DRAFT

"Lapses in Long-Term Care Insurance"
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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 buy long-term care insurance, and many of those who do 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 what factors account for lapses, whether those factors suggest that people let policies lapse strategically or might be making mistakes, and whether lapsing leads to adverse or advantageous selection among remaining policy holders.

Lapses may reflect either new information or a lack of intertemporal consistency in decision-making. Two types of news may arise. 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 dynamic adverse selection or *strategic lapsing*. Another form of news is a negative shock to the household budget constraint, which diminishes both the ability to pay policy premiums and the need to protect one's wealth from Medicaid if care is needed, resulting in *financial lapsing*.[2] A different set of explanations involves time-inconsistent preferences. Individuals who plan on future expenditure that is in their best interest may fail to follow through

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[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).

[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. We show later that this explanation matters little in practice because the size of the aging reserve becomes too large.

on that plan. This may occur because of self-control problems or because of a loss of financial competence, inducing *forgetful lapsing*.

We analyze lapsing from 2002-06 in the Health and Retirement Study (HRS) using variables that plausibly capture these three explanations. Our major finding is that lapse rates are significantly and substantially *higher* among the cognitively impaired, demonstrating the importance of forgetful lapsing.[3] If everyone with low cognitive scores in our sample 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. We also find evidence that limited financial resources predict lapsing, but that strategic lapsing motives appear to be extremely small, contrasting evidence from previous research.[4] We further show, using a dynamic optimization model of insurance and asset drawdown decisions based on Friedberg, Hou, Sun, and Webb (2016), that changes in information would have to be unrealistically large in order to motivate either strategic or financial lapsing for the average policy holder. In sum, we find evidence of forgetful lapsing and financial lapsing, but no evidence of strategic lapsing.

We use a dynamic optimization model to calculate the welfare cost to forgetful lapsers. We find that the amount someone would be willing to pay to avoid lapsing a policy purchased at age 65 continues to rise until extremely old ages. This makes the cost of lapsing for someone who does not get news about their health or finances quite high. In social welfare terms, lapses reallocate premiums (net of administrative and market costs) from the feckless to the far-sighted. However, this overlooks an additional cost of lapses, because individuals who purchase and then unexpectedly lapse choose a post-retirement wealth drawdown path that is based on the mistaken belief that they will retain coverage. We show that a forgetful lapse makes a single man who purchases insurance at age 65 and then lapses at age 75 over 30% worse off, and a single woman almost 10% worse off, than an anticipated lapse would because they are overly optimistic in drawing down wealth. This approach assumes that people make optimal decisions up until they

[3] We do not find that other indicators of a lack of commitment are correlated with long-term insurance lapses.
[4] We find that an individual's self-assessed probability of using care predicts subsequent care use, as in Finkelstein and McGarry (2006). However, in contrast to their analysis, we find an extremely small effect of the self-assessed probability of using care on lapsing, whether before or after controlling for risk type and risk preferences. We use the HRS, as they do, but the HRS questions on long-term care insurance changed substantially in 2002, resulting in statistics on insurance holdings and lapses that appear to be more accurate, as we explain later.

lapse; yet, if someone mistakenly purchases a policy, they might nonetheless find it optimal to continue holding the policy as the aging reserves build up.

Lastly, we consider whether lapsing induces adverse or advantageous selection in the market of remaining policyholders. Dynamic adverse selection due to strategic lapsing might help explain the small size and costly premiums observed in the long-term care insurance market. However, we find evidence of dynamic *advantageous* selection (from the point of view of insurers), specifically generated by cognitive impairment. Among those whose policies lapsed between 2002 and 2006, 23 percent then used care between 2006 and 2012, compared with 16 percent of non-lapsers. Moreover, cognitive impairment has a significant and strong effect on later care use.[5] Therefore, this unanticipated lapsing is both large in magnitude and extremely costly. Individuals face annual nursing home costs of about $79,800 on average, and Medicaid pays currently pays about $130 billion per year for long-term care of those who cannot otherwise afford it.[6]

The remainder of the paper is organized as follows. Section 1 presents data on lapse rates. Section 2 discusses the HRS data and summarizes previous research, largely using the HRS. Section 3 presents our econometric models and test for dynamic selection. Section 4 reports descriptive statistics and the results of our econometric models, and Section 5 concludes and discusses policy implications.

