I Z A Institute
of Labor Economics
Initiated by Deutsche Post Foundation

DISCUSSION PAPER SERIES

IZA DP No. 14753

Long-Term Care Partnership Effects on Medicaid and Private Insurance

Joan Costa-Fonta
Nilesh Raut

SEPTEMBER 2021

I Z A Institute
of Labor Economics

Initiated by Deutsche Post Foundation

DISCUSSION PAPER SERIES

IZA DP No. 14753

Long-Term Care Partnership Effects on Medicaid and Private Insurance

Joan Costa-Fonta
London School of Economics and Political Science, IZA and CESIfo

Nilesh Raut
London School of Economics and Political Science

SEPTEMBER 2021

ISSN: 2365-9793

IZA – Institute of Labor Economics

Schaumburg-Lippe-Straße 5–9
53113 Bonn, Germany

Phone: +49-228-3894-0
Email: publications@iza.org

www.iza.org

ABSTRACT

Long-Term Care Partnership Effects on Medicaid and Private Insurance*

Can the expansion of Medicaid, a means-tested health and long-term care insurance, be slowed down by incentivising the purchase of private long-term care insurance (LTCI)? We study the implementation of the long-term care insurance partnership (LTCIP) program, a joint federal and state-level program that intended to promote LTCI coverage. Drawing on a difference-in-differences (DD) design we study the effect of the rollout of the LTCIP program between 2005 and 2016 on both LTCI uptake and Medicaid eligibility, and we estimate the effect on Medicaid savings. Drawing on a difference-in-differences (DD) design, we find that, unlike previous estimates, the introduction of the LTCIP *does significantly increase LTCI coverage and reduce the uptake of Medicaid*. The effects are driven by the introduction of LTCIP in states after 2010. We estimate that the adoption of LTCIP has given rise to an *average Medicaid saving of $36 for every 65-year-old*. This suggests scope for LTCI arrangements to reduce Medicaid spending.

JEL Classification: I18, H11, H24

Keywords: long-term care partnerships, long-term care insurance, Medicaid, United States, difference-in-differences

Corresponding author:
Nilesh Raut
Department of Health Policy
London School of Economics
London
United Kingdom
E-mail: N.Raut@lse.ac.uk

* We are grateful to Mike Miners and Edward Norton for their guidance and support. We would also like to thank Andrew Street, Alessandro Zenati, Genevieve Jeffreys, Sang June Kim, and HP500 class and seminar participants at the London School of Economics and Political Science for insightful comments and discussion.

1. Introduction

The design of insurance for long-term care services and supports (LTCSS) has significant financial consequences for both households as well as the financial balance of public insurance programs such as Medicaid. Estimates suggest that two-thirds of Americans aged 65 and above are expected to use LTCSS at some point in their life (Congressional Budget Office 2013; Eggleston and Fuchs 2012; Eggleston and Mukherjee 2019; Kemper, Komisar, and Alecxih 2005). However, it is unclear how such access to LTCSS will be funded.

To date, public insurance programs fund 72% of LTCSS spending, and Medicaid, a public insurance program jointly financed by both states and the federal governments and administered for low-income families, alone makes up around 53% of the overall expenditure on LTCSS (AARP 2019; Kaiser Family Foundation 2019; Reaves and Musumeci 2015; Thach and Wiener 2018). The remaining 28% of LTCSS spending consists of private insurance or LTCI (11%) and out-of-pocket expenses (17%) (Thach and Wiener 2018; Reaves and Musumeci 2015). The small share of private LTCI is one of the most worrying concerns of old age Americans given their low savings. This slim coverage of private-LTCI, in addition to limited public insurance coverage, means that in the absence of any public intervention most Americans will go without insurance coverage. Thus, in the event of needed long-term care, lack of LTCI increases not only the individual's out-of-pocket expenses but also the public expenditure via Medicaid for long-term care (Goda, 2011).

The uptake of a private-LTCI can reduce the expected Medicaid spending as Medicaid act as a secondary payer, hence any private insurance benefit must be exhausted before availing the Medicaid-financed care (Pauly 1990; Brown and Finkelstein 2008). Also, it is mandatary by law that a private policy pays first even-though an individual satisfies both Medicaid income and assets entitlement means-testing criterion. However, the secondary payer status of Medicaid imposes an implicit tax on private-LTCI leading to a reduction in the net benefits

obtained from private policy (Brown and Finkelstein 2008; 2011). Owing to these reasons, private-LTCI has exhibited very moderate growth over time, and barely 11% of individuals in the Health and Retirement Survey have contracted such an insurance policy. As the Baby boomers start to retire due to aging, the demand for Medicaid is likely to rise as individuals cannot fully afford the costs of LTSS (Bergquist et al 2015). This presents three major social policy challenges: 1) a rise in Medicaid expenditures, 2) insufficient coverage of LTSS coverage, and 3) as a result a growth of the fiscal deficit, which compromises the public sustainability of the current Medicaid design, and calls for strategic policy interventions to reduce spending to qualify for Medicaid (Pauly 1990).

One of the chief initiatives taken by some US states includes the design of an LTCIP program (Meiners and Goss 1994; Bergquist, Costa-Font, and Swartz 2018). This program is intended to reduce the uptake of Medicaid by stimulating the purchase of private LTCI among individuals who otherwise would turn to Medicaid. The main advantage for individuals purchasing qualifying insurance is that those individuals may retain some assets equivalent to the amount specified in the policy and still qualify for Medicaid, provided they meet other eligibility requirements[1]. This paper examines the effects of LTCIP.

Earlier studies focused on the introduction of the LTCIP before 2010, and did not find any evidence of an *immediate short-term effect* on the uptake of LTCI (Robert Wood Johnson Foundation (RWJF) 2007; Lin and Prince 2013). However, LTCIP might take some time to produce effects, and previous studies do not consider the significant expansion of LTCIP program after 2008 when a long list of states join the program (see Figure 1 below). Earlier studies do not examine the effect on Medicaid spending, although the introduction of LTCIP

[1] The LTCIP program is administered through the combined effort of public and private insurance providers in the form of a new insurance product known as LTCIP (Robert Wood Johnson Foundation (RWJF) 2007; Lin and Prince 2013).

in several U.S. states allows for the examination of long-term effects on both insurance uptake as well as spending. Finally, it is important to mention that LTCIP adds to other state-level fiscal incentives, many of which are not to be cost-effective (Goda 2011), to encourage the uptake of LTCI. Nevertheless, it is still unclear what the return on the dollar is for LTCIP, more generally what's the welfare effects of the program.

This paper examines whether the states' adoption of a LTCIP program led to an increase in the uptake of public (Medicaid) and private insurance (LTCI). Firstly, we use a Difference-in-Differences (DiD) design to identify the effect of the LTCIP in the uptake of LTCI (intensive and extensive margin) and Medicaid entitlement. We draw on a comprehensive longitudinal dataset that follows individuals for 22 years (1996-2016) from the Health and Retirement Study, and we exploit the rollout of the LTCIP program in different states to evaluate whether the LTCIP program successfully stimulated the purchase of private LTCI and subsequent changes in the trends in Medicaid entitlement. Secondly, we examine the heterogeneous effects across household composition, alongside robustness checks including a placebo test and a confirmation of the short-term effects using earlier studies (Lin and Prince 2013). Finally, the paper provides a simple welfare evaluation of the impact of the LTCIP program compared to a state-specific tax incentive.

We contribute to the literature in several ways. First, we examine whether the introduction of the LTCIP design (where individuals manage to protect their assets equivalent to the value of their insurance coverage and still qualify for Medicaid) reduced Medicaid uptake (Brown and Finkelstein 2009; 2008; Norton 2000; Norton and Sloan 1997)[2]. Second, unlike previous studies which either focused on short-term effects on individual data (Lin and Prince

[2] One study examines aggregate changes in Medicaid spending after the introduction of the early partnerships (Bergquist et al., 2018), but it is restricted to the period 1999-2008 and significant number of states (20 states) adopted LTCIP program only after 2008. Hence, Bergquist et al. (2018) only observe three years of data after the implementation of the Deficit reduction Act (DRA).

