using nursing home care in the future, the lower is the likelihood of the policy lapse. For example, one percentage increase in perceived risk of needing nursing home use is associated with 0.7% decrease in the probability of lapse and this effect is significant at 1% level. However, expected length of nursing home stay based on care transition model contradicts this finding suggesting that an increase in one month stay in nursing home use is associated with about 5% higher likelihood of lapse. Furthermore, subsample results indicate that higher expected utilization in assisted living facility is associated with lower likelihood of policy lapse. Therefore, it is not evident that individuals lapse because of change in risk reclassification assessment of their future care needs.

The final column of the Table 4 suggests that even after controlling for financial status and expected utilization risk of LTSS, a higher cognitive score is associated with lower lapse rates - an one point increase in cognitive score is associated with about 0.5% lower probability of lapse. A plausible explanation of this result could be forgetfulness or poor financial decision-making regarding the purchase of LTCI. Being female, more educated, White and older are less likely to lapse while individuals with Hispanic ethnicity are more likely to lapse. The sign of the coefficients are consistent with all the specifications. Coefficients on the time dummies (not shown in the table) indicate a clear trend toward lower lapse rates over time. Conceptually, lapse should less likely to occur the longer into the policy contract the person is because at each time point, present value of expected future benefits remains the same, except for discounted less (as getting closer to the future) while present value of future premium will be smaller as the over amount to be paid goes down (although lower discounting would increase the present value but this effect would be smaller compared to the overall payment for the policy contract). Intuitively, lapse rates should decline sharply the longer the policy is in effect because the insured person is aware that the risk of needing the LTSS is increasing while premium remains the same and having paid premiums for so many years, the policy owner would be reluctant to let it lapse because at that age, it would be financially impossible to purchase any new policy.

Adding loss ratio as a proxy for financial performance of insurers in the model did not significantly impact the policy lapse decision in the full model. Although, without controlling for demand side variables, higher loss ratio was significantly associated with lower probability of terminating an existing policy, this effect disappeared after controlling for all the demand side factors in the model. This may imply that demand-side factors are important in policy lapse decision compared to supply-side factors.

7.3 Suspect Choice

To examine the characteristics of individuals that are directly related to the lapse decision, I examine three indicators of suspect choices related to lapse behavior. Table 5 summarizes the results of impacts of individual characteristics for whom the observed lapse choice differs from the predicted lapse. The table presents the marginal effects based on a binary probit regression, adjusted for HRS survey weights, both for full sample as well as sub sample. The outcome variable of this regression is an indicator variable for whether the individual's observed lapse status differs from the predicted lapse decision. Results suggest that individuals with lower personal savings (or higher competing financial needs within household) or wealth quartiles are more likely to deviate from their predicted lapse behavior. Marginal effects indicate that a decrease in personal savings or wealth from the top to the bottom quartile increases the probability of making a suspect choice by up to 7.6 and 9.0 percentage points. These effects are reduced after accounting for expected risk and utilization of nursing home care and cognitive status.

The estimates in columns 2 and 3 suggest that individuals with higher expected utilization of nursing home care are more likely to deviate from their predicted behavior. But individuals with higher perceived risk of needing nursing home care and higher cognitive status are less likely to deviate from predicted lapse behavior. Again, in the subsample, individuals with higher expected utilization of assisted living care are less likely to deviate from their predicted lapse behavior. This could be due to an increase in number of assisted living facilities in an effort to promote home and community based long-term care services as oppose to nursing home use. The result that higher cognitive function is associated with a lower probability of making a suspect choice is economically meaningful as suggesting that individuals with higher level of cognition are better able to make a choice that is consistent with their preferences under the expected utility framework. Women appear less likely to deviate from their predicted behavior, which could be explained by the higher likelihood of needing care for women than men due to greater longevity. However, it looses statistical significance in the full model accounting for expected utilization and cognitive status.

For the second indicator of the suspect choice i.e. individuals' observed lapse decision for which expected cost and variance of cost are lower with retaining the LTCI policy, the suspect choice is then defined if individuals lapse the policy for whom expected cost and variance were higher for retaining the policy versus dropping it. In this analysis, there were 107 individuals for whom expected cost of retaining the LTCI policy was lower than dropping the policy but the variance of cost was higher, therefore, for them letting the policy lapse is optimal in terms of risk reduction but not in terms of mean LTCI expenditures. I drop these individuals from the analysis and estimate the model forthose the definite identification of suspect choice is possible. The marginal effects from this binary probit model are summarized in Table 6.

Results are qualitatively similar to the results from the first indicator of suspect choice, although magnitudes of wealth quartiles are higher. No significant differences in estimated effects of individual characteristics on these two suspect choice indicators suggest that impact of individual characteristics are not dependent on the these two definitions of suspect choice indicators. The results from the knowledge-based suspect choice indicator (3rd indicator of suspect choice) however, suggest no apparent effect of these individual characteristics on the lapse decision without understanding the crucial feature of the LTCI policy. The only significant impact observed is that individuals with 3rd personal savings quartile are more likely to make a decision at the time of policy renewal even not fully understanding the inflation protection feature of the policy. The effect is consistently significant in all models and a reduction from top to 3rd quartile increases the probability of

making a suspect choice by up to 4.9 percentage point. One potential explanation would be, all else constant, individuals who have more than median personal savings are more likely to make the suspect choice without fully understanding their options before the policy renewal probably because financial needs will not influence their ability to retain the policy. However, this is an ad hoc judgement about the tradeoffs between retaining versus dropping the policy based on expect cost and variance, compared to other two theory based indicators. These results are summarised in Table 7.