1. Lapse Rates and the Cost of Lapsing

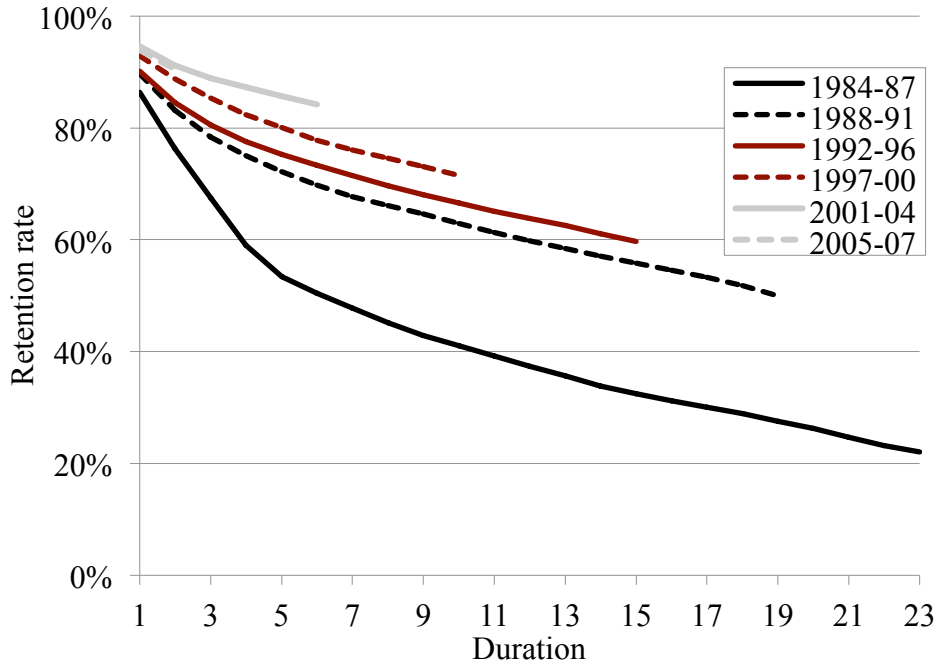
Lapse rates for long-term care insurance policies are substantial. Figure 1 shows declining cumulative retention rates (the percent of policies still in force by number of years since issue)

[5] This finding does not by itself rule out strategic lapsing, as multiple explanations for lapsing might operate simultaneously, though it runs counter to earlier conclusions using the HRS. Finkelstein, McGarry, and Sufi (2005) find that lapsing is associated with *reduced* entry into care, using pre-2002 data. As mentioned earlier, changes in the HRS insurance questions may explain the disparate results, but these changes make it impossible to replicate the pre-2002 findings using post-2002 data. Meanwhile, Browne's (2006) finding that people whose policies lapse following premium increases are less likely to go into care does not contradict our evidence.

[6] American Association for Long-Term Care Insurance (2015); Medicaid paid for 62.3 percent of total long-term care costs of $210.9 billion in 2011 (The National Health Policy Forum 2014). Note that other policy holders whose policies do not lapse should benefit from this advantageous selection, in the form of lower premiums. Given that we have little information about how premiums are determined or how they affect insurance purchases, we have not undertaken a full welfare calculation.

by policy duration, for non-group policies issued from 1984-2007.[7] Policies issued in the 1980s had substantially higher lapse rates than those issued more recently, but lapse rates remain high. At current lapse rates, 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, assuming that lapse rates remain at the levels observed for recent cohorts.[8]

Figure 1. *Cumulative Retention Rates by Issue Year*



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

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

[7] 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.

[8] 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 historical perspective. Premiums are not payable and policies therefore cannot lapse when benefits are being paid. The denominator in the 2011, but not in the 2015 study includes policies on which benefits are currently being paid out. The 2015 statistics in the text are currently an approximation because they do not adjust for periods during which benefits are being paid out; we will undertake this correction but anticipate only minimal changes in computed lapse rates. The 2015 data do not allow a long-term analysis of lapsing by duration and year in which the policy was issued, since such data are only available from 2000 onwards. The change in denominator likely contributes to differences between the 2011 and 2015 lapse patterns, which are generally small. Reflecting the use of a denominator that excludes policies in payment, we calculate current lifetime lapse rates by running Monte-Carlo simulations using a care status transition matrix in which transitions vary with age and gender.

of that year's care (the cost of care, multiplied by the probability of needing 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 value of long-term care insurance. This can show us the magnitude of changes in news or in financial status needed to justify strategic or financial lapsing. First, to compute the expected present value (EPV) at each age of remaining lifetime premiums and benefits, conditional on survival, we use policy characteristics described by Brown and Finkelstein (2007) as typical and updated to 2015;[9] and we use information on the likelihood of needing different types of care as estimated in, Hou, Sun, Webb, and Li (2014). This demonstrates financial valuations of insurance that are independent of preferences. Second, we use a standard dynamic optimization model, similar to Brown and Finkelstein and Friedberg, Hou, Sun, and Webb (2016), to compute willingness-to-pay by age and wealth level for the typical policy.

