Lapses in Long-Term Care Insurance

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Abstract. About a quarter of long-term care insurance (LTCI) policy holders aged 65 let their policies lapse prior to death, forfeiting all benefits. We find that lapse rates are substantially higher among the cognitively impaired in the Health and Retirement Study. This generates a pernicious form of dynamic advantageous selection, as the cognitively impaired are more likely to use care. Simulations show that an inappropriate asset drawdown path further increases the individual welfare cost of unanticipated lapses. Meanwhile, we find evidence of a significant but very small role for either strategic or financial motives for lapsing.

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Long-term care, including both nursing home and home health care, represents a substantial financial risk for most retired households. Yet, few purchase long-term care insurance, and many purchasers let their policies lapse, even after holding them for years. Lapsing can be quite costly to individuals, as they forgo their aging reserves (that is, access to backloaded benefits) and face much higher premiums for a new policy. Extrapolating current lapse rates, over one-quarter of individuals who purchase long-term care insurance at age 65 will let their policies lapse before death, forfeiting all benefits.[1] We investigate reasons why people might let policies lapse, whether the lapses might be strategic or unintended, and whether lapsing leads to adverse or advantageous selection among remaining policyholders.

Researchers have sought evidence of adverse selection in the holding of many types of insurance, including for long-term care, by consumers with private information about their riskiness (Finkelstein and Einav 2011). While insurance lapsing is generally more difficult to observe than insurance purchases, dynamic adverse selection in long-term care insurance has also received some attention. Some lapses may be unintended, however, reflecting a lack of intertemporal consistency in decision-making, and such lapses may lead to dynamic adverse or advantageous selection.

We evaluate evidence for three possible explanations for lapsing. Two of these explanations involve sources of new information. Long-term care insurance contracts have very long duration – claims may occur 25 years or more after purchase. Individuals who learn during that period that their risk of needing care is less than previously expected may let policies lapse, generating *strategic lapsing*. Another form of news is a negative shock to the household budget

[1] Hou, Sun, and Webb (2015). Note that lapse rates were high even before recent large premium increases for policyholders (http://www.insurance.ca.gov/01-consumers/105-type/95-guides/05-health/01-ltc/rate-history-active.cfm). Finkelstein, McGarry, and Sufi (2005a,b) and Brown and Finkelstein (2007) note the likely high costs of lapses to policyholders.

constraint, which diminishes both the ability to pay premiums and the need to protect one's wealth from Medicaid if care is needed, resulting in *financial lapsing*.[2] The third explanation involves unanticipated lapses, for example due to time-inconsistent preferences or a loss of financial competence. Individuals who plan on future expenditure that is in their best interest may fail to follow through on that plan, inducing *unintended lapsing*.

We evaluate these explanations for lapsing using both simulation and empirical methods. We begin by simulating a dynamic optimization model that quantifies possible causes of lapsing by rational agents, as well as the consequences of unintended lapsing by agents who initially purchase insurance optimally. We use a model of insurance, asset, and Medicaid choices that is standard in the literature (Brown and Finkelstein 2008, Friedberg, Hou, Sun, and Webb 2016). The analysis shows that changes in information would have to be large to motivate either strategic or financial lapsing for someone who optimally purchases a policy at age 65 that is described as typical in (Brown and Finkelstein 2007). This is because individuals in our model continue to place a high value on insurance until very old age. Yet, models like this one cannot fully explain the low rate of insurance holding in the first place (Brown and Finkelstein 2008, Lockwood 2017) and may not fully explain lapsing, so we test empirical explanations for observed lapses.

We analyze lapsing from 2002-06 in the Health and Retirement Study (HRS).[3] We use variables that plausibly capture the three explanations for lapsing enumerated above. We find

[2] Financial lapsing might also reflect rational lapses by households whose wealth has declined as planned during retirement. Such declines diminish the wealth protection motive of long-term care insurance, especially in the presence of Medicaid. In the simulations, this explanation matters little in practice because the size of the aging reserve becomes too large. In the empirical analysis, a significant negative relationship between financial status and lapsing can indicate that either a negative financial shock or planned wealth drawdown leads to lapsing.

[3] As we explain later, questions about long-term care insurance changed markedly in 2002, so we do not use earlier data. We focus on lapsing over a period of time after the insurance questions change, and then subsequent nursing home use after that.

evidence of a significant but very small role for both strategic and financial lapsing, as suggested by our model of rational decision-makers.[4] However, we find that lapse rates are significantly and substantially *higher* among people with lower cognitive scores, demonstrating the importance of unintended lapsing. If everyone with low cognitive scores in our sample had cognitive scores equal to the median value, our estimates suggest that lapsing would be 17% lower.

Our dynamic optimization model gives us an idea of the potential welfare cost of losing insurance due to unintended lapsing by someone who purchased a policy optimally at age 65. Because policies remain valuable until extremely old ages in our model absent a change in information, the cost of unintended lapsing is quite high. People who pay premiums and later lapse forgo their aging reserves (which can be thought of as the cost of an anticipated lapse), and also may choose a post-retirement wealth drawdown path that is based on the mistaken belief that they will retain coverage. For example, for people at the 80th percentile of the wealth distribution at age 65, overconsuming their wealth subsequently makes the welfare cost of an unintended lapse over 30% higher for a single man and almost 10% higher for a single woman, in addition to the cost of losing their aging reserves.[5]

Lastly, we consider whether lapsing induces adverse or advantageous selection among remaining policyholders. We do this by analyzing nursing home use in the HRS from 2006-12, a period immediately following our analysis of lapsing from 2002-06. If dynamic adverse selection occurs, it might help explain the small size and costly premiums observed in the long-

[4] As in Finkelstein and McGarry (2006), we find that an individual's self-assessed probability is informative of future care use. However, it has an extremely small (though significant) association with lapsing.

[5] The focus of these welfare calculations is on the ex ante value of insurance, before one knows one's care needs, rather than heterogeneous ex post outcomes for those who "luckily" lapse (because they end up not needing care) versus those who lapse and need care. A full ex ante welfare analysis would be complicated by the recognition that lapses reallocate premiums (net of administrative and marketing costs) from the feckless to the farsighted.

term care insurance market. However, we find that cognitive impairment generates dynamic *advantageous* selection (from the point of view of insurers).[6] This unintended lapsing is costly to individuals who end up in care and to Medicaid, which covers their costs when they cannot.[7]

The remainder of the paper is organized as follows. Section 1 presents industry data on lapse rates and an analysis of lapsing in a dynamic optimization model. Section 2 discusses the HRS data and summarizes previous research using the HRS. Section 3 presents our econometric models for lapsing and for dynamic selection based on subsequent nursing home entry. Section 4 reports descriptive statistics. Section 5 reports the evidence about lapsing and Section 6 about nursing home entry. Section 7 concludes.