7.4 Lapse and Subsequent Utilization

Understanding potential reasons for lapse LTCI policies suggest that housing wealth, competing financial needs, expected utilization and risk of needing nursing home care and cognitive status are important predictors of a policy lapse. However, this analysis does not address the possible association between lapsing and subsequent use of nursing home care, which is important for indentifying potential *ex post* adverse selection in this market. Using a very similar sample construction that was used by Finkelstein *et al.* (2005), there were 3,417 individuals identified "at risk" of letting their policies lapse and who can be observed for subsequent nursing home care utilization after the policy lapse. It is worth noting a puzzling pattern in the descriptive of this sample: on average, about 14% of individuals used subsequent nursing home care after dropping their policies compared to 4% used a overnight nursing home care who maintained their coverage. This is opposite to what risk reclassification hypothesis suggested in Finkelstein *et al.* (2005) paper that those who dropped coverage were less likely to use a nursing home than those who retained coverage. However, this is unadjusted for health and demographic control variables. Regression results are summarized in Table 10 from a binary probit model to test the association between lapse and subsequent use of nursing home care. The relationship between a policy lapse and subsequent nursing home use is significantly positive, suggesting that those who dropped coverage were more likely to use subsequent nursing home care compared to who maintained coverage. This finding is consistent with the recent evidence of a positive correlation between policy lapse and subsequent care use, however, the strength of this positive relationship loses statistical significance after controlling for other factors in that brief report (Hou *et al.*, 2015).

8 Sensitivity Analyses

I conduct a series of robustness checks to ensure that results are not driven by exclusions and assumptions. First, individuals those who died and were institutionalized at time 2 of each 2-year transition were excluded. This exclusion ensures that the policy lapse was not due to death. Also, individuals who were institutionalized will not consider to lapse the policy as they do not require to pay premium while collecting benefits. A total of 584 individuals were excluded from the initial sample and regression results are summarized in Table 8. For the most part, the results from these regressions qualitatively similar and robust compared to the original probit model of lapse with one exception that expected nursing home utilization loses its statistical significance in this specification. Second, due to uncertainty regarding people's ability to report their LTCI ownership status, I assess whether results are robust to the credibility of responses. Following Konetzka & Luo (2011), I assume that individuals who responded their LTCI status are credible if they answered detailed questions about LTCI after the initial LTCI ownership question was asked in the survey. Following a positive response of LTCI ownership question, individuals were asked if the policy included both nursing home and home health care, if benefits payments increase with inflation, if respondents received benefits under the existing policy, amount of premium they pay

for the policy and how often payments are made. The main analyses were re-estimated on the subset of respondents who answered at least 3 out of 5 of these questions that were asked in all HRS waves. Results are robust and similar to the main analyses (can be obtained from the author upon request). Finally, all analyses were performed using the subsample using data from HRS 2002-2012 and results are consistent in both samples. Starting from HRS 2002, to confirm that respondents refer LTCI status correctly, follow-up question was asked which is likely to reduce any potential bias in the lapse variable based on reporting LTCI status in the current study. Results from the susbsample analyses qualitatively similar to the full sample analyses, ensure the robustness of the findings.

9 Conclusion

The current study investigates potential factors that contribute to the LTCI policy lapse as well as consequences of lapsing. While examining factors responsible for dropping an existing LTCI coverage, I include actual LTCI premium data from the Genworth (previously GE Financial Inc.), cost of long-term care (nursing home, assisted living and home health) using data from MetLife Market Survey (MetLife, 2012) and incorporate these cost and premium data into a recent long-term care simulation model developed by Friedberg *et al.* (2014). The simulation model then produced expected cost of care and utilization of each type of care which contributed to our understanding of the affordability of existing LTCI policy and if that is one of reasons people drop their LTCI coverage, although the same policy was initially affordable to them. Konetzka & Luo (2011) clearly identified the usefulness of LTCI cost and premium data while examining individual's lapse behavior and Li & Jensen (2012) questioned the role of competing financial needs within the household that could potentially cause LTCI to become less affordable and ultimately drop of coverage. The current study addressed both of issues by using actual LTCI premium and LTCI cost estimates along with the measure of financial need while examining the lapse decision.

Initial analyses find that an individual's wealth, competing financial needs within household, expected utilization of nursing home care and assisted living facility, and cognitive status are significantly related to the LTCI lapse decision. While examining suspect choice related to LTCI lapse, I find that less wealthier individuals and those with greater financial needs are more likely to make suboptimal decision in regard to the LTCI lapse. Similarly, individuals with higher cognitive status are less likely to make suspect choice regarding to the policy lapse. Results, in most part, are consistent with regard to two theory-based definitions of suspect choice indicators used in the current study.

The consequence of lapsing is significant and it contradicts to risk reclassification hypothesis in the private LTCI market. Results indicate that individuals those who lapse are more likely to subsequently use nursing home care in the future which is in contradiction to what Finkelstein *et al.* (2005) found but consistent with the recent brief report by Hou *et al.* (2015). Implications of this result are significant as it suggests that for many lapsers maintaining the LTCI coverage could actually be counterproductive but by letting the policy lapse they are exposed to resumed risk of self-financing long-term care while forfeit anticipated policy benefits and lost premium paid for the policy. It also implies that these individuals may spend-down their retirement wealth for paying for long-term care when they could have received benefits under the policy had they maintained the coverage.

Limitations of this study include lack of data on supply-side factors, especially features of the private LTCI market that could potentially influence the policy lapse decision. One such important factor is the possibility of higher premium

rates of an existing policy. Although LTCI companies don't have the right to increase premium for this type of policy and for a particular policyholder, but frequently companies increase premium for a class of policyholders and explain that the premium increase is necessary to account for higher unexpected increase in claims. For example, recently Genworth increased premium for their LTCI policies about 60% in the state of New York (Genworth, 2015). Although in case of premium increase, policyholders are given options of lowering benefits to keep premium fairly at the same level, but in most cases, lapse becomes an obvious choice to a policyholder who can't afford to pay the increased premium to maintain the coverage or lowering benefit structure may not be economically justifiable. Second, trust in insurers in paying claims for LTSS use in the future. Policyholders may perceive the risk that insurers will deny claims submitted by insured persons. For example, based on the National Long-Term Care Decision Study, about 30% claims submitted between 2007-2008, on average, were denied (LifePlans Inc., 2010). This is a very likely situation becase the policies that have been purchased decades ago may contain out of date requirements for claiming benefits and because the changes are not retroactive, policyholders are denied claims as policies sold prior to the change donot comply with the new changes. Another supply-side factor is the counter-party risk that may influence people's lapse decision of an existing LTCI policy. Counter-party risk identified in Brown *et al.* (2012), is the risk if policyholders have concerns about insurers going bankrupt or exiting the market then individuals may decide to let the current policy lapse rather than continue to pay premiums with uncertainly about collecting future benefits when needing care. Authors found that individuals having concerns about the financial stability of insurance companies (for example, exit of several insurance carriers from the market) were less likely to purchase the policy. However, these features of the private market are not controlled in the current study because of lack of appropriate data, which, in fact, are not readily avaiable for research. However, adding the loos ratio as a proxy for financial stability of the insurers did not appear to influecne the policy lapse decision.