Figures 2A and 2B show the evolution of the EPV of policy costs and benefits, for single men and women respectively. At age 65, the expected present values of lifetime premiums in Figures 2A and 2B are both at their highest values and exceed the EPV of benefits, by a considerable amount for men (with an EPV of $55,196 and $21,857 for premiums and benefits) and by less for women (with an EPV of $60,851 and $46,307 for premiums and benefits). The EPVs of premiums decline rapidly as people age and begin to exceed the slowly-declining EPVs of benefits at around age 68 for women and at age 73 for men.

Willingness-to-pay depends not only on whether expected benefits exceed costs but also on factors including wealth and the option to rely on Medicaid. Figures 3A and 3B show that, for single people who are relatively wealthy, willingness-to-pay is positive at age 65 and grows until

[9] This is an unlimited duration policy purchased at age 65, covering both home health care and nursing home costs, and with benefits increasing at five percent a year. We assume a $165 daily benefit, 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 taken from the American Association for Long-Term Care Insurance (2015).

much older ages, absent a dramatic and unexpected change in beliefs or wealth.[10] Lower-wealth individuals are not willing to purchase insurance at age 65 because they have the option to claim Medicaid, which pays for long-term care costs after an individual has spent down most wealth. 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 on to the policy rather than lapsing. For 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 at older ages willingness to avoid losing the policy increases by a few thousand dollars per year. Willingness to avoid losing the policy increases as the aging reserves build until the early 90s for single men and the mid 80s for women. Then, it starts to decline as individuals draw down their wealth and the implicit Medicaid tax on wealth that they face increases. It does not become negative (indicating that lapsing is optimal) until past age 100. Willingness to avoid losing the policy is even higher for individuals who experience a deterioration in health and who are therefore more likely to claim benefits in the near future.

These results show that policy lapsing should not optimally occur for most people until extreme old age. It also provides insight about the financial cost of lapsing, even if people do not fully optimize when making decisions about insurance. These results rule out one type of financial lapsing – arising because planned drawdown of wealth has left one willing to forgo insurance in favor of means-tested Medicaid – as a likely explanation for observed lapses. We can also quantify drivers of the other type of financial lapsing, due to a negative wealth shock. In the

[10] 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 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.

optimization framework, wealth would have to suddenly fall below the 70th percentile for men and the 80th percentile for women at age 65. At older ages, policies continue to grow in value for many years, so 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 they would never enter a nursing home before they died, but they retained the expectation that they might need 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 have a slight gain from lapsing and single men with more wealth would still hold a policy. Consequently, very major shifts in circumstances are needed to generate strategic and financial lapsing.[11]

2. Data and Literature

Many studies of lapsing use the HRS, a panel micro dataset with detailed information about participants' health and financial status.[12] Questions about insurance holdings in the HRS have changed in ways that substantively affect the measurement of lapsing, though. We estimate rates of lapsing that are lower and are in line with the Society of Actuaries statistics, compared to earlier papers, and we also find different results about strategic lapsing. We discuss these changes and how they have altered conclusions about lapsing below.

The HRS follows Americans aged 51 and older. It began in 1992 with people aged 51-61 (and their spouses) and in 1993 with people aged 70 and over, and it re-interviews respondents every two years.[13] Although the HRS questions on long-term care insurance are detailed, insurance coverage appears to be reported with error before 2002, and the approach to measuring lapsing changed from 2002 on.

[11] Similar logic would apply to any other changes in circumstances that once justified taking out a policy but then justified lapsing.

[12] The Society of Actuaries provides statistics on aggregate lapsing by gender and age.

[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. Cohorts born 1925-30 and 1942-47 were added in 1998, and younger individuals were added in 2004 and 2010; they have not been observed for a long period and hence are not used for our analysis.