2013) or, aggregate-level data Bergquist et al. (2018), we examine the long-term effects of LTCIP and present an evidence of a positive stimulus of LTCIP. Furthermore, Lin and Prince (2013) overlook the differences between the Permanent Partnership states (RWJF states[1]) and the New Partnership states (DRA-2005 states). In contrast, we focus on the long-term effects of LTCIP, distinguishing between *the new and the so-called 'permanent' partnership states*. In addition, the use of individual-level surveys allows for the inclusion of a rich set of controls and individual-specific fixed effects that control for several unobservables (e.g., Medicaid stigma, risk aversion) and allow us to carry out heterogeneity analysis. Finally, this paper contributes to the literature by developing a welfare evaluation of the LTCIP effect on both LTCI (private insurance) and Medicaid (public insurance) adoption, and we compare it to the alternative stimulus available at the state level, namely the effect of a state-level tax incentive (Goda, 2011).

The rest of the paper is organised as follows. The next section describes the relevant institutional background on how long-term care is funded in the U.S. and the effects of the LTCIP. Next, we describe the data and empirical strategy. Section four reports the results, section five provides robustness checks, and a final section concludes the paper.

2. Institutional Background

Funding long-term care. The funding of LTCSS is based on a combination of public and private insurance schemes. However, close to three quarters of spending on LTCSS is financed by public sources, whereas more than half of LTCSS is funded by Medicaid, a means-tested program that is jointly financed by state and federal governments (Reaves and Musumeci, 2015, AARP, 2019; Kaiser Family Foundation, 2019; Thach and Wiener, 2018)[3]. Although

[3] As of January 2019, the income eligibility criteria to qualify for Medicaid is 138% of the federal poverty line

very popular among elderly people in the U.S., Medicare is a public health insurance program that only provides short-term stay coverage in a skilled nursing home (AARP, 2019). The bulk of LTCSS is financed by Medicaid. Nevertheless, due to the means-testing provision, Medicaid is an inefficient long-term care consumption smoothing mechanism for majority of the elderly population in the US (Brown and Finkelstein 2008). The means-testing limit not only restricts an individual's ability to choose optimal consumption of care but substantially reduces her household expenditure for non-care consumption. Most importantly, it exposes all but the poorest individuals to a risk of bearing considerable amount of out-of-pocket expenses (Brown and Finkelstein 2008). Limited Medicaid coverage exerts unintended consequences by lowering the demand of private-LTCI by imposing implicit tax on private-LTCI, leading to a significant welfare loss for an individual (Brown and Finkelstein 2008; 2011).

Private Long-Term Care Insurance (LTCI). About 28% of spending on LTCSS is privately funded, which breaks down into LTCI coverage premiums (11%) and out-of-pocket expenses (18%) (Reaves and Musumeci 2015; Thach and Wiener 2018). Private LTCI covers the considerable costs of long-term care services for those who need help in performing day-to-day tasks such as dressing, bathing, and toilet activities (AALTCI 2019; National Institute of Aging 2017). It is an important policy to be purchased, especially for the elderly population, to insure against the severe financial risks of the future. In 2017, the average monthly costs of long-term care in a nursing home stood at $8,385 (AALTCI 2019; CMS 2018). The policy holders of private LTCI can receive long-term care services in-house, in a nursing care centre, in an adult day-care centre, or in an assisted living facility, and get the reimbursement for the money spent on buying such services. Approximately 11% of old age Americans hold an LTC insurance policy.

The Long-Term Care Insurance Partnership (LTCIP) Program. The LTCIP program is an intervention designed to incentivise LTCI coverage through an insurance design that entails a collaboration between state and private insurers (Robert Wood Johnson Foundation (RWJF) 2007), and it targets middle income individuals who fail to purchase LTCI as well as do not qualify for Medicaid. The LTCIP program was first promoted by the Robert Wood Johnson Foundation (RWJF) in 1987. Initially, only four states—commonly known as RWJF states—adopted the partnership program: California (1994), Connecticut (1992), Indiana (1993), and New York (1993) (Alper 2006; "The Federal Long-Term Care Insurance Program" 2018), given the constraints (moratorium) in federal legislation. In this paper, we call these four states 'permanent partnership states' and include them separately in our analysis.

We exploit the effect of the lifting of the moratorium in 2006, as part of the federal Deficit Reduction Act of 2005 (DRA 2005). The LTCIP program allows policyholders not to account for their long-term care expenses—usually equivalent to individual LTCIP coverage amount—in the Medicaid eligibility criteria (the model is also known as the 'dollar-for-dollar')[4]. For example, an insurance policy for a 65-year-old individual, with a median wealth of $144,000, provides a daily benefit of $100 per day for two years, thus an individual can protect an asset worth of $73,000 (= 365 x 100 x 2) (Brown and Finkelstein 2011). Therefore, she needs to spend down remaining assets worth of $69,000 (= $144,000 - $73,000 - $2000) to become eligible for Medicaid financed care. The LTCIP nevertheless offers an incentive to protect individuals' assets as well as reduce future Medicaid spending by stimulating the purchase of private LTCI (Rothstein 2007; Bergquist et al 2018). It is important to note that a resident of a state, who already holds a LTCI-policy when state adopts LTCIP program, can exchange existing LTCI-policy for LTCIP-policy under the guidelines suggested by DRA

[4] Although the 'dollar-for-dollar' model was initiated by California, Connecticut, and Indiana and later embraced by New York in 2006 (Meiners, McKay, and Mahoney 2002; NYSPLTC 2011; Bergquist, Costa-Font, and Swartz 2018), all new partnerships developed after 2006 follow the 'dollar-for-dollar' model by default.

2005[5]. Given the advantage of securing wealth under the LTCIP, this provision of DRA2005 makes it more likely for a policyholder to hold LTCI policy that she may not have had prior to LTCIP being implemented. Figure 1 depicts the adoption of LTCIP across U.S. states in a given year. Since 2006, there has been a proliferation of states that have progressively adopted the same LTCIP design that is standardised in its terms, and hence can be compared across different states.

[Insert Figure 1 about here]

Data. We use a large-scale longitudinal dataset from the Health and Retirement Study (HRS). The HRS is a panel study sponsored by the National Institute of Aging (NIH). It is a bi-annual survey that began interviewing respondents and their spouses from 1992 onward. The first wave of HRS collected information from individuals aged 50 and above (mainly aged 51-61 and born between 1931-1941) when the sample was first collected in 1992 (National Institute on Aging and The Social Security Administration 2018). The HRS contains the oldest cohort, i.e. people born before 1923, named as Asset and Health Dynamics among the Oldest Old (AHEAD). Starting in 1993, the AHEAD sample was collected every alternate year until 1998 when it was merged with other samples. Subsequently, two additional sample cohorts were added, namely the War Baby (WB - Individuals born between 1942 and 1947) and the Children of Depression Age (CODA - Individuals born between 1924 and 1930) cohorts.

The HRS provides extensive information on various components of the elderly life, including information on household characteristics, income including pension income, employment and retirement records, education attainment, financial wealth, insurance coverage, alongside a number of health and disability records . We draw on restricted HRS

[5] DRA2005: "In the case of a long-term care insurance policy which is exchanged for another such policy, subclause (I) shall be applied based on the coverage of the first such policy that was exchanged." Subclause I - "The policy covers an insured who was a resident of such State when coverage first became effective under the policy." https://www.govinfo.gov/content/pkg/PLAW-109publ171/pdf/PLAW-109publ171.pdf

data from 1992 through 2016, which allow to identify state information to locate the state residence for all sampled individuals. However, we remove the first two waves (1992 and 1994) from our main sample due to the vagueness in the questions' wording. Thus, the final sample consists of data from 1996 through 2016 which has 148,972 observations and 32,182 sample individuals.

Next, we have matched the final sample with the policy data referring to the LTCIP implementation for each of the states at time t. That is, information about a specific state's adoption of a LTCIP in a given time t. Hence, the policy variable equals 1 if an individual resides in a state that has implemented a LTCIP program, otherwise it equals 0. This allows comparing the bulk of LTCIP to other states, locating the counterfactual, and identifying the shift in the purchase of private LTCI. However, all the reported estimates are calculated after including both North Carolina and Washington into the group of new-partnership states[6].

3. **Empirical Strategy.**

Event Study Design. Panel event study methods are at the core of recent developments in quasi-experimental techniques as they attempt to estimate the impact of events occurs at different time periods. A growing number of studies tests a combination of complex identifying assumptions in this regard and attempts to provide a guidance on accurately estimating the impact of staggered adoption of policies (Athey and Imbens 2021; Borusyak and Jaravel 2017; Callaway and Sant'Anna 2018; de Chaisemartin and D'Haultfoeuille 2019; Abraham and Sun 2020; Goodman-Bacon 2021). One of the major concerns of using two-way fixed effects is that the interpretation of the estimated coefficient is not straightforward due to heterogeneity in treatment effects (Callaway and Sant'Anna 2018; de Chaisemartin and D'Haultfoeuille 2019;

[6] We include the state of North Carolina and Washington into the non-partnership member states only for the purpose of plotting graphs, because both introduced LTCIP only after 2011.