Despite, findings of the current study have important implications for potential LTCI purchasers, insurers and policy makers. Elderly individuals considering financing long-term care needs through private LTCI policy are unaware about the possibility that initially affordable policies may become unaffordable later on and factors that contribute to potential lapse of the policy. Specifically, potential purchasers with higher competing financial needs within household or lower cognitive status may want to seek additional advice and reconsider the decision to purchase a LTCI policy as they are at high risk for dropping the coverage at some point after the purchase before benefits trigger. One possible way to reduce the lapse rate is to require lump sum payment of LTCI premium since potential LTCI purchasers have accumulated significant financial wealth while making the decision to purchase private LTCI. But from the insurer's perspective this will be economically inefficient without having the possibility of premium increase should claim experiences be higher than expected. From the policy makers' perspective, letting a LTCI policy lapse after purchase will not reduce the burden on publicly funded program (mainly Medicaid) for financing long-term care and solve the financing challenge that elderly individuals are yet to face in the future. However, a host of supply side factors including non-standardization of LTCI porducts with significant product differentiation, potential risks of premium increase and claims denials and financial instaibiltiy of insurers may also be potentially responsible for the lapse of LTCI policies. If private LTCI market is expected to successfully help financing of LTSS then product standards need to be developed to overcome problems associated with the LTCI market in the US.

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10 Tables and Figures

Table 1: **Summary Statistics by Time 2 LTCI Status**[a]

	Full Sample	LTCI Lapsed	LTCI Retained
Age	69.9	68.4	70.4
	(0.23)	(0.38)	(0.34)
Female	0.59	0.54	0.63
	(0.23)	(0.38)	(0.34)
Education	12.7	12.3	13.0
	(0.01)	(0.02)	(0.02)
White	0.92	0.86	0.96
	(0.007)	(0.01)	(0.006)
Hispanic	0.03	0.05	0.01
	(0.004)	(0.01)	(0.003)
Cognition	23.7	23.2	24.1
	(0.10)	(0.17)	(0.10)
Married(partnered)	0.64	0.59	0.68
	(0.01)	(0.02)	(0.01)
Couple	0.70	0.64	0.74
	(0.01)	(0.02)	(0.01)
Risk tolerance	0.20	0.20	0.19
	(0.001)	(0.002)	(0.001)
Medicaid	0.03	0.06	0.01
	(0.004)	(0.008)	(0.003)
NH move	0.31	0.27	0.33
	(0.006)	(0.009)	(0.007)
Total wealth	$560,574	$383,141	$689,036
	($32,343)	($44,871)	($36,645)
Personal savings	$254,041	$163,931	$319,282)
	($16,303)	($24,269)	($21,352)
Population Size	10.7 mil.	3.7 mil.	6.6 mil.
Sample Size	3,600	1,409	2,191

[a]Estimated population means with standard errors are reported in parenthesis.

Table 2: **Monthly LTCI Premiums, Plan Benefits and Monthly LTSS Costs**[a]

Age	Census Region	Annual LTCI Premiums	Monthly Nursing Home Costs	Monthly Home Health Costs	Monthly Assisted Living Costs
(60-70)	Northeast	$1,556	$6,273	$2,307	$2,531
	Midwest	$1,556	$4,188	$2,160	$2,059
	South	$1,556	$4,087	$1,885	$2,045
	West	$1,556	$5,453	$2,243	$2,131
(71-80)	Northeast	$3,595	$6,273	$2,307	$2,531
	Midwest	$3,595	$4,188	$2,160	$2,059
	South	$3,595	$4,087	$1,885	$2,045
	West	$3,595	$5,453	$2,243	$2,131
(81-95)	Northeast	$9,549	$6,273	$2,307	$2,531
	Midwest	$9,549	$4,188	$2,160	$2,059
	South	$9,549	$4,087	$1,885	$2,045
	West	$9,549	$5,453	$2,243	$2,131

[a]Monthly LTCI premiums are based on a plan offered in the State of Texas by GE Capital in 2002. The plan had lifetime maximum payment of $73,000 with 5% compound benefit increases, 100 days elimination period, daily maximum nursing home benefit of $100, daily benefits for assisted living and home health care expenses were 80% and 90% of daily maximum, respectively.

Table 3: **Summary of Expected Utilization and Expenditures of LTSS**[a]

	Years in Health State			Expenditures	
Age Range	Nursing Home	Assisted Living	Home Health	LTCI Retained	LTCI Lapsed
Female					
(60,70)	2.73	3.51	7.05	\$6,033	\$14,742
				(\$8,827)	(\$9,566)
(71,80)	2.97	3.16	7.14	\$8,373	\$22,789
				(\$11,693)	(\$14,075)
(81,95)	3.19	2.59	5.08	\$9,306	\$17,482
				(\$8,419)	(\$15,864)
Male					
(60,70)	1.81	2.01	5.77	\$4,601	\$12,594
				(\$8,835)	(\$9,428)
(71,80)	2.07	1.62	5.74	\$6,110	\$19,016
				(\$10,115)	(\$12,850)
(81,95)	2.49	1.47	4.52	\$7,103	\$15,979
				(\$7,744)	(\$14,904)

[a]Estimated time in each health state and costs by age and gender based on monthly transitional probabilities. Present discounted values of expected costs are calculated over a 30 year-period with a discount factor of 3.5% per year. The summary statistics are averaged across individuals in all cases. For example, \$6033 reflects the mean (across individuals) of mean expenditures (within individuals) retaining LTCI and \$14,472 is the mean (across individuals) of mean expenditures (within individuals) after the policy lapse.