From 1995 (AHEAD) and 1996 (HRS) on, participants were asked whether they held long-term care insurance and if so what it covered and whether they had ever received benefits.[14] Between 1995-2002 participants were also asked, "Have you ever been covered by a policy that you cancelled or let lapse." Finkelstein and McGarry (2006) used the questions to measure policy holding, and Finkelstein, McGarry, and Sufi (2005a, 2005b) used them to measure lapses. However, concern about respondent confusion drove wording changes in 2002 that clarify which types of plans were to be considered when respondents answered. The new wording asked participants at the outset whether the long-term care insurance policy that they had in mind when answering questions was one of the plans (referring to health insurance plans) that the participant had told the interviewer about earlier in the interview. In 2002, 23% of respondents who said they had a long-term care insurance policy then answered that this was one of the health insurance plans that they had mentioned earlier. This evidence of respondent confusion raises substantial concern about analysis of lapsing using questions before 2002.[15]

After 2002 the direct question about ever lapsing was no longer asked, and we use changes in reported policy holding across waves to measure lapses. Both changes to the insurance questions mean that we cannot replicate the earlier analysis using data from 2002 on or replicate our analysis using from before 2000. Yet, the resulting lapse rates match up reasonably with industry statistics, suggesting that the new wording and the cross-wave measure of lapsing provide useful information.[16] We show later that the findings in Finkelstein, McGarry, and Sufi that private information about nursing home needs leads to strategic lapsing are not confirmed in the data from 2002 on.

[14] Questions about long-term care insurance coverage were not asked separately from questions about health insurance in 1992 or 1994.

[15] It is not feasible to compare overall holding rates using pre-2002 data with industry statistics, which do not report holding rates disaggregated by age. However, an indication of respondent confusion arises when comparing pre-2002 holding data across consecutive waves. This method suggests pre-2002 lapse rates over a two year span of about 50%, which is far too high. Finkelstein, McGarry, and Sufi (2005a) and (2005b) report ever-lapse rates of 37.1% and 27.0%, respectively, for people in the 1995-2000 HRS waves who say they had ever had a policy. The (2005b) paper refers to the (2005a) paper for details of sample construction, with both papers reporting the same number of lapsers but different sample sizes. Taken at face value, a lapse rate of 27.0% is consistent with SOA statistics for policies that were in force for roughly 7 years, if those policies were issued around 1992-96.

[16] The two-year lapse rate for people aged 65 and over in the HRS is 8.4% from 2002-04. 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. These calculations focus on voluntary lapses (defined as termination causes 00, 01, 04, 05, and 06).

The papers most relevant to our analysis are those that study lapsing because it may reveal market failures in the long-term care insurance market. The market is small and policies are expensive, and in addition to suggesting that private information causes adverse selection in who buys policies (Finkelstein and McGarry 2006), researchers have sought evidence of dynamic adverse selection arising from strategic lapsing in who continues to hold policies (Finkelstein, McGarry, and Sufi 2005b). Both papers make use of respondent's self-reports in the HRS of their likelihood of needing care in the future. If such information is unobservable to insurers, then those who are more likely to need care should find insurance a better deal and hence should purchase and then retain policies. Finkelstein and McGarry, focusing on who holds long-term care insurance, show that these self-reports are informative about future care use 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 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, find that individuals whose policies lapse are 2.4 percentage points less likely to enter a nursing home at some point prior to the 2000 interview, the latest wave for which they have data. This evidence of dynamic adverse selection is overturned with our use of data from 2002 and later. Meanwhile, they do not find that selection fully explains lapse behavior, 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 are needed to explain rational lapses.[17]

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

Other studies also use the pre-2002 data on lapsing. McNamara and Lee (2004) find evidence consistent with financial lapsing. Konetzka and Luo (2011) consider the relationship between lapsing and later care use but they do not isolate the mechanisms behind it, as we do. Two recent studies of lapsing exploit the questions added in 2002 (Cramer and Jensen, 2007, Li and Jensen 2012), as we do. Neither study tested for dynamic selection. 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.

3. Econometric Models of Lapsing and Dynamic Selection

In this section, we present our approach to estimating predictors of lapsing. We focus on people holding policies in 2002 (when the HRS questions about long-term care insurance changed), and we measure lapsing between 2002-06. We regress lapsing on variables observed at the same time that capture various explanations for lapsing. Then, we investigate predictors of care use between 2006-10 and relate these to earlier lapsing, which indicates whether selection out of the market via lapsing is adverse or advantageous.