1. Lapse Rates and the Cost of Lapsing

Lapse rates for long-term care insurance policies are substantial. Figure 1 shows declining cumulative retention rates the longer that polices are in force, for non-group policies issued from 1984-2007.[8] Policies issued in the 1980s had especially high lapse rates, but lapses remain common. For policies issued in 1992-96 (corresponding roughly to the original HRS/AHEAD cohorts), 24.7% had lapsed after five years, and 40.3% had lapsed after fifteen

[6] Our findings do not rule out dynamic adverse selection based on other unobserved attributes, as multiple explanations for lapsing might operate simultaneously. However, we do not confirm earlier findings in Finkelstein, McGarry, and Sufi (2005a,b) that lapsers are overall less likely to use care later. These earlier findings use pre-2002 data from the HRS, before substantive changes to the insurance questions that we discuss later. We show later that our lapse statistics using 2002-06 data match up well with outside sources, but the question changes mean that we cannot compare directly the earlier findings with ours.

[7] Average nursing home costs are $79,800 (American Association for Long-Term Care Insurance 2015), and Medicaid pays about $130 billion per year for long-term care (The National Health Policy Forum 2014). While other policyholders whose policies do not lapse may benefit from this advantageous selection, in the form of lower premiums, we have little information about how premiums are determined or how they affect insurance purchases, so we have not undertaken a full welfare calculation.

[8] The data from a 2011 Society of Actuaries experience study pools information from insurance companies selling long-term care insurance. We assume 1950 cohort morality for all issue years to abstract from cross-cohort changes in life expectancy.

years. At current lapse rates we calculate that men and women who purchase a policy at age 65 have, approximately, a 27- and 29-percent chance of lapsing their policies before death, respectively.[9]

The cost of lapsing in terms of foregone "aging reserves" is substantial. Aging reserves accumulate because the premium on a newly issued policy is much more than the expected cost of that year's care, since the risk of requiring care is dramatically lower at younger ages. The excess premiums paid in the early years of the policy effectively form a reserve, which is drawn down in later years when the expected cost of care exceeds the premiums. An individual who lapses his policy forfeits this reserve and must face higher age-rated premiums if he wishes to purchase a new policy.

In order to evaluate the cost of lapsing, we compute the financial and utility values of long-term care insurance. First, we compute the expected present value (EPV) at each age of remaining lifetime premiums and benefits, conditional on not currently needing care, for someone considering whether to hold onto a policy. Expected remaining premiums are based on policy characteristics described by Brown and Finkelstein (2007) as typical and updated to 2015.[10] Expected benefits are based on the likelihood of needing different types of care as estimated in Friedberg, Hou, Sun, Webb, and Li (2016). These EPVs demonstrate the financial

[9] The calculations in the text use data from the 2015 Society of Actuaries experience study, while Figure 1 uses data from the 2011 study to offer a longer historical perspective. The 2015 data only report information on policies from 2000 onward and so do not allow a long-term analysis of lapsing by duration and year in which the policy was issued. We plan to adjust these statistics to reflect the fact that premiums are not payable and policies therefore cannot lapse when benefits are being paid, and the denominator in the 2011 study (p.146), but not in 2015, includes policies on which benefits are currently being paid out. We anticipate only minimal changes in computed cumulative lapse rates after undertaking this correction by running Monte-Carlo simulations using care status expectations that vary with age and gender. .

[10] This is an unlimited duration policy purchased at age 65, covering both home health care and nursing home costs. We assume a $165 daily benefit in 2015 dollars with benefits increasing at 5% per year after that, nursing home and assisted living costs of $79,800 and $42,750 a year and home health aide and skilled nursing home costs of $21 and $43 an hour. The updated information is from the American Association for Long-Term Care Insurance (2015).

valuation of insurance, independent of risk aversion and the option to rely on Medicaid. Second, we use a dynamic optimization model for single men and women that is standard in the literature (Brown and Finkelstein 2008, Friedberg, Hou, Sun, and Webb 2016) to compute willingness-to-pay by age and wealth level for this typical policy. Agents in the model make annual choices over insurance, assets, and the use of means-tested Medicaid, beginning at age 65. Willingness to pay depends not only on expected benefits relative to expected costs, as computed above, but also on factors including wealth, risk aversion, and the option to rely on Medicaid.

We use these calculations to consider the magnitude of changes in news or in financial status needed to justify strategic or financial lapsing. The EPV calculations for remaining premiums and benefits at each age show that the value of continuing to hold a typical policy is large. At age 65, the EPV of lifetime premiums in Figures 2A and 2B are at their highest values and exceed the EPV of benefits, by a considerable amount for men (with EPVs of $55,196 and $21,857 for premiums and benefits) and by less for women (with EPVs of $60,851 and $46,307 for premiums and benefits). The EPV of premiums declines rapidly as people age and begins to exceed the slowly-declining EPV of benefits at around age 68 for women and at age 73 for men.

Meanwhile, willingness to pay for single people who are relatively wealthy, in Figures 3A and 3B, is positive at age 65, and it grows until much older ages, absent a dramatic and unexpected change in beliefs or wealth.[11] Lower-wealth individuals are not willing to purchase

[11] The optimization model adapted from Friedberg, Hou, Sun, and Webb (2016) begins with an individual who is retired and in good health at age 65 choosing consumption each period to maximize expected remaining lifetime utility. The model replicates the Medicaid program, assumes a time preference rate of three percent and constant relative risk aversion with a coefficient of three, and is solved numerically for wealth deciles of single individuals in the HRS. The model first assumes that the individual purchases long-term care insurance, calculates the optimal wealth decumulation strategy, and notes expected discounted lifetime utility. The optimal decumulation strategy is then recalculated if long-term care insurance is unavailable. If it is positive, willingness to pay for long-term care insurance equals the amount by which age-65 wealth must be increased so that the individual can achieve the same expected discounted lifetime utility when he does not purchase insurance. To assess the value of retaining an

insurance at age 65 because they have the option to claim Medicaid. Valuations of insurance at age 65 become positive near the 80th wealth percentile for single men and a little above the 70th wealth percentile for single women.

After age 65, the same value of willingness to pay for age-65 prices, conditional on being in good health, also shows the value of holding the policy rather than lapsing. Consider a single man and a single woman at the 80th percentile of their respective wealth distributions. Willingness to pay for a policy at age 65 is, respectively, $14,500 and $48,400, and then willingness to avoid lapsing that policy increases by a few thousand dollars per year for many years after – until the early 90s for single men and the mid 80s for women. It is only then that the value of holding a policy starts to decline gradually, as individuals who have drawn down their wealth face an increasing implicit Medicaid tax. Willingness to pay remains even higher for those whose health deteriorates.

These results show that policy lapsing should not optimally occur for most people until extreme old age. Therefore, the results rule out one type of financial lapsing – arising because planned drawdown of wealth has left the typical policyholder willing to forgo insurance in favor of means-tested Medicaid. We can also quantify how big a negative wealth shock would have to occur to induce financial lapsing. If wealth suddenly fell below the 70th percentile for men and the 80th percentile for women at age 65, they would no longer want to hold a policy. At older ages, as policies continue to grow in value, the sudden and unexpected wealth drop would have to be greater.