Table 4: **Probit Regression of LTCI Lapse**[8]

	Full Sample (1996-2012)			Subsample (2002-2012)		
Variables	(1)	(2)	(3)	(1)	(2)	(3)
Age	-0.065***	-0.078***	-0.077***	-0.051***	-0.063***	-0.061***
	(0.007)	(0.010)	(0.010)	(0.007)	(0.010)	(0.011)
Age-sq.	0.0004***	0.0005***	0.0005***	0.0003***	0.0004***	0.0004***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Female	-0.036***	-0.064**	-0.060**	-0.030***	-0.042*	-0.037
	(0.009)	(0.026)	(0.026)	(0.009)	(0.025)	(0.025)
Education	-0.034**	-0.038**	-0.026	-0.021	-0.026	-0.015
	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.015)
White	-0.120***	-0.137***	-0.133***	-0.124***	-0.137***	-0.143***
	(0.025)	(0.026)	(0.027)	(0.031)	(0.033)	(0.033)
Hispanic	0.215***	0.199***	0.194***	0.210***	0.181***	0.177***
	(0.046)	(0.051)	(0.052)	(0.056)	(0.061)	(0.063)
Couple	-0.033	-0.012	-0.013	-0.016	-0.021*	-0.023**
	(0.016)	(0.014)	(0.015)	(0.011)	(0.012)	(0.012)
Risk Tolerance	-0.026	-0.047	-0.025	-0.104	-0.113	-0.088
	(0.088)	(0.087)	(0.087)	(0.093)	(0.090)	(0.089)
Medicaid Spend-down	0.129**	0.127**	0.123**	0.125***	0.119*	0.113*
	(0.058)	(0.061)	(0.061)	(0.063)	(0.067)	(0.043)
Personal savings Quartiles						
1*st* Quartile	0.086***	0.080***	0.089***	0.061***	0.079***	0.050**
	(0.022)	(0.231)	(0.030)	(0.023)	(0.023)	(0.023)
2*nd* Quartile	0.029	0.027	0.026	0.009	0.027	0.008
	(0.019)	(0.018)	(0.018)	(0.018)	(0.018)	(0.018)
3*rd* Quartile	0.015	-0.020	-0.019	-0.021	-0.025*	-0.026*
	(0.016)	(0.016)	(0.017)	(0.016)	(0.016)	(0.016)
Wealth Quartiles						
1*st* Quartile	0.128***	0.111***	0.110***	0.135***	0.110***	0.109***
	(0.024)	(0.024)	(0.024)	(0.027)	(0.027)	(0.027)
2*nd* Quartile	0.039**	0.040**	0.039**	0.047**	0.045**	0.045**
	(0.018)	(0.019)	(0.019)	(0.020)	(0.020)	(0.020)
3*rd* Quartile	0.017	0.012	0.011	0.025	0.012	0.022
	(0.016)	(0.016)	(0.016)	(0.017)	(0.016)	(0.017)
Expected Utilization and Risks						
Nursing home		-0.001	-0.006		-0.010	-0.013
		(0.031)	(0.031)		(0.014)	(0.030)
Assisted Living		0.057***	0.060***		0.054**	0.057***
		(0.023)	(0.023)		(0.023)	(0.023)
Home Health		-0.042***	- 0.043***		-0.040***	-0.040***
		(0.013)	(0.013)		(0.014)	(0.014)
Risk of nursing home move		-0.001***	-0.001***		-0.001**	-0.001**
		(0.0004)	(0.0004)		(0.0004)	(0.004)
Financial decision						
Cognitive Status			-0.004***			-0.004***
			(0.001)			(0.001)
Time Trends						
Year=1998	0.374***	1.27***	0.364***			

continued to next page

[8]Regressions were adjusted for HRS survey weights and sampling design, marginal effects with standard errors are in parenthesis. Column (1) represents role of competing financial needs within household on lapse; column 2 and 3 reflect results for strategic lapse decision and poor financial decision-making respectively.An intercept was included in all regressions but not shown in the table. $^{\star}p < 0.1$,$^{**}p < 0.05$, $^{***}p < 0.01$

Table 4: *(continued)*

	Full Sample (1996-2012)			Subsample (2002-2012)		
Variables	(1)	(2)	(3)	(1)	(2)	(3)
	(0.032)	(0.123)	(0.043)			
Year=2000	0.219***	0.827***	0.215***			
	(0.021)	(0.093)	(0.285)			
Year=2002	0.101***	0.407***	0.092***	0.091***	0.087***	0.084***
	(0.018)	(0.090)	(0.022)	(0.017)	(0.021)	(0.022)
Year=2004	0.030*	0.118	0.026	0.027**	0.024	0.024
	(0.016)	(0.085	(0.019))	(0.014)	(0.017)	(0.017)
Year=2006	0.024	0.096	0.019	0.022	0.019	0.018
	(0.015)	(0.730)	(0.016)	(0.013)	(0.014)	(0.014)
Year=2008	0.020	0.119*	0.024*	0.017	0.023*	0.021
	(0.013)	(0.064)	(0.014)	(0.012)	(0.013)	(0.013)
Year=2010	0.000	0.009	-0.000	0.002	0.002	0.0001
	(0.011)	(0.047)	(0.009)	(0.010)	(0.008)	(0.008)
Census Region						
South	-0.001	0.004	-0.001	0.013	0.008	0.007
	(0.020)	(0.022)	(0.022)	(0.021)	(0.023)	(0.023)
West	-0.036	-0.045**	-0.047**	-0.015	-0.026	-0.028
	(0.022)	(0.023)	(0.023)	(0.23)	(0.024)	(0.024)
Midwest	-0.044**	-0.051**	-0.051**	-0.030	-0.041**	-0.041**
	(0.019)	(0.021)	(0.021)	(0.020)	(0.021)	(0.021)
Person-year Observations	10,097	9,254	9,164	8,222	7,496	7,425