Goodman-Bacon 2021). However, a panel event study design can address the concern arises from heterogenous treatment effects when treatment occurs in different time periods for different units (Abraham and Sun 2020; Clarke and Schythe 2020). We initially estimate a non-parametric event study specification, defining the event (t=0) as the adoption of the DRA 2005 which opens the door to LTCIP programs. We use Health and Retirement Survey data for the study, which is a biannual survey, therefore we only observe the introduction of the DRA 2006 (or Wave 8), and we define indicator variables relative to the event for New-Partnership states and non-Partnership states. The non-parametric specification is as follows:

$$Yit = \delta t + \beta Xit + \theta s + \sum_{r=-2}^{-5} \Phi r + \sum_{r=0}^{5} \Phi r + (\sum_{r=-2}^{-5} \Psi r + \sum_{r=0}^{5} \Psi r) * NewPS + Vit \quad (1)$$

In equation 1, δt and θs indicate year and state fixed effects, respectively. It must be noted that r=0 corresponds to year 2006 i.e., the interview was conducted one year after the adoption of DRA-2005. Because HRS is a biannual survey, we do not observe the data recorded for year 2005. The X_{it} indicates other control variables and Ψr represents coefficients on leads and lags for New-Partnership states (*NewPS*) relative to the omitted category Ψ_{-1}, whereas Φr represents coefficients for leads and lags for non-Partnership states. The non-parametric event study allows us to visually investigate the outcome pattern subject to the adoption of LTCIP by each state. We test two identifying assumptions: 1) The parallel trend assumption suggesting that the baseline outcome is mean-independent of the timing of LTCIP adoption, and 2) The anticipation of treatment (event) should not occur.

Difference-in-Differences. Next, we use the generalized Difference-in-Differences (DiD) design to compare the changes in the average likelihood of LTCI uptake in New-Partnership states to that of non-Partnership states. Equation 2 represents our fully specified model for

difference-in-differences, which is also a two-way fixed effects estimator. The recent literature in this regard observe that we know relatively less about the two-way fixed effect when treatment varies across different time periods for various groups (Borusyak and Jaravel 2017; Callaway and Sant'Anna 2018; de Chaisemartin and D'Haultfoeuille 2019; Abraham and Sun 2020; Goodman-Bacon 2021). As per Goodman-Bacon (2021), the two-way fixed effects is a weighted average of all the existing 2x2DD estimators. However, the approach suggested by Goodman-Bacon (2021) has few limitations when it comes to our data sample. Firstly, Goodman-Bacon (2021) DD decomposition approach needs a strongly balanced panel. Our sample consists of information on LTCI and Medicaid uptake over the period from 1996 through 2016. It is an unbalanced panel data. We attempted to obtain a strongly balanced panel for stated approach but lose significant number (about 85%) of observations. Approximately, 11-12% of the sample respondents hold each of LTCI or Medicaid. Thus, obtaining a strongly balanced panel comes at a cost of scarce information and statistical power. Secondly, the bulk of our treatment (appx 34/38 of LTCIP) occurs in the year 2008 and 2010, only a wave apart. As the treatment timings almost coincide, therefore, we do not obtain a proper '*Early Group vs. Late Group, before*' comparison as suggested by Goodman-Bacon (2021). In addition, *'Early Group vs. Late Group, after'* comparison is not applicable in our case because the treatment remains in place after adoption. Hence, we continue to use two-way fixed effects DiD model shown in Equation 2. We also compare changes in the average uptake of Medicaid in New-Partnership states to comparable changes in average uptake of Medicaid in Non-Partnership states. The DiD estimation approach is one of the most widely used identification strategies in empirical economics (Angrist and Krueger 1999; Athey and Imbens 2006; Bertrand, Duflo, and Mullainathan 2004; Ai and Norton 2003; Puhani 2012). We disentangle the effect of partnership states from that of non-partnership states. However, among partnership states, we further form two treatment groups, namely the Permanent Partnership states (or

RWJF states) and New Partnership states (or DRA 2005 states), in order to spell out the effect of new partnerships. The data consists of information on LTCI and Medicaid uptake over the period from 1996 through 2016. New-Partnership states began participating only after 2005.

We employ a linear probability model, and non -liner models in the robustness checks. An advantage of this approach is that the interpretation of the interaction terms is straightforward (Ai and Norton 2003; Athey and Imbens 2006; Puhani 2012). Our generalized difference-in-differences specification is as follows:

$$Y_{ist} = \beta_0 + \beta_1 LTCIP_{ist} + \beta_2 PP_{ist} + \rho X_{ist} + \theta_s + \sigma_t + \eta_i + \epsilon_{ist} \qquad (2)$$

Where Y_{ist} is either private LTCI or Medicaid for an individual (i) in state (s) at time (t). Based on a year in which a state adopts a LTCIP program, we categorize states into New-Partnership states, Permanent-Partnership (PP) states, and non-Partnership states. In the above model, coefficients β_1 estimate the effect of New Partnerships in addition to the effect (β_2) of Permanent-Partnership (PP), and the effects of set of controls (X), respectively. The regression estimates controls for additional state specific fixed effects (θ_s) which eliminate time-invariant differences among various states and wave-year fixed effects (σ_t) to flexibly account for variation across time. This allows us to compare people living in different states as they differ in terms of socio-politico-economic characteristics. In addition, the regression model includes time-invariant individual specific characteristics (η_i) which can potentially be correlated with the error term (ϵ_{ist}) and therefore a source of endogeneity. Such time-invariant individual heterogeneity can be removed using a Fixed Effects Model.

4. Results

Descriptive Evidence. Figure 2a depicts the trends in the percentage of individuals that have private LTCI in New-Partnerships states, non-Partnership states and the states that participated

in the Robert Wood Johnson initiative. Importantly, the figure displays evidence suggesting that the introduction and subsequent rollout of LTCIP programs increased the uptake of private LTCI compared with other states, given that trends were comparable between the two groups in the pre-partnership period. In contrast, Permanent-Partnership and Non-Partnership states exhibit lower trends of insurance uptake share, suggesting an average insurance uptake gap of 1 to 2%. When it comes to the trends in the uptake of Medicaid as shown in Figure 2b, Permanent-Partnership states significantly differ from those of the remaining states. One of the key reasons for this difference is that as the partnership program matures as policyholders age, and they have already exhausted their private coverage and qualified for Medicaid, leading to increase in Medicaid uptake in Permanent-Partnership states. Therefore, other states are different compared to permanent partnership states with regards to Medicaid pattern.

[Insert Figure 2a, and Figure 2b about here]

Table 1 displays the descriptive statistics (means and standard deviations) of individuals that have private LTCI and Medicaid, respectively. LTCI purchasers have higher income and wealth, on an average, compared to the sample population, whereas LTCI purchasers from partnership states are slightly poor when compared with LTCI-purchasers in general. We report that LTCI coverage holders are healthy compared to the average population indicating the insurance underwriting in the market for private-LTCI. However, exactly opposite can be observed in case of Medicaid uptake, which is obvious given that it is meant for the poorest of the individuals.[7]

In Table 2, we compare the characteristics of the sample for private-LTCI uptake and Medicaid entitlements across the state categories viz. New-partnerships, Permanent-partnerships, and

[7] Appendix-Table I : It compares the sample means to that of insurance takers' means.

non-partnerships states. On average, the proportion of people having private-LTCI coverage is greater for New-partnership states, across all the socio-economic characteristics, compared to the remaining states. Similarly, we report that the proportion of people enrolled in Medicaid program is lower for New-partnership states across majority of socio-economic characteristics.

[Insert Table 1 and 2 about here]

Figure 2b reports the trends of Medicaid uptake over time among what we define as the New-Partnership, the so-called permanent partnerships (PP), and Non-Partnership states. The figure suggests gradual shift in Medicaid uptake trend, though Medicaid uptake is generally lower after the implementation of a LTCIP. In contrast, Permanent-Partnership states exhibit a steeper rise in Medicaid expenditure throughout the entire sample period.