Lastly, a change in one's expectation of needing future care would also have to be large to generate strategic lapsing. In the optimization model, suppose people suddenly believed that

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existing policy, the model considers whether an individual who remains in good health would choose to newly purchase a policy at the age-65 premium.

they would never enter a nursing home before they died, but retained their expectation of needing home health care or assisted living. Given this major shift in beliefs, a single woman at the 80th percentile of wealth would still prefer to hold a policy at age 75, while a single man at the 80th percentile would now have only a slight gain from lapsing, and single men with more wealth would still hold a policy. Consequently, major shifts in circumstances or beliefs are needed to generate strategic or financial lapsing in an optimizing model. Yet, optimizing models like this one cannot fully account for the low rate of insurance holding in the first place (Brown and Finkelstein 2008, Lockwood 2017) and may not fully explain lapsing. Therefore, we proceed to test empirical explanations for observed lapses.

2. Background and Literature

Studies of lapsing have typically used the HRS, a panel micro data set with detailed information about participants' health and financial status.[12] However, questions about long-term care insurance holdings in the HRS have changed in ways that substantively affect the measurement of lapsing, both by asking clarifying questions to measure insurance holdings more accurately and by shifting the focus to short-term lapsing, rather than lifetime lapsing. Using the most recent set of questions, we estimate short-term lapse rates that are in line with the Society of Actuaries statistics. The capacity to measure short-term lapses accurately allows us, further, to relate current lapsing to current variables that may account for lapsing, an approach that is difficult when the timing of lifetime lapsing cannot be pinpointed in the HRS.

[12] The main alternative is to use statistics from the Society of Actuaries, which are aggregated by gender and age. Browne (2006), using industry data, finds that people whose policies lapse following premium increases are less likely to go into care; this does not directly contradict our evidence, but it is not possible to investigate it further because the HRS does not collect careful data on premium increases.

The HRS follows Americans aged 51 and older. It began in 1992 with people aged 51-61 (and their spouses of any age) and in 1993 with people aged 70 and over, and it re-interviews respondents every two years.[13] As Table 1 shows, from 1995 (AHEAD) and 1996 (HRS) on participants were asked whether they held long-term care insurance. Until 2002, participants were also asked, "Have you ever been covered by a policy that you cancelled or let lapse."

Table 1 demonstrates two important changes in the insurance questions that took place after 1996-2000, the time period that was the focus of some important lapsing studies. First, a new question was added in 2002 to clarify what type of plan was being discussed. The new question asked participants whether the policy that they had in mind when answering the long-term care insurance questions was one of the plans (referring to health insurance plans) that the participant had told the interviewer about earlier in the interview. The scope of respondent confusion before the clarifying question was added appears to be high: 23% of respondents who said they had a long-term care insurance policy in 2002 then answered that this was one of the health insurance plans that they had mentioned earlier. This raises concern about the use of questions from before 2002 in the lapsing studies listed in Table 1.

Second, the question about ever lapsing was removed after 2002, so we use changes in reported policy holding across waves to measure recent lapses. The resulting lapse rates match up well with industry statistics. The two-year lapse rate that we compute for people aged 65 and over in the HRS between 2002-04 is 8.4%. The 2015 SOA study indicates a two-year lapse rate of 8.5% for those aged 60 and over and 9.7% for those aged 70 and over. This suggests that the new wording is critical in allowing us to measure cross-wave lapsing, especially given concerns raised by Finkelstein, McGarry, and Sufi (2005a) about the validity of short-term lapsing

[13] The original HRS cohort, born between 1931 and 1941, has been interviewed every two years. The AHEAD cohort was interviewed in 1993, 1995, 1998, and every two years thereafter. While other cohorts have been added to the HRS, we do not use them for our analysis.

measures before 2002.[14] Given both of the changes to the insurance questions – the addition of the clarifying question about the type of policy and the removal of the question about ever lapsing – we cannot replicate the earlier analysis (showing dynamic adverse selection) using data from 2002 on or replicate our analysis (showing dynamic advantageous selection) using data from before 2000.[15] Neither can we replicate our analysis of possible explanations for lifetime lapsing, since the HRS does not report when many of those policies were either purchased or lapsed.

The papers most relevant to our analysis are those that study strategic lapsing and adverse selection. The long-term care insurance market is small and policies are expensive, with evidence of asymmetric information in who buys policies (Finkelstein and McGarry 2006) and adverse selection in who retains policies (Finkelstein, McGarry, and Sufi 2005a, b). Finkelstein and McGarry show that the self-reported likelihood of needing nursing home care in the future is informative about future care use in the HRS even when conditioning on observable predictors of later care use. Yet, those who hold insurance are *not* more likely on average to use care in the future conditional on observables, in spite of their private information. They resolve this puzzle by showing that insurance holders are also more risk averse along various measures, and those who are risk averse are less likely to use care. This underlines two points: a negative correlation between lapsing and care use can occur even in the absence of asymmetric information, if preferences rather than beliefs influence the lapsing decision; and conversely, the absence of a

[14] They point out that using this approach to measure cross-wave lapsing before 2002 would yield extremely high lapse rates, of around 50% across a two-year period, almost an order of magnitude higher than our measure using the 2002-06 data. The SOA statistics to which we compare our lapse rates are voluntary lapses, defined as termination reasons 00, 01, 04, 05, and 06.

[15] Finkelstein, McGarry, and Sufi (2005a) report an alternative approach to defining their lapse sample to focus on recent lapses. This approach uses only those who report having coverage in an HRS wave and then later report ever lapsing. They report that this sample still demonstrates dynamic adverse selection in later nursing home use. Thus, the difference between their results and ours may be a consequence of the clarifying question about type of policy, rather than the focus on short-term lapses versus lifetime lapses.

correlation does not prove that asymmetric information is irrelevant in the lapsing decision. Therefore, it is important to consider simultaneous motives for lapsing and to control for them when analyzing the relationship between lapsing and subsequent nursing home use.

Meanwhile, Finkelstein, McGarry, and Sufi, focusing on lapses rather holdings of long-term care insurance and on dynamic selection. They find that individuals in the HRS whose policies have ever lapsed are 2.4 percentage points less likely to be in a nursing home at any time between 1996 and 2000. As we have noted, this evidence of dynamic adverse selection is not confirmed with our use of data from 2002 and later. Still, they argue that strategic motives do not fully explain lapses, and nor do we find that the broader set of explanations we consider fully explain lapses. They point to the high early lapse rate as inconsistent with the immediate arrival of new information right after policy purchases, similar to our point above that considerable changes in information or circumstances would be needed to explain rational lapses.[16]

Other studies mentioned in Table 1 also use the pre-2002 data on lapsing. McNamara and Lee (2004) find evidence consistent with financial lapsing. Konetzka and Luo (2011) use data from 1996 until 2010 to analyze the relationship between lapsing and later care use, combining information from before and after the HRS question that clarified insurance holding was included. Two recent studies of lapsing exploit the questions added in 2002, though neither considers dynamic selection, as we do. Li and Jensen (2012) find that the probability of a lapse increased with lack of knowledge about one's policy benefit provisions, with prior encounters with the long-term care system, with less expensive policies, with less generous policies, and with low income and low wealth. Cramer and Jensen (2007) also find that inability to perform ADLs was positively correlated with lapsing.