Testing explanations for lapsing

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

$$\Pr(LAPSE_i = 1) = \Phi(X_i\beta + \varepsilon_i), \quad \varepsilon_i \sim N(0,1) \qquad (1)$$

in which the dependent variable takes the value one if the individual lapsed coverage between 2002 and 2006, or zero if he retained coverage. Explanatory variables include characteristics that may result in financial, strategic, or forgetful 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 finding a statistically significant effect suggests its presence. In evaluating each of these

explanations, it is changes in conditions (wealth, expectations or health, cognitive ability) that should predict lapsing. However, measuring changes in variables across two-year waves of the HRS introduces very substantial noise.[18] Moreover, a thorough analysis would require measuring changes in circumstances since the date the policy was purchased, an even longer period that is not well documented in the HRS.[19] Instead, we rely on the recognition highlighted by Hendren (2013) that policies are only offered to 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 are likely to reflect changes for the worse from previously better circumstances.[20]

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 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).[21] We also consider whether the individual has a spouse, children, or daughters, which may prompt a reassessment of care options, to test for strategic lapsing. Those relatives, especially spouses and daughters, provide the bulk of informal care (Hiedemann et al

[18] 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 rather than saving leads to somewhat reliable estimates of asset values in the cross-section but not across waves. We have found this problem to arise with other self-reported variables as well.

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

[20] Hendren notes the considerable rejection rate of applicants for long-term care insurance and a subset of the conditions that lead to rejection by a major insurer. He also points out that those who do not qualify for policies are not extremely infirm; among people in the HRS who do not qualify for a policy, their nursing home entry rate in the next five years is less than 25%.

[21] Long-term care insurance claims are predicated on needing help with ADLs. Moreover, we find that self-reported health is a much poorer predictor of care use than are ADL limitations, so we use ADL limitations as controls.

2016), possibly including financial management, and may offset the effects of cognitive impairment. [22]

A second explanation is that over time some purchasers may come to view the insurance premium as a financial burden. This could occur if they suffer a negative wealth or income shock or if a policy they were willing to pay for loses its value after gradual (and planned) wealth decumulation makes Medicaid more attractive than continuing insurance coverage, inducing *financial lapsing*. Recall that our dynamic optimization model showed that very substantial changes in wealth would be required to induce either of these types of financial lapsing. Nevertheless, we will examine whether wealth or income (measured in logs) explain observed lapses.

A third explanation for lapses is that they are unplanned and are due to poor financial decision-making, inducing *forgetful lapsing*. While we cannot easily test explanations such as intertemporal inconsistency, we try two other sets of variables to address this. 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 cognitive impairment increases lapsing (while also showing that cognitive impairment does not increase misreporting about policies in other ways). For example, individuals might forget to pay their premiums or no longer understand the potential value of their policies. In this case, individuals would be more likely to lapse *even though their impairment makes them more likely to need care*; these forgetful lapsers are the opposite of strategic lapsers. Several questions in the HRS are designed to reveal a respondent's cognitive state. We form an index of those answers that are found in Hurd et al (2013) to significantly predict dementia.[23]

[22] 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.

[23] Hurd et al (2013) develop an individual-specific predictor of the likelihood of dementia for HRS respondents. It is a function of many of the variables that we use in our lapse and care regressions, so it would not add new information to our analysis.

Finally, we include additional socioeconomic variables, reflecting age, education, and gender, that may affect demand for insurance, which may be directly or indirectly related to insurance offer and pricing decisions (Hendren 2013). We follow the baseline approach from Hendren of using only a minimal set of such 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 of the policies that we consider were issued.[24]

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 (as in Hendren 2013) 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).

Two issues arise with this approach. First, the test does not distinguish between asymmetric information and preference-based selection. As mentioned above, when focusing on coverage and not lapsing, Finkelstein and McGarry (2006) show that preference-based selection (the risk averse like to buy insurance although there risk is low) offsets risk-based selection in the decision to purchase long-term care insurance. Similar considerations are likely to apply in the lapsing decision. The absence of a negative correlation between lapsing and care use does not therefore prove that the market is not affected by asymmetric information or that the market is efficient. Second, risk classification occurs when the policy is issued, and it is difficult to identify the date of issue, and thus observe risk at that time, with any precision. As we noted earlier, the pre-2002 HRS data on policy holdings is deficient, and some policies were in effect before the HRS began in 1992.

[24] 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.