Event Study: Figures 3a and 3b plot the estimated coefficients, obtained after estimating the non-parametric event study regression (1) for both private and public long-term care insurance. They report the impact of the introduction of a LTCIP in a specific state on the uptake of private LTCI and Medicaid uptake in such states compared to non-partnership states. We document that the effect of LTCIP on private LTCI builds up over time and reaches a peak after 2 to 3 waves of the HRS. Similarly, the effect of LTCIP on Medicaid uptake follows the impact on private LTCI, as a comparison between Figure 3a and 3b reveals. Both figures show comparable linear trends in the pre-LTCIP period for both private and public insurance. The evidence suggests that LTCIP exerts a statistically significant impact on the purchase of private LTCI and the uptake of Medicaid in the post-DRA 2005 era[8], implying that LTCIP is associated

[8] We also plot event study by assuming that the reform began in 2008 instead of 2006. Figure V and VI of the Appendix represent event study plot for LTCI and Medicaid respectively. We observe that the event study

with an increase in private insurance purchases and a subsequent decrease in the uptake of public insurance (Medicaid).

[Insert Figure 3a, and Figure 3b about here]

Baseline Estimates. The reported trends do not control for time varying state-level characteristics, alongside individual compositional differences. Next, we estimate equation (2), namely a Difference-in-Differences (DiD) design used to identify the effect of LTCIP on private coverage and Medicaid uptake. Table 3 reports the estimates of the impact of LTCIP on LTCI with no controls and no state and year fixed effects. Column (2) includes state and year fixed effects, whereas Column (3) indicates the fully specified regression model with full controls and year and state fixed effects. Column (3) reports an effect of 1.64 percentage points, which on average entails a 18% increase in the likelihood of LTCI coverage. Column (4) displays a fully specified model with individual fixed effects, which account for time unvarying individuals' unobservables. Individual fixed effects models suggest the effect of within-individual uptake of LTCI varies after the implementation of the LTCIP and, estimates indicate a 1 percentage point (11% increase w r t mean) increase in the likelihood of LTCI coverage. Although a DiD specification should not provide a significantly different result when individual fixed effects are included, we prefer the Fixed Effects Model when the decision is made on a yearly basis. That is, Column (3) and Column (7) estimates when the decision is not affected by the year of its occurrence.

[Insert Table 4 about here]

trends are almost unaffected due to the change in reform. This happens because only two states began adopting LTCIP in 2006. Thus, we obtain similar event study trends.

Similarly, Column (5) from Table 3 reports the impact of LTCIP on the uptake of Medicaid in the absence of any controls, state & year effects, and person specific fixed effects. Column (6) includes state and year fixed effects, whereas Column (7) from Table 3 is the fully specified model for Medicaid and reveals that the adoption of a LTCIP program reduced the likelihood of Medicaid uptake by approximately 1.5 percentage points, which is equivalent to a 13.5% decrease in the likelihood of Medicaid uptake at the 9% pre-partnership Medicaid coverage rate. Estimates are precisely estimated. Column (8) from Table 3 reports the fully specified model with individual fixed effects, but these estimates were less precise, and hence are not statistically significant.

Cumulative Effects. The effect of LTCIP kicks-in gradually as the program is disseminated among new beneficiaries. This explains why earlier studies showed no evidence of an effect (Bergquist et al. 2018; Lin and Prince 2013). Our estimates differ significantly from those of earlier studies because of two main reasons. Firstly, as discussed in Brown and Finkelstein (2011), the LTCIP tackles one of the two sources of Medicaid implicit tax by delaying the process of qualifying for Medicaid through the inclusion of private insurance coverage towards the means-tested eligibility for Medicaid. Although not entirely, this definitely helps in reducing Medicaid's implicit tax on private insurance and thus increases the demand of private-LTCI to some extent which is also evidenced by our estimates. It must be noted that LTCIP does not change the status of Medicaid as a secondary payer, which is another source of Medicaid implicit tax (Brown and Finkelstein 2011). Secondly, the existence of a lag between the time when a policy is purchased and when people use their coverage, also mentioned by Bergquist et al. (2018), likely delays the uptake of Medicaid until further down the road which is also reflected by the event study plot in Figure 3. The effect on Medicaid picks up almost 2-3 years after the implementation of LTCIP. Overall, the evidence we provide suggests that the

effect of LTCIP appears over time, and the effect is mostly driven by partnerships set up after 2010 which are not covered by previous studies. The Table 4 shows the impact of LTCIP on private-LTCI and Medicaid uptake over the post-reform years.

[Insert Table 4 about here]

Effects on the Intensive Margin and OOP Expenses. Next, we test the effect on the intensive margins and on the out-of-pocket medical expenses, which capture among others, the effect of generous insurance policy coverage after the LTCIP program has been introduced because the program allows individuals to secure their assets and meet the asset threshold for Medicaid eligibility, which in turn can be transferred as a bequest (and hence satisfy bequests motives). First, we examine the impact of LTCIP by estimating Equation (1) on the monthly premium of individual's private LTCI plan as a dependent variable, as well as distinguishing whether a purchased plan covers both nursing home care as well as home care. Table 5 summarizes the results in which Column (1) and (2) represent the estimated impact of LTCIP on the monthly premium of a private LTCI plan. Column (2) estimates are obtained using a fully specified model with individual fixed effects. LTCIP results in the monthly premium of private LTCI to go down by approximately \$0.179, but these estimates are not statistically significant. Similarly, Column (3) and (4) indicate that LTCIP increases the likelihood of purchasing a plan with coverage of both nursing home care as well as home care by 1.4 percentage points (and by 0.7 percentage points without controlling for individual fixed effects). These results indicate that the LTCIP program impacted both intensive as well as extensive margins. The increase in private LTCI premiums after the adoption of LTCIP indicates that some individuals were motivated by the program to secure their assets. This resulted in the increase in the broadness of the private LTCI contracts.

[Insert Table 5 about here]

Second, we analyse the impact of LTCIP on extensive margins of out-of-pocket medical expenses viz. expenses above $500 and above $1k. Column (5), (6), (7), and (8) show that LTCIP is associated with decrease in the likelihood of out-of-pocket medical spending. This indicates that LTCIP increases the coverage of private-LTCI and has a negative cascading effect on out-of-pocket medical spending.

Heterogeneity. Table 6 shows that different sub-samples of the U.S. population differ in the level of pre-partnership private LTCI coverage. The adoption of LTCIP programs differs for different states, with some states adopting LTCIP immediately after the passage of Deficit Reduction Act (2005), whereas other participating states followed a few years later[9]. Thus, the limitation of data prevented previous researchers from identifying the variation in the responsiveness across various observable characteristics. The use of Health and Retirement Survey data provides an advantage to examine how outcomes vary across different sub-populations. Identifying the responsiveness across different factors can help determine both Medicaid eligibility as well as the savings in Medicaid expenditure. Therefore, we estimate the fully specified models to find how various outcomes respond to LTCIP across different observable characteristics such as education, wealth level, gender, retirement status, marital status, health status, and the number of children.

[Insert Table 6 about here]

Table 6 displays the heterogenous impact of LTCIP on the likelihood of private LTCI coverage and Medicaid uptake across different socioeconomic characteristics. Similarly, Figure 4a and 4b report the effects on LTCI coverage and Medicaid entitlements. We find that LTCIP

[9] Previous studies such as Bergquist et al (2018) used the data on insurance contracts provided by National Association of Insurance Commission (NAIC), which do not include individual-level information.

programs increased the uptake of private LTCI coverage among more affluent individuals, whereas a strong and significant effect can also be observed for individuals with upper-middle level of wealth. In contrast, lower middle-wealth individuals experienced a moderate but no significant increase in private LTCI coverage after the adoption of LTCIP, whereas low wealth individuals witnessed a slight decrease in private LTCI coverage after the reform. These results are in line with previous studies conducted by Bergquist et al (2018) and Lin and Prince (2014). Nonetheless, the most striking impact that was observed refers to Medicaid uptake. Specifically, we observe a decrease in the uptake of Medicaid, with a significant decrease among middle-wealth and high-wealth individuals, and a substantial increase among low-wealth individuals. LTCIP affects high-income individuals more than their low- and middle-income counterparts. However, Medicaid uptake for high- and middle-income groups was significantly reduced after LTCIP compared to low-income groups. The effect of LTCIP on private LTCI coverage is larger among highly educated individuals compared to less-educated ones, whereas the reverse is observed in the case of Medicaid uptake in which highly educated individuals are less likely to take up Medicaid. It must be noted that the effect of education, income, and wealth cannot be fully identified because these characteristics are strongly correlated with each other.