[16] Gan, Huang, and Mayer (2015) propose a test for such private information.

3. Econometric Models of Lapsing and Dynamic Selection

In this section, we present our approach to testing explanations for lapsing and testing for dynamic selection. We regress lapsing on variables that capture various explanations for lapsing. Then, we observe nursing home use for a period of time after lapsing in order to analyze sources of dynamic selection, whether adverse or advantageous. We investigate whether any of the variables related to lapsing are also related to subsequent nursing home use. If so, that indicates a source of selection, either adverse or advantageous, out of policy holding. We focus on people aged 65 and over holding policies in 2002 (beginning when the HRS questions about long-term care insurance changed), then measure lapsing from 2002 to 2006, and then measure nursing home use from 2006 to 2012.

Testing explanations for lapsing

To test explanations for lapsing, we estimate the following probit model:

$$\Pr(LAPSE_i = 1) = \Phi\left(\beta_x strategic_i + \beta_f financial_i + \beta_u unintended_i + \beta X_i\right) \quad (1)$$

in which the *LAPSE* takes the value one if the individual lapsed coverage between 2002 and 2006, or zero if he retained coverage. Right-hand side variables include characteristics that may result in *strategic*, *financial*, or *unintended* lapsing, plus controls for demographic characteristics and risk preferences.

We test three explanations for why individuals with long-term care insurance let their policies lapse. We do so by using variables from the HRS that plausibly capture these explanations. As these variables are not comprehensive, a null finding does not rule out an explanation, but a statistically significant finding suggests its presence. In evaluating each explanation, it is changes in conditions (wealth, need for care, cognitive ability) that should

predict lapsing. However, measuring changes in variables like wealth across two-year waves of the HRS introduces substantial noise.[17] Moreover, it is not possible to measure changes in circumstances since a policy purchase, an even longer period that is not well documented in the HRS.[18] Instead, we rely on the observation by Hendren (2013) that policies are only offered to people in good physical and mental health and, similarly, only affordable to people with financial means. This motivates our consideration of current circumstances when we observe lapses, as poor current circumstances most likely reflect changes for the worse.[19]

The first explanation we consider is that policyholders may acquire new information about their risk of requiring care. If they learn that the risk is lower than they originally expected, they have less need for insurance and may let their policies lapse, which we term *strategic lapsing*. We use HRS variables on both the self-assessed probability of needing care and other objective and subjective measures of well-being: self-reported health, the log of last year's medical expenditures, and the presence of Activities of Daily Living (ADLs) or Instrumental Activities of Daily Living (IADLs).[20] We also consider whether the individual has a spouse, any children, or any daughters, which may prompt a reassessment of care options.

[17] Venti (2011) details concerns about measurement error in measuring wealth that lead to extreme noisiness in measuring changes in self-reported wealth across waves of the HRS. Measurement error arises from item nonresponse and from inaccurate respondent reports of the ownership and level of assets. Hot-deck imputation of wealth leads to somewhat reliable estimates of asset values in the cross-section but not of changes across waves.

[18] We do not know when many people bought their policies, both because of policies purchased before people entered the HRS and because of the inaccurate measurement of long-term care insurance holding before 2002, which leads many policies to apparently disappear and reappear.

[19] Hendren highlights frequent rejection of applicants for long-term care insurance and reports a long list of conditions that a major insurer uses as grounds for rejection.

[20] Long-term care insurance claims are predicated on needing help with ADLs.

Relatives provide the bulk of informal care (Hiedemann et al 2016), possibly including financial management, and may offset the effects of cognitive impairment. [21]

A second explanation for lapses is that some purchasers may come to view the insurance premium as a financial burden over time. This could occur if they suffer a negative wealth or income shock or if a policy they were willing to pay becomes less valuable after gradual (and planned) wealth drawdown increases the Medicaid implicit tax on retaining a private policy, inducing *financial lapsing*. We examine whether wealth or income (measured in logs) are associated with observed lapses.

A third explanation for lapses is that they are *unintended*, for example due to time-inconsistent preferences or inattention. We cannot test comprehensively for sources of unintended lapses, so we try two sets of variables to capture particular explanations. First, we consider whether proxies for a propensity to plan and undertake precautionary actions (getting a flu shot, cholesterol test, pap smear, or breast or prostate cancer screening, as suggested by Finkelstein and McGarry 2006), affect lapsing. Second, we consider whether having difficulty handling money or experiencing cognitive impairment increases lapsing (while also showing that these variables do not increase misreporting about policies in other ways). For example, individuals might forget to pay their premiums or no longer understand the value of their policies. In this case, individuals may be more likely to lapse *even though their impairment makes them more likely to need care*, making these unintended lapsers the opposite of strategic lapsers. Several questions in the HRS are designed to reveal a respondent's cognitive state. We

[21] As Ko (2016) points out, insurance companies do not use information on family structure in their pricing and offer decisions. She shows in turn that having family members affects the take-up of both insurance (generating adverse selection) and care (generating moral hazard), and in our framework it may well affect lapses.

form an index of those answers that are found in Hurd et al (2013) to significantly predict dementia.[22]

Finally, we include socioeconomic variables (age, education, and gender) that may affect demand for insurance and also reflect other variables that influence insurance offer and pricing decisions (Hendren 2013). We follow the baseline approach from Hendren of using a minimal set of controls. Other health-related variables that may influence purchases and that he uses in an extended set of controls are not observable at the time that many policies were issued.[23]

Dynamic selection due to lapsing

Dynamic adverse selection due to strategic lapsing might help explain the small size and costly premiums observed in the long-term care insurance market. The standard test for selection due to asymmetric information involves estimating whether insurance coverage against a risk and subsequent risk occurrence are correlated (Chiappori and Salanie, 2000). In our case, it would involve a bivariate model of lapsing and nursing home entry, conditional on a vector of risk classification variables that are observable to insurers when the policy was issued and then test whether the error terms are positively correlated (indicating adverse selection) or negatively correlated (indicating advantageous selection).

However, this test does not distinguish between asymmetric information and preference-based selection. As mentioned above, Finkelstein and McGarry (2006) show that preference-based selection (the risk averse like to buy insurance although their risk is low) offsets risk-based selection in the decision to purchase long-term care insurance. Similarly, the absence of a negative correlation between lapsing and care use does not prove that the market is unaffected by

[22] Hurd et al (2013) develop an individual-specific predictor of the likelihood of dementia for HRS respondents. It is a function of cognitive indicators as well as many of the variables that we include separately in our regressions.