Table 5: **Suspect Choice Indicator of LTCI Lapse-Observed Vs. Predicted Behavior**[a]

	Full Sample (1996-2012)			Subsample (2002-2012)		
Variables	(1)	(2)	(3)	(1)	(2)	(3)
Age	-0.032***	-0.004	-0.003	-0.021*	0.001	0.007
	(0.009)	(0.014)	(0.014)	(0.011)	(0.014)	(0.015)
Age-sq.	0.0002 ***	0.000	0.000	0.0001	0.0003***	-0.0001
	(0.0000)	(0.0001)	(0.0001)	(0.0000)	(0.0001)	(0.0001)
Female	-0.026**	-0.064	-0.032	-0.056	-0.075**	-0.067
	(0.013)	(0.038)	(0.038)	(0.015)	(0.041)	(0.041)
Education	-0.019	-0.002	0.001	-0.019	-0.019	- 0.005
	(0.020)	(0.017)	(0.014)	(0.015)	(0.020)	(0.019)
White	-0.064***	-0.081***	-0.061*	-0.128***	-0.115***	-0.126 ***
	(0.029)	(0.033)	(0.033)	(0.029)	(0.046)	(0.045)
Hispanic	0.044	-0.004	0.042	- 0.011	0.044	0.006
	(0.049)	(0.041)	(0.040)	(0.041)	(0.049)	(0.036)
Couple	-0.019	0.007	0.008	-0.015	-0.019	-0.014
	(0.024)	(0.014)	(0.014)	(0.011)	(0.024)	(0.012)
Risk Tolerance	-0.165	-0.107	-0.102	-0.160	-0.165	-0.132
	(0.158)	(0.091)	(0.091)	(0.091)	(0.158)	(0.157)
Medicaid spend-down	0.024	0.048	0.027	0.056	0.062	0.064
	(0.042)	(0.044)	(0.043)	(0.029)	(0.058)	(0.059)
Personal savings Quartiles						
1*st* Quartile	0.101***	0.078***	0.076***	0.066***	0.059**	0.056***
	(0.028)	(0.029)	(0.022)	(0.029)	(0.023)	(0.023)
2*nd* Quartile	0.040*	0.033	0.038**	0.006	0.010	0.007
	(0.023)	(0.024)	(0.024)	(0.024)	(0.018)	(0.017)
3*rd* Quartile	0.004	-0.004	-0.019	-0.021	-0.012	-0.026*
	(0.019)	(0.015)	(0.017)	(0.016)	(0.015)	(0.015)
Wealth Quartiles						
1*st* Quartile	0.055**	0.050**	0.043	0.067***	0.070**	0.068**
	(0.027)	(0.028)	(0.028)	(0.023)	(0.032)	(0.031)
2*nd* Quartile	0.018	0.023	0.019	0.045**	0.018	0.015
	(0.025)	(0.024)	(0.019)	(0.020)	(0.025)	(0.031)
3*rd* Quartile	-0.0.003	-0.005	-0.007	0.0.026	-0.0.003	-0.004
	(0.019)	(0.016)	(0.019)	(0.017)	(0.0196)	(0.019)
Expected Utilization and Risks						
Nursing home		-0.021	0.050***		-0.021	-0.018
		(0.031)	(0.020)		(0.031)	(0.020)
Assisted Living		0.052***	0.051**		0.059***	0.055***
		(0.022)	(0.022)		((0.023)	(0.022)
Home Health		-0.041***	0.042***		-0.031**	-0.031 **
		(0.013)	(0.013)		(0.013)	(0.014)
Risk of nursing home move		-0.001**	-0.001**		-0.001**	-0.001**
		(0.0004)	(0.002)		(0.0004)	(0.0004)
Financial decision						
Cognitive Status			-0.003*			-0.003**
			(0.001)			(0.001)
Person-year Observations	10,097	9,254	9,164	8,205	6,753	6,611

[a]Regressions results where observed Lapse differs from predicted lapse behavior, adjusted for HRS survey weights and sampling design, marginal effects with standard errors are in parenthesis. Column (1) represents role of competing financial needs within household on lapse; column 2 and 3 reflect results for strategic lapse decision and poor financial decision-making respectively. An intercept was included in all regressions but not shown in the table. Estimates for time trends and census regions follow similar qualitative results to the base regression model and thus not reported in the table (can be found from the author upon request)$^{\star}p < 0.1$,$^{**}p < 0.05$, $^{***}p < 0.001$

Table 6: **Suspect Choice Indicator of LTCI Lapse-Dominated Choice**[a]