[Insert Figure 4a, and Figure 4b about here]

The evidence suggests that the effect of LTCIP on private LTCI coverage increased more for working individuals. In addition, the purchase of private LTCI significantly increased for healthy individuals but did not increase for older individuals with pre-existing health conditions. This clearly indicates the presence of an adverse selection. Additionally, this result is suggestive of evidence of a positive selection in the case of private LTCI. The LTCIP program is slightly stronger for women and for married individuals which subsequently leads

to a decrease in their uptake of Medicaid. The findings suggest that individuals without children are more likely to purchase private LTCI coverage compared to those with children. The effect is not significant in the case of Medicaid uptake. Finally, we find that the purchase of private LTCI after LTCIP increased among white Americans but decreased among ethnic minorities, whereas the effect is significantly reversed in case of Medicaid uptake.

Robustness Checks. The reported estimates are robust to various robustness checks. Firstly, we control for state tax subsidy and find that the model produces similar estimates with a very slight change. Table 7 indicates the robustness check results. The effect slightly increases from 1.64 percentage points to 1.7 percentage points after controlling for tax subsidy. These two programs were independently active at the same time. Few states had private LTCI available through both partnership as well as tax subsidy programs during the same period. Secondly, we check whether our estimates are influenced by Affordable Care Act (ACA hereafter) Medicaid expansion for low-income individuals up to age 64. McInerney et al. (2020) use HRS data to identify the impact of ACA's Medicaid expansion on Medicaid uptake and find that the Medicaid expansion program significantly increases the uptake of Medicaid by 15 percentage points on average among low-income adults aged 50-64. Thus, it is important to test whether our specification is robust to ACA's Medicaid expansion. Consistently, we interact LTCIP with Medicaid expansion states at time t and observe that ACA's Medicaid expansion has no impact on the purchase of private-LTCI and it decreases the uptake of Medicaid same as our baseline specification. Hence, we conclude that our specifications are robust to the effect of ACA's Medicaid expansion and the effect is driven entirely by LTCIP. In addition, we test our main specification using a probit model and show that its marginal effects are identical to that of linear model. Next, add to our main specifications age specific fixed effects, and we find that the estimates do not change. Simultaneously, we test our specification after controlling for

wealth (net-worth) and the uptake of other insurance contracts such as property and vehicle insurance. Our results remain unaltered and overall suggest that same effects as that of our main models. Lastly, to match our specifications to that of previous studies (Lin and Prince, 2013), we include permanent partnership states into the treatment states and run the model again. We observe that this specification change does not affect our result whatsoever and we obtain the exact same estimates as those from our main model. Therefore, this suggests that our estimates are robust to all necessary specification checks.

[Insert Table 7 about here]

Placebo Test. To ensure that the estimated effect of LTCIP is not driven by other insurance products such as life insurance or health insurance, and more generally reflects a wider effect, we run our main model using several unrelated dependent variables such as life insurance and employer pension contributions. Table 8 reports evidence of statistically insignificant or negligible effects, consistent with the expected estimates of a placebo test.

[Insert Table 8 about here]

Mechanism. Finally, we examine a number of mechanisms that can underpin the effect of LTCIP as reported in Table 9. First, we examine how the LTCIP changed bequest motives or altruistic transfers. We analyse the impact of LTCIP on an individual's probability of leaving any bequest, and we find that the effect on post-reform bequest transfers is negative. The magnitude of the change in bequest motive intensions is almost equivalent to the impact on private LTCI. Next, we analyse the impact of LTCIP on income, wealth, and savings behaviour as proxying individuals' self-insurance of their LTCSS. However, we do not find a statistically significant effect. Another potential channel refers to the effect on health behaviour outcomes

post-reform. Importantly, we find that longevity or the probability of living up to 100 years of age is positively associated with LTCIP. Also, the likelihood of dying decreases with the effect's magnitude equal to that of private LTCI and the estimates are statistically significant. However, we do not observe an impact for disability. Finally, we find a positive and significant effect on self-reported health, body-mass index, and mental health, which suggest evidence of a genuine insurance effect on wellbeing, including physical and mental health.

[Insert Table 9 about here]

5. Medicaid Savings Simulation After the Adoption of LTCIP

This section reports the LTCIP effect on both LTCI uptake as well as Medicaid expenditure. The program was expected to increase the uptake of LTCI especially among median-wealth households (Lin and Prince 2014, Bergquist et al. 2016). The policies purchased through the LTCIP convey extra benefits via additional wealth protection due to higher asset thresholds for Medicaid eligibility, which prevents spending-down effects (Pauly 1990). Previous evidence indicates that low LTCI uptake leads to a rise in both out-of-pocket expenses and public expenditure (via Medicaid) for long-term care (Brown and Finkelstein 2007; 2008; 2011; Goda 2011; Bergquist et al. 2018; Frank 2012). Hence, it is important to evaluate whether LTCIP exerts an effect on Medicaid expenditure. Thus, we decide to implement the simulation model, in line with that of (Goda 2011), with the help of other relevant studies on the topic to predict the impact of LTCIP on fiscal public Medicaid expenditure.

Simulation procedures. We follow Goda (2011)'s simulation model for tax subsidy as a reference model for predicting the impact of LTCIP on the Medicaid expenditure. In line with

Goda (2011), we simulate the impact of adopting LTCIP programs for a 65-year-old with gender *g* and wealth decile *i*. We define $C_i(I)$ and $C'_i(I) = C_i(I) + P_i$ as a coverage rate of private LTCI before and after the adoption LTCIP, respectively, in which P_i is the change in private LTCI coverage due to LTCIP. The share of the expected present discounted value (EPDV hereafter) of long-term care expenditures for gender *g* and wealth decile *i,* with and without private LTCI coverage, are denoted by $M_{i,g}(I)$ and $M_{i,g}(N)$, respectively. Let $M_{i,g}(P)$ and $M'_{i,g}(P)$ be the share of Medicaid before and after the adoption of LTCIP program, respectively. They are defined as:

$$Mi,g(P) = Ci(I) * Mi,g(I) + (1 - Ci(I)) * Mi,g(N) \quad (3)$$

$$M'i,g(P) = C'i(I) * Mi,g(I) + (1 - C'i(I)) * Mi,g(N) \quad (4)$$

Let $E_g(LTC)$ be the EPDV of long-term care costs for a person with gender *g.* Therefore, the expected Medicaid savings due to the adoption of LTCIP program for gender *g* and wealth decile *i* is as follows.

$$Ei,g(S) = \left(Mi,g(P) - M'i,g(P)\right) * Eg(LTC) - E(C) \quad (5)$$

Where E(C) is the expected cost of implementation of LTCIP program per person. The program implementation cost does not differ for individuals with gender *g* and wealth decile *i. In other words, the cost is the same for all individuals.* However, we assume that the implementation of LTCIP incurs little to no costs. Thus, while calculating and reporting the expected Medicaid savings, we insert E(C) = 0 in equation 5.

Simulation Assumptions. We use the above model for the prediction of savings in Medicaid expenditure after the adoption of the LTCIP program. However, we need important assumptions concerning the effect of LTCIP on private LTCI coverage rates and premiums, and Medicaid costs (Goda 2011). Column (2) of Table 6 indicates our assumption that the impact of LTCIP by Low, Middle, and High wealth levels correspond to 30th, 60th, and 80th

percentile, respectively. We also linearly interpolate responses for the remaining percentiles in our simulation model. Similar to Goda (2011), we use the estimates of $M_{i,g}(I)$ and $M_{i,g}(N)$ which represent the Medicaid share of EPDV for LTC by gender g and wealth decile i for 65-year-old individuals with and without private LTCI coverage, provided by Brown and Finkelstein (2008). We use an annual premium of θ = \$2,000—which is gender neutral—and assume that private LTCI coverage provides a daily benefit of \$100 for a 65-year-old individual. Brown and Finkelstein (2008) and Goda (2011) use the EPDV of LTC costs by gender, calculated in the year 2000, as $E_f(LTC)$ =\$43,750 for women and $E_m(LTC)$ = \$17,500 for men. However, we calculate these values of EPDV for the year 2006. Thus, we use $E_f(LTC)$ =\$52,523 for women and $E_m(LTC)$ = \$21,021 for men, in our simulation model.

Simulation Results: Assuming that the implementation of LTCIP incurs little to no administrative costs, Figures (6) reports the net Medicaid savings across different levels of wealth. The net Medicaid savings is non-monotonically related to wealth. The net savings for an individual at the 10th percentile of wealth is zero but becomes negative for the 20th, 30th, and 40th percentile in the amount of \$56, \$106, and \$12 respectively. The 30th percentile corresponds to the lowest net saving. Net savings recovers for the 40th percentile to -\$12 and subsequently becomes positive afterward, attaining a peak of \$174 at the 70th percentile, and begins to decline as the wealth percentile increases. The net Medicaid savings is \$40 at the high end of the wealth distribution (the 90th percentile). Overall, the federal government saves[10], on average, \$36 per 65-year-old in Medicaid expenditure. The 95% confidence interval ranges from -\$23 to \$95. Overall, this indicates that an increase in the purchase of private LTCI through LTCIP adoption increases the savings in government expenditure via Medicaid.