[23] Hendren tests for the presence of private information among people who are likely to be rejected, based on observables, if they try to purchase long-term care insurance. His results change little in significance or magnitude when he moves beyond including age and gender and adds numerous health-related variables available in the HRS.

asymmetric information. As an alternative, we consider the following relationship, adapted from Finkelstein and McGarry:

$$\Pr(CARE_i = 1) = \Phi\left(\gamma_x strategic_i + \gamma_f financial_i + \gamma_u unintended_i + \gamma X_i\right) \quad (2)$$

CARE indicates whether a person entered a nursing home between 2006-12. The other variables are the ones from above. *X* includes the variables that may explain lapsing from 2002-06. If any control variable explains care use as well as lapsing, then this suggests a source of dynamic selection. *LAPSE* indicates whether the individual lapsed the policy before entering care, and if it remains significant conditional on *X*, then it may indicate other unobservable sources of dynamic selection. In this approach, lapsing does not cause care use but instead captures private information about likely care use that is not reflected in *X* and that affects insurance demand.

4. Data

We use HRS questions about long-term care insurance holdings that were first asked in 2002 in order to define our sample of policyholders. As we noted earlier, 2002 was the first year in which survey questions about long-term care insurance fully distinguished them from health insurance plans that an individual might also hold. We use changes in reported insurance holding across waves to define lapsing. We focus on lapsing between 2002-06 and care use between 2006-12.[24] Among people aged 65 or older in 2002, 1,048 had long-term care insurance, and among them, 966 had known insurance status in 2006. We drop people who are missing answers to questions about anticipated care use and about cognitive ability, because

[24] While lengthening the time period would reveal more nursing home spells, an increasing share of them would be unforeseeable when we observe lapsing.

these are critical to our analysis; this leaves us with an insured sample of 891. For this group with insurance in 2002, 13.0% lapsed their policy between 2002-06.[25]

Table 2 reports sample statistics, using sample weights in order to make the sample nationally representative for this group with long-term care insurance in 2002. They have an average age of 74 and are quite likely to be married. They are relatively well off, with median financial wealth of $125,000 and median annual income of $44,380, and we will control for the natural log of these variables. Their health is good; 13.5% report fair or poor health (as opposed to excellent, very good, or good), and 2% have limitations on activities of daily living (ADLs); this is not surprising, given the prevalence of denials for people who are not in good health (Hendren 2013). Interestingly, a relatively high share – 31.3% – reports having difficulty handling money.

Lapsers are in significantly poorer shape on many dimensions than are non-lapsers – an indication that lapsing may yield dynamic advantageous selection among remaining policyholders. Lapsers are less likely to be married (56.7% versus 70.8%) and have somewhat lower income and financial wealth. They are in poorer health (20.5% versus 12.5% in fair or poor health) and have lower cognitive scores (2.7 versus 3.0).[26] On the other hand, they have similar rates of difficulty in handling money (31.0% versus 33.6%, difference not statistically significant) and have similar beliefs about the likelihood of moving into a nursing home in the next five years (19.6% versus 18.7% chance).

[25] As we noted in Section 2, the lapse rates that we calculate in the HRS are consistent with lapse rates for similarly aged policyholders in Society of Actuaries studies. In order to have a conservative estimate of lapses, we treat people who in later waves say they have a policy but are at that point confused about what kind of policy it is as still holding a long-term care policy.

[26] We compute this score by forming an index of cognitive variables that have a statistically significant association with dementia (Hurd et al 2013). We use the weighted sum of the correct answers to the following questions, where the weights are the inverse of the standard deviation of the answers to whether the respondent correctly: 1) reports today's year, month, day, and date; 2) names the current U.S. president and vice-president; 3) counts backward by sevens; and 4) recalls a list of words that the interviewer reads, both immediately and on a delayed basis.

Among the 891 in the 2002-06 insurance sample, we then consider whether they used nursing home care between 2006-12. We do not observe sufficient information about subsequent nursing home use for 68 of them, leaving a nursing home sample of 823.[27] Table 2 shows that lapsers have much higher subsequent care use, at 41.6%, compared to non-lapsers, at 31.0%. This statistically significant difference suggests the possibility of dynamic advantageous selection in the long-term care insurance market. As noted earlier, it stands in contrast to the evidence from Finkelstein, McGarry, and Sufi (2005a,b) using earlier HRS data.

5. Evidence about Explanations for Lapsing

We estimate a probit model of lapsing between 2002-06 in order to test for the presence of strategic, financial, and/or unintended lapsing. As we noted earlier, we use variables from the HRS that plausibly capture these explanations. As these variables are not comprehensive, a null finding does not rule out an explanation, but a statistically significant estimate suggests its presence.

Empirical results

The lapsing model controls for characteristics that may result in financial, strategic, or unintended lapsing, as well as demographic characteristics and risk preferences. Variables intended to capture financial lapsing are log financial wealth and log income. Variables intended to capture strategic lapsing are the self-assessed probability of using nursing home care within the next five years, limitations on ADLs, the log of last year's medical expenditures, and whether the individual has a spouse, children, or daughters in particular. Variables intended to capture

[27] We include individuals who died between 2006 and 2012 and make use of nursing home information from exit interviews with relatives of deceased participants. While home health care is also covered by insurance policies, the use of paid home health care is difficult to measure in the HRS because participants are only asked a single question: "In the last two years, has any medically trained person come to your home to help you?" Home health care assistants are typically not "medically trained," and the survey does not ask about the frequency of care.

unintended lapsing are cognitive score and having difficulty handling money. As we noted earlier, we cannot reliably determine when a policy was purchased or measure changes in these variables over the entire time since purchase. Instead, we rely on the recognition that policies are only purchased by people with financial means and in good physical and mental health (Hendren 2013), and we use variables measuring current circumstances when we observe lapses.

Table 3 reports probit marginal effects. The results show that lower income and lower financial wealth are associated with higher probabilities of lapsing, but the estimated magnitudes are small. A 10% reduction in financial wealth is associated with a statistically significant 0.1 percentage point reduction in the probability of lapsing, and a 10% reduction in income is associated with a 0.3 percentage point reduction, which falls short of statistical significance. This finding provides limited support for the hypothesis of *financial lapsing*.

The self-assessed probability of requiring care is statistically significant at the 90% confidence level but the effects are quite small. A 10% increase in this probability is associated with a 0.2 percentage point reduction in the likelihood of lapsing. On the other hand, being in fair or poor health or experiencing ADL limitations does not significantly raise the likelihood of lapsing (and these variables do not gain in significance if we omit the self-assessed probability of requiring care). A potential concern is that the absence of a substantial negative correlation between lapsing and the self-assessed probability of using care might reflect the offsetting effect of a correlation between lapsing and risk preferences, similar to the results for coverage reported by Finkelstein and McGarry (2006). In results that are not reported, we find no evidence of such an offsetting effect, using the variables that they employ.[28] In short, we find only slight evidence in favor of *strategic lapsing*.

[28] We formed an index of several precautionary actions that people report about, including getting a flu shot, cholesterol test, pap smear, and breast or prostate cancer screening.