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

$$\Pr(CARE = 1) = \Phi(X_i\gamma_1 + \gamma_2 LAPSE + \epsilon_i)\ . \qquad (2)$$

CARE indicates whether a person entered a nursing home between 2006-10. The other variables are the ones from above, measured from 2002-06. *X* represents the variables that may explain lapsing from 2002-06, and if any explain care use as well, then it 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 suggests 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. HRS Sample of Insurance Holders and Lapsers

We use HRS questions about long-term care insurance holdings that were first asked in 2002 in order to define our sample of policy holders. We focus on lapsing between 2002-06 and care use between 2006-12.[25] Among people aged 65 or older in 2002, 1,048 had long-term care insurance and 966 had known insurance status in 2006. Lastly, we drop people who are missing answers to questions about anticipated care use and about cognitive ability, because these are critical to our analysis; this leaves us with an insured sample of 891. Among these, 13.0% lapsed their policy between 2002-06; as we noted in Section 2, the biannual lapse rates in the HRS are consistent with annual lapse rates for similarly aged policyholders in data from the Society of Actuaries.

Table 1 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 73 and are quite likely to be married. 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

[25] 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. In order to have a conservative estimate of lapses, we treat people who in later waves say they have a policy but are confused about what kind of policy it is as still holding a long-term care policy.

good health (Hendren 2013). They have moderate levels of income, and we will control for the natural log of these variables.

Lapsers are significantly different on many dimensions than non-lapsers. 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] They are less likely to be married (56.7% versus 70.8%) and have somewhat lower income and financial wealth. Thus, in many ways the lapsers are in poorer shape, reflecting all three possible explanations (strategic, financial, forgetful) for lapsing.

Among these 891 in the 2002-06 insurance sample, we then consider care use between 2006-10. We observe whether they use nursing home care for 823 of them.[27] Table 1 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 advantageous, rather than adverse, selection, in contrast to the evidence from Finkelstein, McGarry, and Sufi (2005a, 2005b) using earlier HRS data.

5. 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 forgetful 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 finding a statistically significant effect suggests its presence.

Empirical results

The lapsing model controls for characteristics that may result in financial, strategic, or forgetful lapsing, as well as demographic characteristics and risk preferences. Variables intended to

[26] We compute this score by forming an index of cognitive variables that are statistically significant in explaining 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: 1) whether the respondent reports today's year, month, day, and date correctly; 2) whether the respondent whether the respondent correctly names the current U.S. president and vice-president; 3) whether the respondent can correctly count backward by sevens; and 4) whether the respondent can correctly recall a list of words that the interviewer reads, both immediately and on a delayed basis.
[27] We include individuals who died between 2006 and 2012 and make use of data from exit interviews with relatives of deceased participants.

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. As we noted earlier, we cannot reliably determine when a policy was purchased or measure changes in many of these variables over the entire time during which a policy was held. 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 2 reports probit marginal effects. The results show that lower income and lower financial wealth are associated with significantly higher probabilities of lapsing. A 10% reduction in financial wealth is associated with a statistically significant 1.1 percentage point reduction in the probability of lapsing, and, a one-standard deviation decline is associated with a 3.3 percentage point reduction. The effect of income is of the same sign but falls a little short of statistical significance. This finding supports 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. On the other hand, being in fair or poor health or experiencing ADL or IADL limitations does not significantly raise the likelihood of lapsing (and these variables do not gain in significance if we omit the self-assed 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 offsetting effect on 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. In short, we find only slight evidence in favor of *strategic lapsing*.

Importantly, even after controlling for other plausible factors including health, a lower cognitive score is associated with significantly lower lapse rates – a one-standard deviation decline increases the risk of lapsing by 4.5 percentage points, which represents a large share of the overall lapse rate of 13.0%. Our interpretation of the relationship between cognitive score and

lapse rates is that it reflects *forgetful lapsing*.[28] To provide further context, we consider how lapses would change if cognitive scores were higher. Suppose that everyone with low cognitive scores in our sample actually had cognitive scores equal to the 50th percentile value. Our of estimates suggest that lapsing would decline by 2.2 percentage points, or 17% of total lapses.

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. We find no indications that low cognitive score individuals are significantly more likely than others to report lapsing and then later to report having coverage again. Nor do we find any correlation between cognitive score and uncertainty as to long-term care insurance coverage, as measured by the percent not answering the coverage question.

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.[29]

Welfare effects for unanticipated lapsing

The dynamic optimization model that we described in Section 1 gives insights into the welfare loss faced by someone who lapses forgetfully or for some other unanticipated reason. This analysis starts with Figures 3A and 3B, showing the willingness to pay by age and wealth for a typical long-term care insurance policy. Notably, the policy that we consider maintains age-65 prices – so the figures show willingness to continue holding a policy, conditional on good health, that one has purchased at age 65. All that changes over time in these figures is the optimal drawdown of wealth (and not, for instance, a shock to expectations or wealth that would lead to strategic or financial lapsing), so the value of holding on to the age-65 policy equals the value of

[28] 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).
[29] 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 forgetful lapsing.

avoiding a forgetful lapse. As noted earlier, the value of avoiding a lapse rises steadily as one ages until the early 90s for single men and the mid 80s for single women, often reaching more than twice the initial willingness to pay to purchase a policy at age 65. 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.