[10] However, the savings estimates alter if we use results from Column (1) of Table 6 that does not incorporate individual level fixed effects. Figure VII in the appendix represents net Medicaid savings, and we observe that average net savings increases to \$105 per 65-year-old individual if we use the model without individual fixed effects.

The phenomenon that leads to this non-monotonic relationship can be explained in several ways. Firstly, wealth levels below the median can be expected to generate less savings after the LTCIP, because more individuals in these groups opt for Medicaid after the exhaustion of their savings in comparison to individuals above the median-wealth level. Although the response to private LTCIP is slightly negative at the lower levels of wealth, over-insuring on the part of low-income individuals can, on average, yield positive savings in federal Medicaid expenditure. Secondly, the savings begin to decrease as the wealth percentiles move towards the higher end of the wealth distribution e.g., after 70^{th} percentile. This can be explained by the stigma of Medicaid. In the U.S., richer individuals are less likely to opt for Medicaid in conservative states because of unpopular and negative opinions about public insurance programs (Sommers et al. 2012; Allen et al. 2014). In addition, the increase in private LTCI coverage for high-wealth individuals does not significantly alter their Medicaid expenditure for long-term care (Goda 2011). Our findings also suggest that the response to LTCIP is the highest among high-wealth individuals, but these groups account for lower Medicaid savings because there is both no resulting change in their share of Medicaid uptake as well as a high prevalence of stigma for Medicaid among these individuals.

[Insert Figure 5 about here]

Sensitivity analysis: Consistent with (Goda 2011), we perform a sensitivity analysis on the simulation model that we use to calculate Medicaid savings for 65-year-old individuals. As part of the sensitivity analysis, we first calculate the expected long-term care costs (E_g(LTC) or EPDV) at a 10% tolerance in both directions and then replace the EPDVs from our main simulation with the adjusted ones for 65-year-old individuals with gender g. The results indicate that changing EPDVs at a 10% tolerance level alters the Medicaid savings by $4 above and below the baseline value of $36. Medicaid savings at +10% and -10% of EPDV are $40 and $32, respectively. Similarly, we calculate the expected Medicaid savings by altering the

discount rate assumption of 3% in the baseline simulation model. First, we adjust the discount rate to 1.5% and obtain the Medicaid savings estimate of $85 per 65-year-old individual. The lower discount rate increases the present value of long-term care costs relative to baseline discount rate of 3% and yields higher Medicaid savings. However, raising the discount rate to 4.5% decreases the Medicaid savings to $17.

[Insert Table 10 about here]

6. Welfare Analysis: A MVPF Approach

We attempt to evaluate the welfare impact of the LTCIP. Therefore, to analyse the partnership insurance policy, we use Marginal Value of Public Funds (MVPF hereafter) approach suggested by (Hendren 2013; Finkelstein and Hendren 2020; Hendren and Sprung-Keyser 2020). The MVPF is an elegant way of linking causal estimates of a policy to the welfare analysis of that policy. As per Hendren (2016) and Finkelstein and Hendren (2020), the MVPF is defined as the ratio of marginal benefits to the marginal cost of the policy.

$$MVPF = \frac{"Benefits"}{"Costs"} \qquad (6)$$

The numerator refers to the benefit received by a recipient after a policy change. This is equivalent to the willingness to pay for the increased expenditure due to policy (Finkelstein and Hendren 2020; Hendren and Sprung-Keyser 2020). The denominator reflects the costs to the government for the implementation of a policy. It consists of two categories of costs viz. Mechanical Cost and Fiscal Externality of the policy. The mechanical cost of the policy refers to increase in government expenditure post-adoption of LTCIP unaccompanied by any behavioural response. In the context of LTCIP, we assume that the mechanical cost is either zero or miniscule, because the direct cost of the LTCIP program consists of administrative costs of making the policy available for purchase. Such costs are miniscule as a recipient can

choose an option of LTCIP in place of regular insurance policy while buying a contract from the same provider. Therefore, we continue to assume the mechanical cost of LTCIP as zero or miniscule.

The fiscal externality (FE) refers to costs incurred due to the behavioural response after the adoption of policy. In case of LTCIP, the behavioural response can occur through A) Decrease/increase in labour participation after the adoption of LTCIP. Decrease in labour participation means that an individual does not need to accumulate money to finance their future long-term care costs once they are covered and their assets are protected through LTCIP. This leads to decrease in income tax revenue collected by government, a negative fiscal externality. However, an increase in labour participation means that individual may intend to accumulate money to satisfy other motives including transfer of bequest which in turn increases the income tax revenue collected by the government and results in a positive fiscal externality for the government. Our estimates (ref. Appendix) indicate that LTCIP increases the labour participation for elderly, but they are not significant. B) Another behavioural response of the policy can result in increase in government expenditure (or decrease in costs) if an individual happens to purchase more coverage than the assets she intends to protect. Such an additional coverage may ultimately result in decrease in Medicaid costs to government, a positive fiscal externality for government. Hence, we infer that the Medicaid savings we find in our simulation analysis comes from such a behavioural response to the policy. Equation (7) includes the various components of benefits and costs after LTCIP adoption. For numerator, let A, C, & P indicate the protected assets, insurance coverage, and premium in $ respectively; for denominator, let M, t, & X indicate Medicaid costs, tax on earnings, and additional coverage in $ respectively.[11]

[11] It is difficult to distinguish between a policy purchased through LTCIP and using tax-subsidy, but our estimates are robust to the inclusion of tax subsidy in the model. It is not straightforward to calculate the cost of implementation of LTCIP but given that the LTCIP policy can be purchased through the same exchanges we can assume that the adoption of LTCIP incurred minimal or no cost to the government. It is also difficult to identify

$$MVPF = \frac{"Benefits"}{MC + FE} = \frac{A + C - P}{(0) + (M \pm t - X)} \quad (7)$$

For simplicity, we take an example of a median wealth individual with a wealth of $144,000 for our analysis and observe that the welfare analysis of LTCIP results in three different scenarios depending upon how a marginal beneficiary behaviourally responds to the adoption of LTCIP (National Institute on Aging and The Social Security Administration 2018). We continue to assume that a policy can be purchased at an annual premium of θ = $2,000 and that private LTCI coverage provides a daily benefit of $100 for a 65-year-old individual. We observed that, in the absence of LTCIP, a median wealth individual needed to spend down her assets to $2000 before qualifying for Medicaid. Thus, a median wealth individual required to spend $142,000 of her assets, after the exhaustion of private insurance coverage, before becoming eligible for a public insurance via Medicaid. The MVPF associated with no-LTCIP is shown in row 1 of Table 11.

However, in the presence of LTCIP, an individual is provided with an option of discounting her assets before qualifying for Medicaid. In an optimal scenario, a median wealth individual can protect all of her assets by purchasing LTCIP policy with a private coverage equivalent to her assets ($144,000 - $2000 = $142,000). It is important to notice that the exact optimal planning via LTCIP does not affect the Medicaid expenditure and Medicaid costs remains same with or without LTCIP. Nevertheless, it can be observed that the benefits received by an individual with LTCIP policy increase by an amount of assets she protects under the provision of LTCIP. For an individual with private insurance coverage and keeping other things constant, we find that MVPF of LTCIP (row 2 of Table 11) is greater than MVPF without LTCIP (row 1). Thus, we can infer that LTCIP improves the welfare of an individual.

the costs imposed on the government via Medicaid by an individual holding LTCIP policy and getting qualified for Medicaid after exhausting her coverage. Therefore, our welfare analysis of LTCIP does not include the exact cost of Medicaid in the MVPF formula.

Additionally, if a median wealth individual purchases insurance through LTCIP with a coverage less than her total assets (<$142,000), then she pays the difference between amount of coverage and Medicaid threshold out of her own pocket before qualifying for Medicaid.[12] Let that difference be represented by 'd'. But once again it is important to note that this will not change the government expenditure of providing public insurance via Medicaid (ref. row 3 of Table 11).