Importantly, we also find that a lower cognitive score is associated with significantly higher lapse rates, even after controlling for other plausible factors including health. The effect is large – a one-standard deviation decline in cognitive score increases the risk of lapsing by 4.5 percentage points, relative to an overall lapse rate of 13.0%. We interpret this as reflecting unanticipated or *unintended lapsing*.[29] To provide further context, suppose that everyone with low cognitive scores in our sample actually had cognitive scores equal to the 50th percentile value. Our estimates suggest that lapsing would decline by 2.2 percentage points, or 17% of total lapses. However we do not find a statistically significant or meaningful effect of having difficulty handling money.

A potential concern is that the apparent correlation between lapsing and low cognitive score may result because insured individuals with a low cognitive score are more likely to misreport that they no longer have coverage. However, we do not find that low-score individuals are significantly more likely than others either to report lapsing and then later having coverage again or not to answer the coverage question at all.

Lastly, having a daughter is associated with a substantial reduction in the likelihood of lapsing, of 10.0 percentage points (though having a spouse or son is not similarly protective). On the one hand, family members are relatively likely to provide informal care, potentially leading to strategic lapsing. On the other hand, Ko (2016) shows that, while having adult children reduces the likelihood of purchasing insurance, it also increases care use among those who purchase; our results suggest that this form of moral hazard in care use may help explain reduced lapsing.[30]

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[29] We do not find that lapses in life insurance and long-term care insurance are correlated in either direction (so, neither positively if due to inattention or lack of commitment nor negatively if due to news about life expectancy).

[30] In results that are not shown, we do not find a significant effect when having a daughter is interacted with cognitive score, suggesting that daughters do not forestall unintended lapsing.

Welfare effects for unintended lapsing

The dynamic optimization model that we described in Section 1 gives insights into the welfare loss faced by someone who purchases a policy optimally and then lapses for some unintended reason. Recall that Figures 3A and 3B show the willingness to pay by age and wealth for an age-65 long-term care insurance policy – in other words, the willingness to continue holding and avoid an unintended lapse of a policy that one purchased at age 65. The only thing that changes over time is the optimal drawdown of wealth and predictable age-related changes in the likelihood of needing care (with shocks to neither wealth nor care expectations occurring). As noted earlier, holding onto a policy becomes more valuable for many years. For someone in the 80th wealth percentile who purchases a policy at age 65 and lapses at age 75, the individual welfare loss of lapsing is $56,978 for a single man and $98,247 for a single woman. Thus, unintended lapses are extremely costly in this optimization framework.

The willingness to avoid unintended lapses has two components – the loss which people would have suffered had they foreseen giving up their policy and chosen a wealth drawdown path accordingly, and the additional loss resulting from the choice of what was, with the benefit of hindsight, an inappropriately optimistic drawdown path. Considering someone again in the 80th wealth percentile, an anticipated lapse at age 75 would cause smaller welfare losses, equivalent to $41,516 for single men and $90,708 for single women. So, the additional welfare loss for unintended lapsers arising because of excessive consumption is almost 10% for single women and 37% for single men.

Thus, unintended lapsing among those who purchased a policy optimally is extremely costly, though perhaps some people who let their policies lapse made a mistake when purchasing. Some of the losses to lapsers represent a transfer, net of administrative and

marketing costs, in the form of lower premiums to policy holders, but the additional welfare cost to lapsers of consuming too much of their wealth is substantial.

6. Evidence about Dynamic Selection

We finish by estimating a probit model of later long-term care use for the sample of policyholders in 2002. The probit model for care use between 2006-12 includes the same 2002-06 variables that we used to account for lapsing, along with the lapse variable itself. If a control variable explains care use as well as lapsing, then this suggests a source of dynamic selection. If lapsing is significant conditional on these control variables, it may indicate other unobservable sources of dynamic selection.

Earlier we noted that people whose insurance policies lapse between 2002-06 are *more* likely to use care later on, between 2006-12. Our probit estimates in the second column of Table 3 show that, once we control for the same variables as in our lapsing model, lapsing itself does not have a statistically significant association with care use, with a coefficient of -0.0253 (standard error of 0.0569). Unsurprisingly, being older, being in fair or poor health, or having ADL limitations is also associated with more care use, as is having difficulty handling money, while having children is associated with less care use; none of these variables that have a statistically significant association with care use were significantly associated with lapsing. Also, most of the variables that were significantly associated with lapsing in our earlier results (notably, wealth and the self-assessed probability of needing care) do not have a statistically significant relationship with the use of care.

The exception is cognitive impairment, which is associated with significantly and substantially higher use of later care. A decrease in cognitive score of one standard deviation

raises the likelihood of using care by 10.8 percentage points, relative to a mean of 32.3%. Because cognitive impairment also causes lapses, we can see that cognitive impairment generates dynamic advantageous selection. While this potentially benefits insurers and those who hold onto their policies, this unintended lapsing is extremely costly outside of the insurance pool: annual nursing home costs are $79,800 on average, and Medicaid currently pays about $130 billion per year for long-term care on behalf of individuals who are not insured and cannot afford care (Friedberg, Hou, Sun, and Webb 2016).

7. Conclusion

Individuals with long-term care insurance policies exhibit very high lapse rates, with people who are aged 65 having over a one-quarter chance of lapsing prior to death and forfeiting all benefits. Our optimization model shows both a high cost of lapsing absent a change in information, and also that changes in information would have to be large to explain lapsing. We investigate what factors account for observed lapses and whether those factors lead to adverse or advantageous selection among remaining policyholders.

Our analysis yields three main findings. First, lapse rates are significantly and substantially higher among the cognitively impaired, demonstrating the importance of unintended lapsing. However, we find limited evidence of either strategic or financial motives for lapsing, which are the explanations that follow naturally from a model of optimizing decision-makers. Second, we show that unintended lapsing is an important source of dynamic advantageous selection. This selection takes an especially pernicious form, as policyholders who are at imminent risk of needing care are also more likely to stop paying for insurance.

Lastly, we calculate the welfare cost to those who optimally purchase insurance but then lapse unexpectedly. Our model assumes that people insure themselves at age 65 if their willingness-to-pay is positive, given their care expectations, wealth, and the Medicaid program. Lapsing is quite costly to individuals, as policies continue to grow in value far into old age, and it is made costlier when people who do not anticipate lapsing consume too much of their wealth.

One way of eliminating lapses would be to pay premiums in a lump sum. While this is difficult for people who are liquidity-constrained, long-term care insurance is generally purchased by people who are relatively wealthy because crowd-out by means-tested Medicaid reduces demand by others (Brown and Finkelstein, 2008). Some wealthy households could afford to pre-pay much of their premium early on, and might prefer to do this. Not only would it reduce the risk of periodic increases in premiums, but it would also serve to insulate against the risk of unintended lapses. On the supply side, prepayment would help insurers hedge the risk of a decline in interest rates, which increases the present value of future claims, but it would prevent them from increasing premiums should their risk model prove to be incorrect.