This willingness to avoid unanticipated lapses has two components – the loss which they would have suffered had they foreseen they would lapse and chosen a drawdown path accordingly, and the additional loss resulting from the choice of what was, with the benefit of hindsight, an inappropriately optimistic drawdown path. To quantify these losses, we compare the individual's welfare cost of anticipated versus unanticipated lapsing at age 75, for someone who purchases a typical policy at age 65 and is in the 80th wealth percentile. Anticipated lapsing at age 75 causes welfare losses equivalent to $41,516 for single men and $90,708 for single women. So, the additional welfare loss for forgetful lapsers arising because of overly optimistic wealth drawdown is almost 10% for single women and 37% for single men.

Thus, unanticipated lapsing among those who purchased a policy optimally is extremely costly. Some of this represents a transfer to people who hold on to their policy, but the additional welfare cost of consuming too much of one's wealth is also substantial. Our regression analysis does not impose a framework of optimal decision-making, and perhaps some people who let their policies lapse made a mistake when purchasing, not when lapsing. Nevertheless, the dynamic optimization framework still gives a sense of how much they lose as a consequence.

6. Implications of Lapsing on Selection

We finish by estimating a probit model of later long-term care use for the sample of policy holders in 2002. The probit model for care use between 2006-10 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 suggests 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 2006-10. Our probit estimates 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 ADLs or IADLs is also associated with more care use, while having children is associated with less care use.

Most of the variables that we highlighted earlier as affecting lapses (notably, wealth and the self-assessed probability of needing care) do not have a statistically significant relationship with the use of care. However, cognitive impairment 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 is an important source of dynamic advantageous selection. Moreover, this unanticipated lapsing is extremely costly. Individuals face annual nursing home costs of about $79,800 on average, and Medicaid pays currently pays about $130 billion per year for long-term care of those who cannot otherwise afford it.

7. Conclusion

Individuals with long-term care insurance policies exhibit very high lapse rates, with people who are 65 having over a one-quarter chance of lapsing prior to death, forfeiting all benefits. We investigate what factors account for lapses, whether those factors suggest that people let policies lapse strategically or might be making mistakes, and whether lapsing leads to adverse or advantageous selection among remaining policy holders.

The study has three main findings. First, we find evidence of substantial lapsing among the cognitively impaired, demonstrating the importance of forgetful lapsing. We also we find that limited financial resources predict lapsing, but that strategic lapsing motives appear to be extremely small. Second, forgetful lapsing is an important source of dynamic advantageous

selection. This selection takes an especially pernicious form, in which policy holders who are quite likely to need care imminently are also more likely to stop paying for their insurance.

Lastly, we calculate the welfare cost to those who lapse unexpectedly. Our model assumes that people rationally buy policies at age 65 if their willingness-to-pay is positive, given their care expectations, wealth, and the Medicaid program. … In a model that includes the determination of premiums, non-lapsers benefit from premiums that are lower than they would be if everyone retained coverage.

One way of eliminating lapses would be to pay premiums in a lump sum. Due to Medicaid crowd-out, long-term care insurance is most attractive to the wealthy (Brown and Finkelstein, 2008). Some of these households could afford to pay a lump sum premium or to pre-pay much of their premium early on, and might prefer to this, given the risk of increases in periodic premiums. From the insurance company's perspective, the problem with lump sums is that, in contrast to policies with monthly premiums, it would be difficult to increase premiums should claims be higher than expected.

References

American Association for Long-Term Care Insurance. 2015. "The 2015-2016 Sourcebook for Long-Term Care Insurance Information" www.aaltci.org.

Brown, Jeffrey R., and Amy Finkelstein. 2007. "Why is the Market for Long-Term Care Insurance So Small" *Journal of public Economics* 91.10 Nov. Pages 1967-1991.

Brown, Jeffrey R., and Amy Finkelstein. 2008. "The Interaction of Public and Private Insurance: Medicaid and the Long-Term Care Insurance Market" *American Economic Review* 98.3 June. Pages 1083-1102.