	Full Sample (1996-2012)			Subsample (2002-2012)		
Variables	(1)	(2)	(3)	(1)	(2)	(3)
Age	-0.051***	-0.066***	-0.064***	-0.037***	-0.060***	-0.059***
	(0.007)	(0.010)	(0.010)	(0.007)	(0.010)	(0.010)
Age-sq.	0.0003***	0.0004***	0.0005***	0.0002***	0.0004***	0.0004***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Female	-0.011	-0.036	-0.032	-0.013	-0.034	-0.024
	(0.009)	(0.026)	(0.025)	(0.009)	(0.025)	(0.025)
Education	-0.002	-0.003	0.003	0.023	-0.020	-0.012
	(0.013)	(0.014)	(0.014)	(0.015)	(0.015)	(0.014)
White	-0.068***	-0.049**	-0.039*	-0.122***	-0.127**	-0.113***
	(0.023)	(0.023)	(0.023)	(0.015)	(0.031)	(0.032)
Hispanic	-0.007	0.038	0.042	0.059	0.067	0.003
	(0.035)	(0.031)	(0.031)	(0.043)	(0.035)	(0.037)
Couple	0.005	0.001	0.003	-0.014	-0.010	0.003
	(0.013)	(0.014)	(0.014)	(0.011)	(0.011)	(0.014)
Risk Tolerance	-0.052	-0.079	-0.0912	-0.087	-0.132	-0.130
	(0.089)	(0.091)	(0.091)	(0.089)	(0.091)	(0.091)
Medicaid	-0.001	0.007	-0.005	0.004	-0.001	-0.015
	(0.028)	(0.029)	(0.028)	(0.031)	(0.030)	(0.029)
Personal savings Quartiles						
1*st* Quartile	0.076***	0.069**	0.066***	0.060***	0.058**	0.051**
	(0.022)	(0.022)	(0.022)	(0.022)	(0.023)	(0.022)
2*nd* Quartile	0.042**	0.039**	0.041**	0.011	0.012	0.011
	(0.018)	(0.018)	(0.018)	(0.017)	(0.018)	(0.018)
3*rd* Quartile	-0.016	-0.018	-0.018	-0.027*	-0.028*	-0.027*
	(0.016)	(0.015)	(0.016)	(0.015)	(0.015)	(0.015)
Wealth Quartiles						
1*st* Quartile	0.093***	0.076***	0.076***	0.125***	0.100***	0.099**
	(0.023)	(0.023)	(0.023)	(0.027)	(0.026)	(0.026)
2*nd* Quartile	0.039**	0.042**	0.042**	0.046**	0.047**	0.047**
	(0.019)	(0.019)	(0.019)	(0.020)	(0.020)	(0.020)
3*rd* Quartile	0.0.023	0.018	0.017	0.0.028*	0.022	0.022
	(0.016)	(0.016)	(0.016)	(0.017)	(0.016)	(0.016)
Expected Utilization and Risks						
Nursing home		0.054***	0.049**		0.048**	0.039**
		(0.020)	(0.020)		(0.020)	(0.019)
Assisted Living		-0.027**	-0.029***		-0.036***	-0.036***
		(0.013)	(0.013)		(0.013)	(0.013)
Home Health		0.005	0.005		0.008***	0.008***
		(0.005)	(0.005)		(0.003)	(0.004)
Risk of nursing home move		-0.005***	-0.006***		-0.005***	-0.006***
		(0.001)	(0.002)		(0.002)	(0.002)
Financial decision						
Cognitive Status			-0.002**			-003**
			(0.001)			(0.001)
Person-year Observations	9,951	9,144	9,065	8,166	7,467	7,402

[a]Regressions results where dominated choice exists as mentioned in the method section, results are adjusted for HRS survey weights and sampling design, marginal effects with standard errors are in parenthesis. Column (1) represents role of competing financial needs within household on lapse; column 2 and 3 reflect results for strategic lapse decision and poor financial decision-making respectively.An intercept and time trend (calendar years) were included in all regressions but not shown in the table. $^{\star}p < 0.10$,$^{**}p < 0.05$, $^{***}p < 0.01$

Table 7: **Suspect Choice Indicator of LTCI Lapse-Inflation Protection Question**[a]

	Full Sample (1996-2012)			Subsample (2002-2012)		
Variables	(1)	(2)	(3)	(1)	(2)	(3)
Age	-0.026***	-0.028**	-0.027**	-0.037***	-0.034**	-0.034**
	(0.010)	(0.012)	(0.013)	(0.010)	(0.014)	(0.014)
Age-sq.	0.0002***	0.0002**	0.0005***	0.0003***	0.0002**	0.0002**
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Female	-0.011**	-0.017	-0.032	-0.013	-0.020	-0.019
	(0.013)	(0.035)	(0.025)	(0.023)	(0.037)	(0.037)
Education	-0.002	-0.007	-0.002	0.002	-0.001	- 0.001
	(0.021)	(0.022)	(0.014)	(0.023)	(0.024)	(0.025)
White	0.011	-0.008	-0.004	0.011	-0.020	-0.016
	(0.023)	(0.028)	(0.027)	(0.027)	(0.035)	(0.035)
Hispanic	0.058	0.072	0.073	0.078	0.096	0.098
	(0.050)	(0.057)	(0.058)	(0.063)	(0.071)	(0.073)
Couple	-0.008	-0.012	-0.012	-0.005	-0.006	-0.013
	(0.016)	(0.028)	(0.022)	(0.018)	(0.020)	(0.023)
Risk Tolerance	0.001	0.030	0.042	-0.015	0.027	-0.040
	(0.140)	(0.143)	(0.144)	(0.140)	(0.145)	(0.146)
Medicaid	-0.038	-0.042	-0.042	-0.0129	-0.019	-0.021
	(0.025)	(0.026)	(0.027)	(0.039)	(0.039)	(0.038)
Personal savings Quartiles						
1*st* Quartile	0.026	0.044	0.041	0.028	0.054	0.049
	(0.025)	(0.030)	(0.030)	(0.029)	(0.034)	(0.034)
2*nd* Quartile	0.034	0.045	0.043	0.037	0.051*	0.049
	(0.024)	(0.018)	(0.023)	(0.029)	(0.030)	(0.030)
3*rd* Quartile	0.030	0.049**	0.048**	0.032	0.052**	0.051**
	(0.020)	(0.024)	(0.023)	(0.021)	(0.025)	(0.025)
Wealth Quartiles						
1*st* Quartile	0.017	0.012	0.011	0.015	0.005	0.005
	(0.026)	(0.027)	(0.027)	(0.029)	(0.028)	(0.028)
2*nd* Quartile	-0.006	-0.013	-0.013**	-0.010	-0.019	- 0.019
	(0.021)	(0.022)	(0.022)	(0.029)	(0.023)	(0.023)
3*rd* Quartile	-0.0.013	- 0.009	-0.009	-0.0.0009	-0.004	- 0.003
	(0.019)	(0.020)	(0.021)	(0.020)	(0.022)	(0.022)
Expected Utilization and Risks						
Nursing home		0.035	0.036		0.037	0.038
		(0.029)	(0.029)		(0.031)	(0.031)
Assisted Living		-0.021	-0.021		-0.023	-0.022
		(0.020)	0.020)		(0.013)	(0.022)
Home Health		0.007	0.007		0.008	0.009
		(0.013)	(0.008)		(0.014)	(0.014)
Risk of nursing home move		-0.001	-0.001		-0.001	-0.001
		(0.002)	(0.002)		(0.003)	(0.003)
Financial decision						
Cognitive Status			-0.001			-001
			(0.001)			(0.001)
Person-year Observations	10,097	9,254	9,164	8,205	6,753	6,611