Finally, given that the insurance premium varies by gender, age, health conditions, benefit multiplier, and couple status, and comes in several standardized packages. Therefore, buying an optimal coverage becomes a rare possibility, and an individual may end up purchasing a coverage greater than her assets. However, this additional coverage has a direct impact on the Medicaid costs; it leads savings in Medicaid and reduce the fiscal burden on the government. Let 'X' be the additional coverage purchased by an individual, row 4 of Table 11 indicate the MVPF with coverage above optimal level. We find that MVPF associated with row 4 of Table 11 will be greater than previous cases. These negative costs to the government also signify that the government spending pays for itself and MVPF is defined as infinite (Hendren and Sprung-Keyser 2020). Overall, the LTCIP improves the welfare of an individual without raising the costs to the government for providing Medicaid.

[Insert Table 11 about here]

*Benefits, Ordeals, and Target Efficiency***:** One of the major reasons for low uptake of LTCI in the US is the secondary payer status of Medicaid, which imposes implicit tax on private LTCI (Brown and Finkelstein 2008; 2011). Medicaid's implicit tax on LTCI can be eliminated to a certain extent, by delaying the process of qualifying for Medicaid, via the adoption of LTCIP

[12] For example, if she buys a coverage of $100,000, then the difference she needs to pay out of her pocket would be $42,000. Overall, it is not optimal for a median individual to purchase coverage less than $142,000.

(Brown and Finkelstein 2011). Thus, the effect of LTCIP must also be looked through the lens of ordeals. The main purpose of ordeals is to achieve target efficiency by reaching out to those who need it the most (Nichols and Zeckhauser 1982; Zeckhauser 2021). Table 12 represents four types of potential beneficiaries of Medicaid via LTCIP, labelled as A, B, C, and D. The richer the individual gets, then greater the $ amount in coverage she buys. If each individual protects 100% of her leftover assets after paying a premium for LTCIP, then the main goal of partnership program is to serve group D individuals. As group B individual is relatively rich and more likely to have greater coverage, her required LTSS expenses will be majorly financed by private insurance (LTCIP). Similarly, group A and C individuals only need some form of LTSS support, which will be covered under LTCIP. Thus, they do not have to go through the ordeal of qualifying for Medicaid. Hence, LTCIP can achieve target efficiency even in the presence of Medicaid's implicit tax on private-LTCI.

[Insert Table 12 about here]

7. Conclusion

This paper has examined the effect of the rollout of LTCIP on private LTCI and public Medicaid uptake. Unlike previous studies that focus on short-term effects, we find robust evidence that the adoption of LTCIP increases insurance uptake. More specifically, our results reveal that the rollout of LTCIP increased the uptake of LTCI coverage by 1.64 percentage points on average and reduced Medicaid uptake by 1.46 percentage points. This result is suggestive of the important interaction between public and private long-term care insurance and to the possibility of limiting Medicaid expenditure and potential crowding-out effects by way of a partnership design. We draw on more than two decades worth of data from the Health and Retirement Study (from 1996 through 2016) and use a generalised DiD design to exploit the progressive adoption of LTCIP over time after the passage of the federal Deficit Reduction Act (DRA-2005). Evidence from our simulation analysis suggests that private LTCIP generates $36 in Medicaid savings per 65-year-old. Although the response to private LTCIP is smaller in magnitude, it appears to significantly reduce the uptake of Medicaid, leading to generous savings in Medicaid. The main reasons behind these generous savings are: 1) Little to no expected government costs associated with the implementation of private LTCIP, and 2) Private LTCIP allows individuals with medium level of wealth to purchase insurance coverage to fund their future long-term care costs, which otherwise would have been paid for by Medicaid.

Our findings suggest that LTCIP stimulate the purchase of private-LTCI, which subsequently reduces the uptake of Medicaid provide *fresh evidence that the implicit tax on private-LTCI can be minimized to some extent by reducing means testing*. Our results strengthen the claims made by Brown and Finkelstein (2011) suggesting that the Partnership program has a direct impact on means testing component of the implicit tax on private-LTCI and that reinventing

LTCIP can be a way forward for eliminating the implicit tax completely. We also discuss how LTCIP can achieve target efficiency even though Medicaid imposes implicit tax on private-LTCI. Most importantly, our findings certainly create a ground for more research on how LTCIP can be redesigned to address the implicit tax completely by removing Medicaid's role as a secondary payer.

References

AALTCI. 2019. "American Association for Long-Term Care Insurance." http://www.aaltci.org/.

AARP. 2019. "Does Medicare Cover Long-Term Care, Nursing Home Care or Care in Skilled Nursing Facilities?" *American Association of Retired Persons (AARP)*. https://www.aarp.org/health/medicare-qa-tool/current-long-term-nursing-home-coverage/.

Ai, Chunrong, and Edward C. Norton. 2003. "Interaction Terms in Logit and Probit Models." *Economics Letters* 80 (1): 123–29. https://doi.org/10.1016/S0165-1765(03)00032-6.

Allen, Heidi, Bill J. Wright, Kristin Harding, and Lauren Broffman. 2014. "The Role of Stigma in Access to Health Care for the Poor: The Role of Stigma in Access to Health Care for the Poor." *Milbank Quarterly* 92 (2): 289–318. https://doi.org/10.1111/1468-0009.12059.

Alper, Joseph. 2006. "The Partnership for Long-Term Care: A Public-Private Partnership for Financing Long-Term Care." *Robert Wood Johnson* X (To Improve Health and Healthcare).

Angrist, Joshua D., and Alan B. Krueger. 1999. "Empirical Strategies in Labor Economics." In *Handbook of Labor Economics*, 3:1277–1366. Elsevier. https://doi.org/10.1016/S1573-4463(99)03004-7.

Athey, Susan, and Guido W. Imbens. 2006. "Identification and Inference in Nonlinear Difference-in-Differences Models." *Econometrica* 74 (2): 431–97. https://doi.org/10.1111/j.1468-0262.2006.00668.x.

Athey, S., & Imbens, G. W. (2021). Design-based analysis in difference-in-differences settings with staggered adoption. *Journal of Econometrics*.

Bergquist, Savannah, Joan Costa-Font, and Katherine Swartz. 2018. "Long-Term Care Partnerships: Are They Fit for Purpose?" *The Journal of the Economics of Ageing* 12 (November): 151–58. https://doi.org/10.1016/j.jeoa.2018.03.006.

Bertrand, M., E. Duflo, and S. Mullainathan. 2004. "How Much Should We Trust Differences-In-Differences Estimates?" *The Quarterly Journal of Economics* 119 (1): 249–75. https://doi.org/10.1162/003355304772839588.

Borysyak, K., & Jaravel, X. (2017). *Revisiting event study designs, with an application to the estimation of the marginal propensity to consume*. SSRN working paper.

Brown, Jeffrey R., and Amy Finkelstein. 2007. "Why Is the Market for Long-Term Care Insurance so Small?" *Journal of Public Economics* 91 (10): 1967–91. https://doi.org/10.1016/j.jpubeco.2007.02.010.

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): 1083–1102. https://doi.org/10.1257/aer.98.3.1083.

Brown, Jeffrey R., and Amy Finkelstein. 2009. “The Private Market for Long-Term Care Insurance in the United States: A Review of the Evidence.” *Journal of Risk and Insurance* 76 (1): 5–29. https://doi.org/10.1111/j.1539-6975.2009.01286.x.

Brown, Jeffrey R, and Amy Finkelstein. 2011. “Insuring Long-Term Care in the United States.” *Journal of Economic Perspectives* 25 (4): 119–42. https://doi.org/10.1257/jep.25.4.119.

Callaway, B., & Sant’Anna, P. H. (2018). Difference-in-differences with multiple time periods and an application on the minimum wage and employment. *arXiv preprint arXiv:1803.09015*, 1-47.

Clarke, D., & Schythe, K. (2020). Implementing the panel event study. IZA DP No. 13524

CMS. 2018. “Centers for Medicare & Medicaid Services.” https://www.cms.gov/.

Congressional Budget Office. 2013. “Rising Demand for Long-Term Services and Supports for Elderly People.” Congress of The United States.

De Chaisemartin, C., & d'Haultfoeuille, X. (2020). Two-way fixed effects estimators with heterogeneous treatment effects. *American Economic Review*, *110*(9), 2964-96.

Eggleston, Karen N, and Victor R Fuchs. 2012. “The New Demographic Transition: Most Gains in Life Expectancy Now Realized Late in Life.” *Journal of Economic Perspectives* 26 (3): 137–56. https://doi.org/10.1257/jep.26.3.137.