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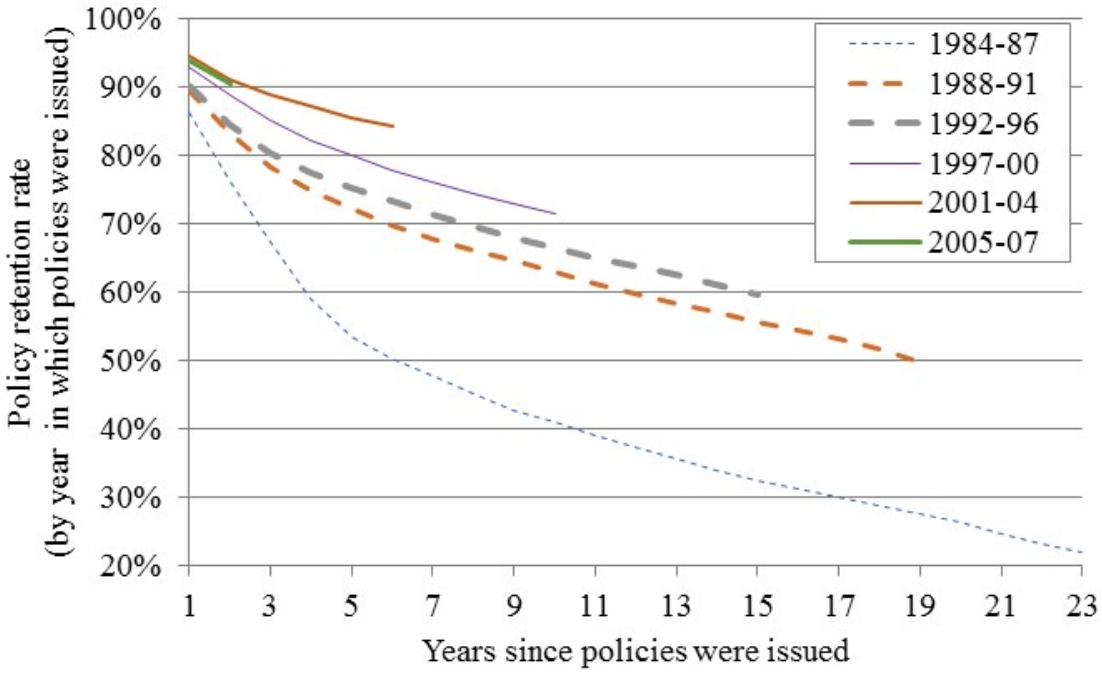
Figure 1. *Cumulative Retention Rates by Issue Year*



Source: Authors' calculations based on Society of Actuaries Experience Study (2011).

Figure 2. *Expected Present Value of Long-Term Care Insurance Premiums and Benefits*

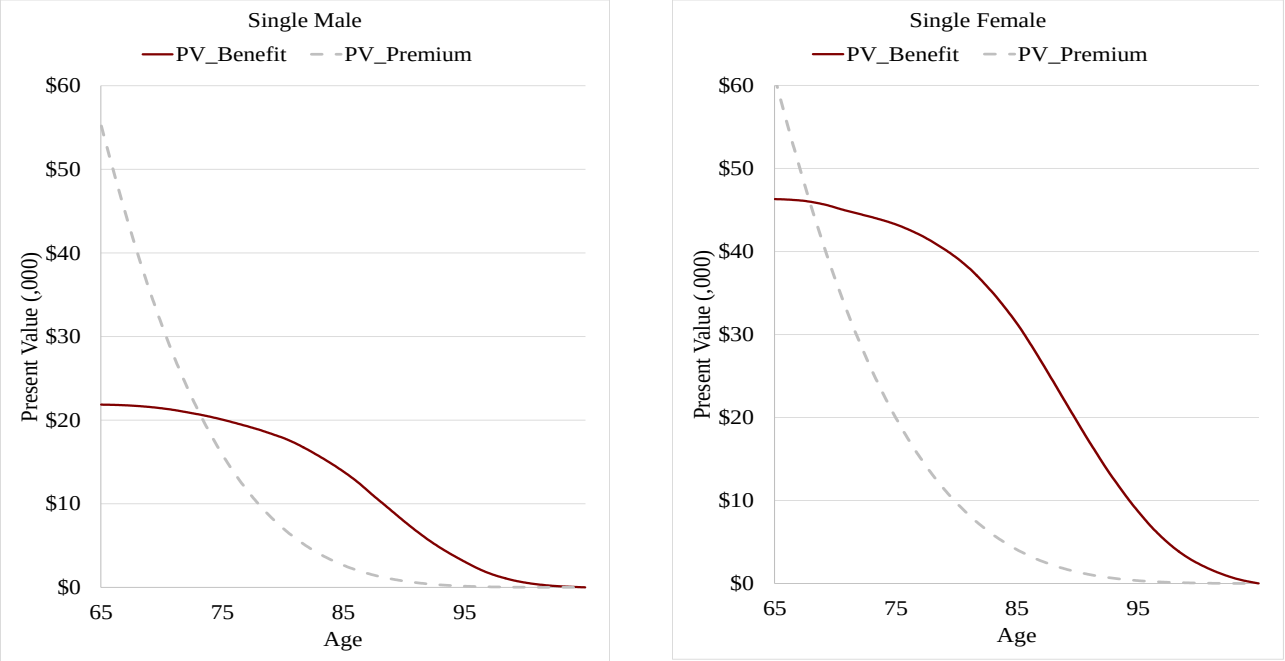
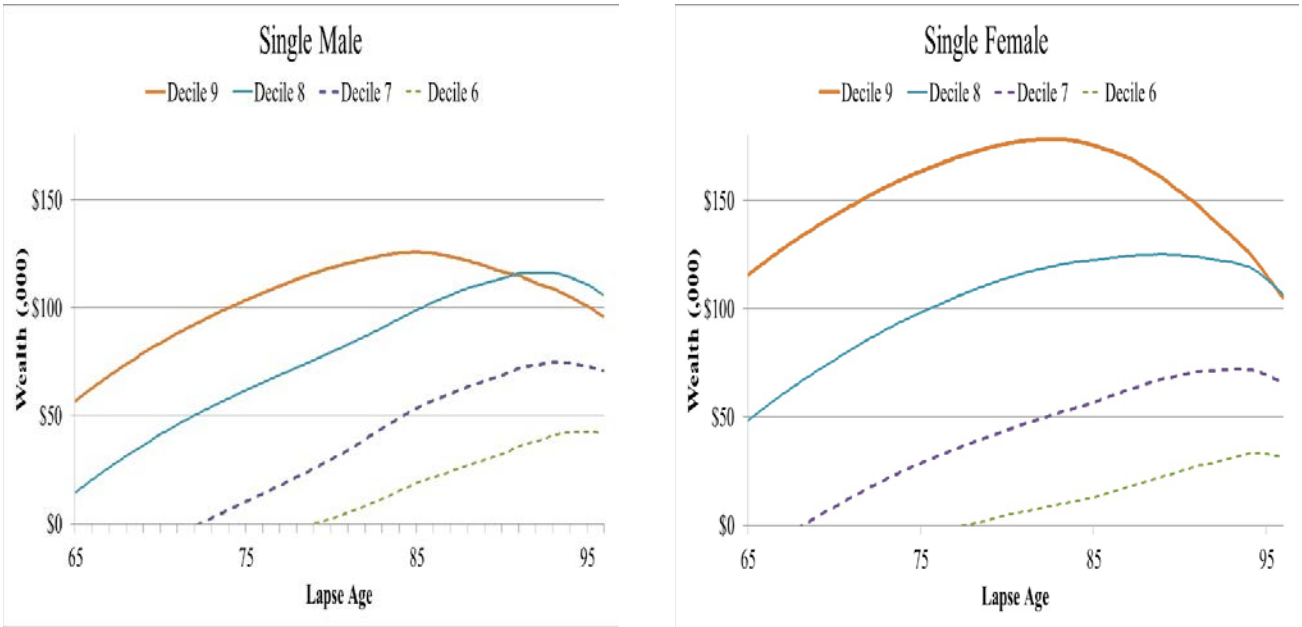