[a]Regressions results where respondents made the renewal decision without having the knowledge of inflation protection beneft of their policies, adjusted for HRS survey weights and sampling design, marginal effects with standard errors are in parenthesis. Column (1) represents role of competing financial needs within household on lapse; column 2 and 3 reflect results for strategic lapse decision and poor financial decision-making respectively. An intercept and time trend (calendar years) were included in all regressions but not shown in the table. $^{\star}p < 0.1, ^{**}p < 0.05$, $^{***}p < 0.001$

Table 8: **Sensitivity Analysis of Lapse**[a]

Variables	(1)	(2)	(3)
Age	-0.067***	-0.078***	-0.076***
	(0.008)	(0.011)	(0.010)
Age-sq.	0.0004***	0.0005***	0.0005***
	(0.0001)	(0.0001)	(0.0001)
Female	-0.035***	-0.044	-0.037
	(0.009)	(0.032)	(0.032)
Education	-0.035**	-0.042**	0.029
	(0.017)	(0.017)	(0.017)
White	-0.127***	-0.149**	-0.143***
	(0.027)	(0.029)	(0.029)
Hispanic	0.212***	0.192***	0.186 ***
	(0.047)	(0.051)	(0.053)
Couple	-0.017	-0.018	-0.020
	(0.016)	(0.016)	(0.016)
Medicaid	0.079**	0.089**	-0.077
	(0.037)	(0.039)	(0.037)
Personal savings Quartiles			
1*st* Quartile	0.078***	0.076**	0.071***
	(0.023)	(0.023)	(0.023)
2*nd* Quartile	0.022**	0.022	0.021
	(0.016)	(0.018)	(0.018)
3*rd* Quartile	-0.011	-0.016	-0.015
	(0.016)	(0.015)	(0.016)
Wealth Quartiles			
1*st* Quartile	0.134***	0.113***	0.112***
	(0.026)	(0.025)	(0.025)
2*nd* Quartile	0.046**	0.046**	0.046**
	(0.019)	(0.020)	(0.020)
3*rd* Quartile	0.0.021	0.018	-0.017
	(0.016)	(0.016)	(0.016)
Expected Utilization and Risks			
Nursing home		0.039	0.036
		(0.020)	(0.024)
Assisted Living		-0.021	-0.021
		(0.013)	(0.013)
Home Health		0.003	0.003
		(0.009)	(0.009)
Risk of nursing home move		-0.007***	-0.007***
		(0.002)	(0.002)
Poor Financial decision			
Cognitive Status			-0.004**
			(0.001)
Person-year Observations	9,513	8,670	8,578

[a]Sample for this regression excluded those who died and institutionalized at the time 2 of any-two period transition.All results are adjusted for HRS survey weights and sampling design, marginal effects with standard errors are in parenthesis. Column (1) represents role of competing financial needs within household; column 2 and 3 reflect results for strategic lapse decision and poor financial decision-making respectively.An intercept and time trend (calendar years) were included in all regressions but not shown in the table. $^{\star}p < 0.1$,$^{**}p < 0.05$, $^{***}p < 0.001$

Table 9: **Association between Lapse and Subsequent Use of Nursing Home Care**[a]

Variables	No Controls	With Control Variables
Coefficient on Lapse	0.114***	0.080***
	(0.012)	(0.011)
Observations	3,271	3,271

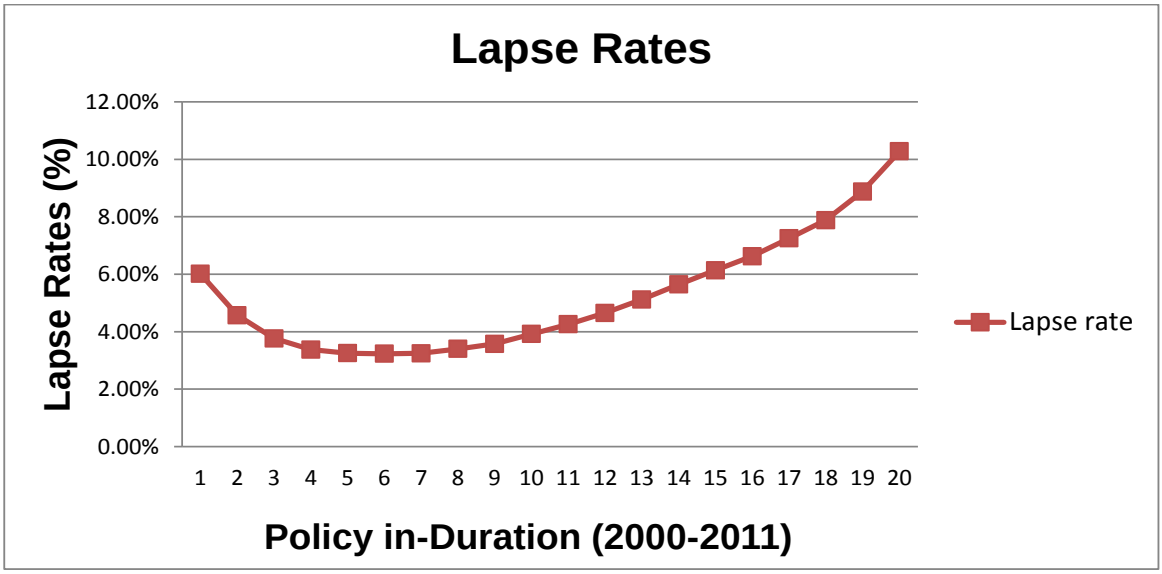
[a]Sample for this regression include individuals who were at "risk of lapsing" as described in the narrative. Dependent variable is whether individuals subsequently use nursing home care and Lapse is an indicator variable whether individuals let their policies lapse. Estimates are adjusted for HRS survey weights and sampling design, marginal effects with standard errors are in parenthesis. An intercept term was included in thel regression but not shown in the table. $^{\star}p < 0.1$,$^{**}p < 0.05$, $^{***}p < 0.001$