Browne, Mark J. 2006. "Adverse selection in the Long-Term Care Insurance Market" in Competitive Failures in Insurance Markets: Theory and Policy Implications Pages 897-112. CESifo Seminar series Cambridge MA. MIT Press.

Chiappori, Pierre-Andre and Bernard Salanie. 2000. "Testing for Asymmetric Information in Insurance Markets." *The Journal of Political Economy* 108(1): 56-78.

Cramer, Anne Theisen and Gail A. Jensen. 2008. "Why Do People Change Their Minds? Evidence from the Purchase of Long-Term Care Insurance." In *Psychology of Decision Making in Economics, Business and Finance.* P. Hofmann Klaus, ed., 179-193. Hauppauge, NY: Nova Science Publishers.

Finkelstein, Amy and Kathleen McGarry (2006). "Multiple Dimensions of Private Information: Evidence from the Long-Term Care Insurance Market" *American Economic Review* Vol. 96 No. 4 Pages 938-958.

Finkelstein, Amy, Kathleen McGarry, and Amir Sufi. 2005a. "Dynamic Inefficiencies in Insurance Markets: Evidence from Long-Term Care Insurance." National Bureau of Economic Research Working Paper No. 11039.

Finkelstein, Amy, Kathleen McGarry, and Amir Sufi. 2005b. "Dynamic Inefficiencies in Insurance Markets: Evidence from Long-Term Care." *American Economic Review* 95(2): 224-228.

Friedberg, Leora, Wenliang Hou, Wei Sun, Anthony Webb, and Zhenyu Li. 2014. "New Evidence on the Risk of Requiring Long-Term Care" Working Paper 2014-12. Chestnut Hill, MA: Center for Retirement Research at Boston College.

Friedberg, Leora, Wenliang Hou, Wei Sun, and Anthony Webb. 2016. "Medicaid and Crowd-Out of Long-Term Care Insurance" Unpublished Working Paper.

Gan, Li, Feng Huang, and Adalbert Mayer. 2015. "A Simple Test of Private Information in the Insurance Markets with Heterogeneous Insurance Demand" Economics Letters. Vol. 138. Pages 197-200.

Hendren, Nathaniel. 2013. "Private Information and Insurance Rejections" *Econometrica*. Vol. 81. No. 5. September. Pages 1713-1762.

Hiedemann, Bridget, Michelle Sovinsky, and Steven Stern. 2016. "Will You Still Want Me Tomorrow? The Dynamics of Families' Long-Term Care Arrangements." Manuscript. Stonybrook University.

Hou, Wenliang, Wei Sun, and Anthony Webb. 2015. "Why Do People Lapse Their Long-Term Care Insurance?" Boston College Center for Retirement Research Issue Brief #15-17.

Hurd, Michael, P. Martorell, A. Delavande, K. Mullen, and K. Langa. 2013. "Monetary costs of dementia in the United States." *New England Journal of Medicine* 368, pp. 1326-1334.

Ko, Ami. 2016. "An Equilibrium Analysis of the Long-Term Care Insurance Market." Draft, University of Pennsylvania.

Konetzka, R. Tamara and Ye Luo. 2011. "Explaining Lapse in Long-Term Care Insurance Markets." *Health Economics* 20: 1169-1183.

Li, Yong, and Gail A. Jensen. 2012. "Why Do People Let Their Long-Term Care Insurance Lapse? Evidence from the Health and Retirement Study." *Applied Economic Perspectives and Policy* 34(2): 220-237.

McNamara, Paul E. and Nayoung Lee. 2004. "Long-Term Care Insurance Policy Dropping in the U.S. from 1996-2000: Evidence and Implications for Long-Term Care Financing." *The Geneva Papers on Risk and Insurance* 29(4): 640-651.

National Health Policy Forum. 2014. "The Basics: National Spending for Long-Term Services and Supports (LTSS) 2012. Policy Brief http://www.nhpf.org/library/details.cfm/2783

Society of Actuaries. 2011. "Long-Term Care Experience Committee Intercompany Study Report 6 1984-2007 "https://www.soa.org/experience-studies/2011/research-ltc-study-1984-report/

Society of Actuaries. 2015. "Long Term Care Intercompany Experience Study – Policy Terminations Aggregate Databases 2000-2011 Report https://www.soa.org/experience-studies/2015/2000-2011-ltc-exp-study-terminations/

Venti, Steven. 2011. "Economic Measurement in the Health and Retirement Study." *Forum for Health Economics and Policy* 14.3.