Figure 3. *Willingness to Pay for Long-Term Care Insurance, by Wealth Decile*



Source: Authors' calculations, based on a typical long-term care insurance policy. See text for more information.

	Table 1: Use of HRS Information about Long-term Care Insurance	
HRS wave	Questions about LTCI holding	Questions about lapsing
1992	(no separate question)	
1993/94	(doesn't ask about type of care that is covered)	
1995/96	Do you hold long term care insurance	Have you ever been covered by any long-term care insurance that you cancelled or let lapse
1998	Do you hold long term care insurance	Have you ever been covered by any long-term care insurance that you cancelled or let lapse
2000	Do you hold long term care insurance	Have you ever been covered by any long-term care insurance that you cancelled or let lapse
2002	Do you hold long term care insurance Is it one of the plans you told me about previously	Have you ever been covered by any long-term care insurance that you cancelled or let lapse
2004	Do you hold long term care insurance Is it one of the plans you told me about previously	
2006+	Do you hold long term care insurance Is it one of the plans you told me about previously	
	Papers about LTCI lapses	Data
	Finkelstein, McGarry, & Sufi (2005a,b)	Sample: people who report having LTCI in 1995/96 or 1998 or who report ever having lapsed in 1996, 1998, or 2000. Key variable: ever having lapsed.
	McNamara & Lee (2004)	Sample: people who report having LTCI 1996-2002. Key variable: number of consecutive waves covered by LTCI.
	Konetzka & Luo (2011)	Sample: people who report having LTCI 1996-2008. Key variable: lapse between waves. Do not mention how they made use of the clarifying question asked in 2002+.
	Cramer & Jensen (2007)	Sample: people who report having LTCI in 2002-2004. Key variable: lapse between waves.
	Li & Jensen (2012)	Sample: people who report having LTCI in 2002-2008. Key variable: lapse between waves.

Table 2: Summary Statistics of LTCI Policy Holders

	Full sample	Non-lapsers	Lapsers	p-value, T Test	
Characteristics in 2002, lapse sample:					
Age	73.554	73.238	75.675	0.001	***
Self_assessed probability of moving to nursing home in next 5 years (1-100)	19.464	19.580	18.686	0.433	
Cognitive Score	2.983	3.017	2.759	0.000	***
Male	0.402	0.403	0.396	0.811	
Less than high school education	0.084	0.079	0.114	0.175	
Some college	0.574	0.585	0.503	0.191	
Fair or poor health	0.135	0.125	0.205	0.056	*
Has limitations in Activities Daily Living	0.024	0.021	0.044	0.278	
Has difficulty handling money	0.313	0.310	0.336	0.553	
Log financial wealth	10.969	11.110	10.024	0.002	
Median financial wealth	125,000	139,000	50,400		
Log household income	10.731	10.768	10.480	0.000	***
Median household income	44,380	47,600	35,096		
Have children	0.926	0.931	0.895	0.199	
Have daughters	0.763	0.781	0.643	0.007	***
Log medical expenditure	7.130	7.140	7.064	0.382	
Married or partnered	0.690	0.708	0.566	0.012	**
N			891		
LTC policy lapsed, 2002-2006	0.130	0	1		
Entered a nursing home, 2006-2012	0.323	0.310	0.416	0.015	**
N			823		

Notes: The lapse sample consists of people who are aged 65 and over in the 2002 HRS; who have long-term care insurance in 2002; who have known insurance status in 2006; and who answer questions about the expected likelihood of needing care and who answer questions about cognitive ability. Lapsers are those who no longer have a LTCI policy in 2006.

The nursing home sample consists of those in the lapse sample who have known nursing home status between 2006-12.

Cognitive score is the weighted sum of answers to several questions that test cognitive ability, where the weights are the inverse of the standard deviation of the answers.

*** p<0.01, ** p<0.05, * p<0.1 for T test of equality of mean values of non-lapsers, lapsers.

Table 3: Probit Estimates for Lapsing, Nursing Home Use		
	Dependent variable:	
	LTCI policy lapsed 2002-2006	Entered nursing home 2006-2012
	Estimated marginal effect (standard error)	Estimated marginal effect (standard error)
Lapse 2002-2006		-0.0253
		(0.0569)
Characteristics in 2002, lapse sample:		
Age	0.0043**	0.0231***
	(0.0020)	(0.0036)
Self_assessed probability of moving to nursing home in next 5 years (1-100)	-0.0012*	0.0012
	(0.0006)	(0.0011)
Cognitive Score	-0.0887***	-0.2570***
	(0.0265)	(0.0565)
Male	0.0195	-0.0258
	(0.0244)	(0.0400)
Less than high school education	-0.0199	-0.0346
	(0.0343)	(0.0686)
Some college	-0.0038	0.0705*
	(0.0245)	(0.0415)
Fair or poor health	0.0484	0.113*
	(0.0381)	(0.0644)
Has limitations on Activities of Daily Living	0.0607	0.395***
	(0.0839)	(0.1320)
Has difficulty handling money	-0.0016	0.0414**
	(0.0086)	(0.0164)
Log financial wealth	-0.0094***	0.0009
	(0.0034)	-0.0067
Log household income	-0.0277	0.0019
	(0.0179)	(0.0292)
Have children	0.0245	-0.1870*
	(0.0394)	(0.0959)
Have daughters	-0.1000***	0.0542
	(0.036)	(0.0512)
Log medical expenditure	-0.0016	-0.0030
	(0.0053)	-0.0101
Married or partnered	-0.0202	-0.0659
	(0.0281)	(0.0474)
N	891	823

Notes: The lapse sample consists of people who are aged 65 and over and who have long-term care insurance in the 2002 HRS; lapsers are those who no longer have a LTCI policy in 2006. Other details of sample construction appear in the Table 2 notes.

The nursing home sample consists of those in the lapse sample who have known nursing home status between 2006-12.

Cognitive score is the weighted sum of answers to several questions that test cognitive ability, where the weights are the inverse of the standard deviation of the answers.

*** p<0.01, ** p<0.05, * p<0.1