Table 10: **Financial performance (Loss Ratio) across Census Region and Policy Lapse**[a]

Variables	No Demand-side Controls	With Demand-side Control Variables
Loss Ratio	-0.012***	0.003
	(0.002)	(0.028)
South	-0.147**	-0.76
	(0.070)	(0.063)
West	-0.263***	-0.106*
	(0.027)	(0.058)
Midwest	-0.234**	-0.107
	(0.059)	(0.060)
Lossratio*South	0.005**	0.002
	(0.002)	(0.001)
Lossratio*West	0.009**	0.002
	(0.002)	(0.002)
Lossratio*Midwest	-0.012**	0.002
	(0.002)	(0.001)

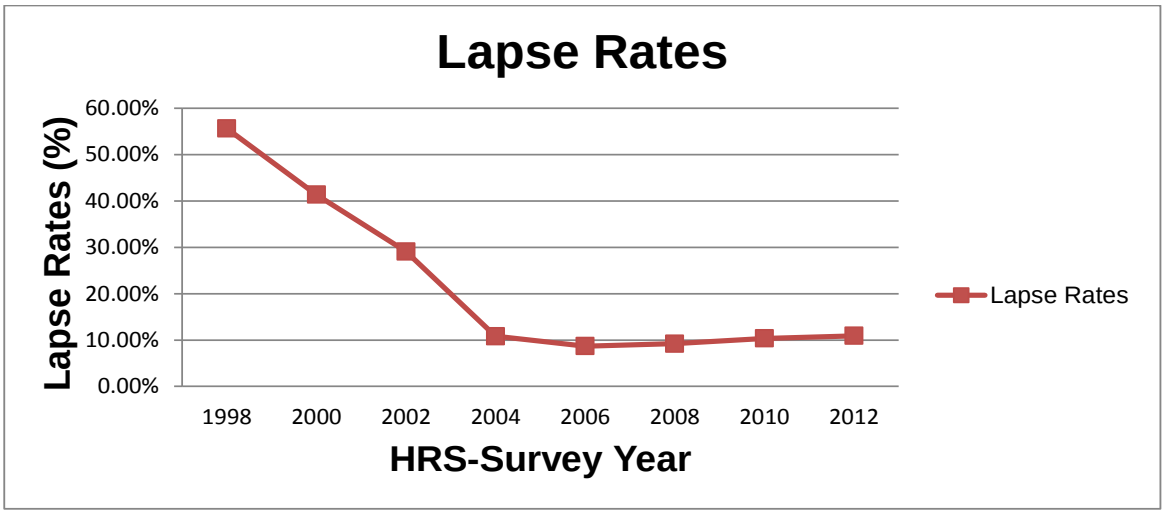
[a] Estimates are adjusted for HRS survey weights and sampling design, marginal effects with standard errors are in parenthesis. Only the full sample restuls are shown here. An intercept term was included in thel regression but not shown in the table. $^{\star}p < 0.1$,$^{**}p < 0.05$, $^{***}p < 0.001$

Figure 1: Lapse Rates from 2000-2011 LTC Experience Study



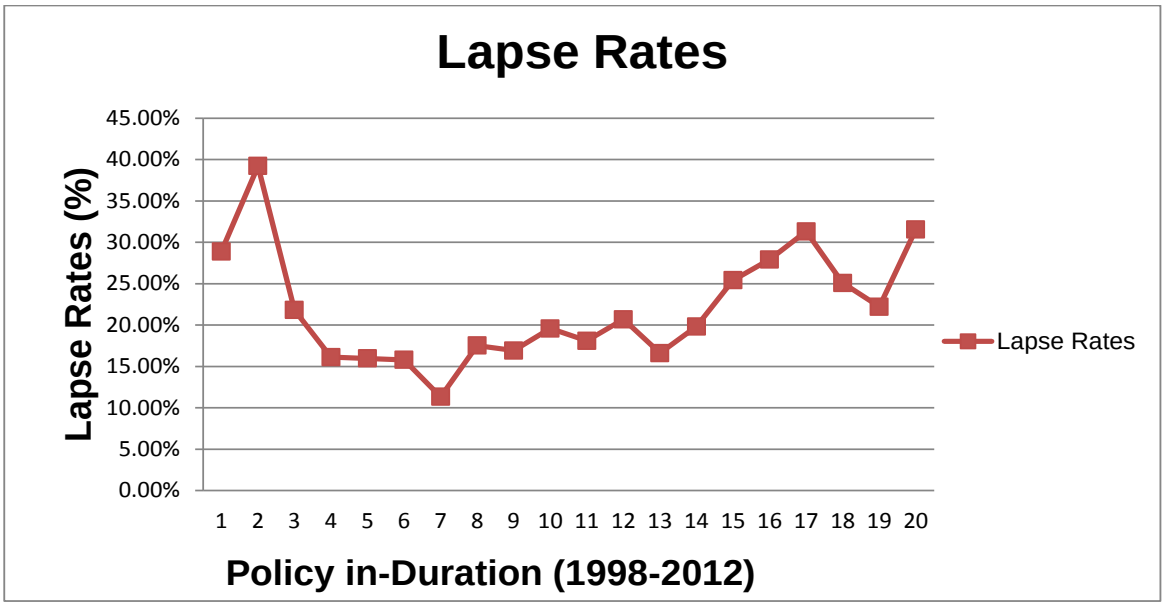
Source: SOA (200-2011, LTC Experience Study)

Figure 2: Lapse Rates by Survey Year from HRS data



Source: Author's calculation based on HRS data (1998-2012)

Figure 3: Lapse Rates by Policy Duration from HRS data



Source: Author's calculation based on HRS data (1998-2012)