Eggleston, Karen N., and Anita Mukherjee. 2019. “Financing Longevity: The Economics of Pensions, Health, and Long-Term Care: Introduction to the Special Issue.” *The Journal of the Economics of Ageing* 13 (May): 1–6. https://doi.org/10.1016/j.jeoa.2018.10.001.

Finkelstein, Amy, and Nathaniel Hendren. 2020. “Welfare Analysis Meets Causal Inference.” *Journal of Economic Perspectives* 34 (4): 146–67. https://doi.org/10.1257/jep.34.4.146.

Frank, R. G. 2012. “Long-Term Care Financing in the United States: Sources and Institutions.” *Applied Economic Perspectives and Policy* 34 (2): 333–45. https://doi.org/10.1093/aepp/pps016.

Goda, Gopi Shah. 2011. “The Impact of State Tax Subsidies for Private Long-Term Care Insurance on Coverage and Medicaid Expenditures.” *Journal of Public Economics* 95 (7–8): 744–57. https://doi.org/10.1016/j.jpubeco.2010.11.001.

Goodman-Bacon, A. (2021). Difference-in-differences with variation in treatment timing. *Journal of Econometrics*.

Hendren, Nathaniel. 2013. “The Policy Elasticity.” w19177. Cambridge, MA: National Bureau of Economic Research. https://doi.org/10.3386/w19177.

Hendren, N., & Sprung-Keyser, B. (2020). A unified welfare analysis of government policies. *The Quarterly Journal of Economics*, *135*(3), 1209-1318.

Kaiser Family Foundation. 2019. “Medicaid and Long-Term Care Quiz.” https://www.kff.org/quiz/medicaid-and-long-term-care-quiz/.

Kemper, Peter, Harriet L. Komisar, and Lisa Alecxih. 2005. “Long-Term Care over an Uncertain Future: What Can Current Retirees Expect?” *INQUIRY: The Journal of Health Care Organization, Provision, and Financing* 42 (4): 335–50. https://doi.org/10.5034/inquiryjrnl_42.4.335.

Lin, Haizhen, and Jeffrey Prince. 2013. "The Impact of the Partnership Long-Term Care Insurance Program on Private Coverage." *Journal of Health Economics* 32 (6): 1205–13. https://doi.org/10.1016/j.jhealeco.2013.09.010.

McInerney, Melissa, Ruth Winecoff, Padmaja Ayyagari, Kosali Simon, and M. Kate Bundorf. 2020. "ACA Medicaid Expansion Associated With Increased Medicaid Participation and Improved Health Among Near-Elderly: Evidence From the Health and Retirement Study." *INQUIRY: The Journal of Health Care Organization, Provision, and Financing* 57 (January): 004695802093522. https://doi.org/10.1177/0046958020935229.

Meiners, Mark R., and Stephen C. Goss. 1994. "Passing the 'Laugh Test' for Long-Term Care Insurance Partnerships." *Health Affairs* 13 (5): 225–28. https://doi.org/10.1377/hlthaff.13.5.225.

Meiners, Mark R., Hunter L. McKay, and Kevin J. Mahoney. 2002. "Partnership Insurance: An Innovation to Meet Long-Term Care Financing Needs in an Era of Federal Minimalism." *Journal of Aging & Social Policy* 14 (3–4): 75–93. https://doi.org/10.1300/J031v14n03_05.

National Institute of Aging. 2017. "What Is Long-Term Care?" https://www.nia.nih.gov/health/what-long-term-care.

National Institute on Aging and The Social Security Administration. 2018. "Health and Retirement Study (U.S)." http://hrsonline.isr.umich.edu/.

Nichols, A. L., & Zeckhauser, R. J. (1982). Targeting transfers through restrictions on recipients. *The American Economic Review*, *72*(2), 372-377.

Norton, Edward C. 2000. "Chapter 17 Long-Term Care." In *Handbook of Health Economics*, 1:955–94. Elsevier. https://doi.org/10.1016/S1574-0064(00)80030-X.

Norton, Edward C., and Frank Sloan. 1997. "Adverse Selection, Bequests, Crowding Out, and Private Demand for Insurance: Evidence From the Long-Term Care Insurance Market." *Journal of Risk and Uncertainty* 15 ((3)): 201–19. https://doi.org/DOI: 10.1023/A:1007749008635.

NYSPLTC. 2011. "New York State Partnership for Long-Term Care. Quaterly Update 2nd Quarter." New York State Department of Health.

Pauly, Mark V. 1990. "The Rational Nonpurchase of Long-Term-Care Insurance." *Journal of Political Economy* 98 (1): 153–68. https://doi.org/10.1086/261673.

Puhani, Patrick A. 2012. "The Treatment Effect, the Cross Difference, and the Interaction Term in Nonlinear 'Difference-in-Differences' Models." *Economics Letters* 115 (1): 85–87. https://doi.org/10.1016/j.econlet.2011.11.025.

Reaves, Erica, and MaryBeth Musumeci. 2015. "Medicaid and Long-Term Services and Supports: A Primer." Kaiser Family Foundation. http://files.kff.org/attachment/report-medicaid-and-long-term-services-and-supports-a-primer.

Robert Wood Johnson Foundation (RWJF). 2007. "Program to Promote Long-Term Care Insurance for the Elderly." Health Policy Snapshot.

Rothstein, Joanie. 2007. "Long-Term Care Partnership Expansion: A New Opportunity for States." Issue Brief. *Robert Wood Johnson Foundation*.

Sommers, Benjamin D., Meredith Roberts Tomasi, Katherine Swartz, and Arnold M. Epstein. 2012. "Reasons For The Wide Variation In Medicaid Participation Rates Among States Hold Lessons For Coverage Expansion In 2014." *Health Affairs* 31 (5): 909–19. https://doi.org/10.1377/hlthaff.2011.0977.

Sun, L., & Abraham, S. (2020). Estimating dynamic treatment effects in event studies with heterogeneous treatment effects. *Journal of Econometrics*.

Thach, Nga, and Joshua Wiener. 2018. “An Overview of Long-Term Services and Supports and Medicaid: Final Report.” Office of the Assistant Secretary for Planning and Evaluation, U.S. Department of Health and Human Services. https://aspe.hhs.gov/basic-report/overview-long-term-services-and-supports-and-medicaid-final-report.

“The Federal Long-Term Care Insurance Program.” 2018. USA. https://www.ltcfeds.com/.

Zeckhauser, R. (2021). Strategic sorting: the role of ordeals in health care. *Economics & Philosophy*, *37*(1), 64-81.

Figures and Tables

Figure 1 – The US states map representing the adoption of LTCIP in states over time. (Colour Codes: RED – Permanent partnership or RWJF states, BLUE – LTCIP states or new partnership states, GRAY- Remaining states).

Note: State-wise information on the adoption of LTCIP is obtained from American Association of Long-Term Care Insurance website, which comes under U.S. Government Accountability Office's Consumer Information Center. Refer Appendix for more details.

Table1: Summary Statistics of Individual Level Characteristics

	Private-LTCI				Medicaid (or Public-LTCI)			
	NO		YES		NO		YES	
	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev
New-Partnerships	0.2795	0.449	0.3	0.46	0.278	0.448	0.308	0.462
RWJF-Partnerships	0.195	0.4	0.18	0.384	0.187	0.391	0.26	0.439
Income	64793	197352	96147	200502	73144	227184	17438	25701
Wealth	377746	1E+06	736146	2E+06	431003	1335141	45526	287864
Age	62.68	6.9216	64.28	6.88	62.8	6.93	63.11	7
Age_sq	3977	873	4180	876	3991	875	4032	886
Male	0.433	0.4955	0.416	0.493	0.44	0.496	0.34	0.474
Married	0.649	0.477	0.728	0.445	0.691	0.462	0.315	0.46
College/More	0.428	0.495	0.61	0.49	0.471	0.5	0.203	0.403
Children	0.93	0.253	0.92	0.272	0.933	0.25	0.903	0.3
White	0.745	0.436	0.83	0.38	0.78	0.415	0.496	0.5
Retired	0.543	0.498	0.62	0.485	0.532	0.5	0.777	0.416
Fair/Poor Health	0.286	0.45	0.167	0.3733	0.238	0.426	0.638	0.48

Note : This table provides description of important variables using Health and Retirement Study, Waves 3-13, year 1996-2016. All observations are weighted using survey weights at person level. The present sample is restricted to age 50-75. 'Partnership' variable equals 1 if an individual living in a state that had LTCIP available at a given time t post DRA-2005, else equals 0. RWJF States mean Permanent Partnership states, equals 1 if New York, California, Indiana, Connecticut.

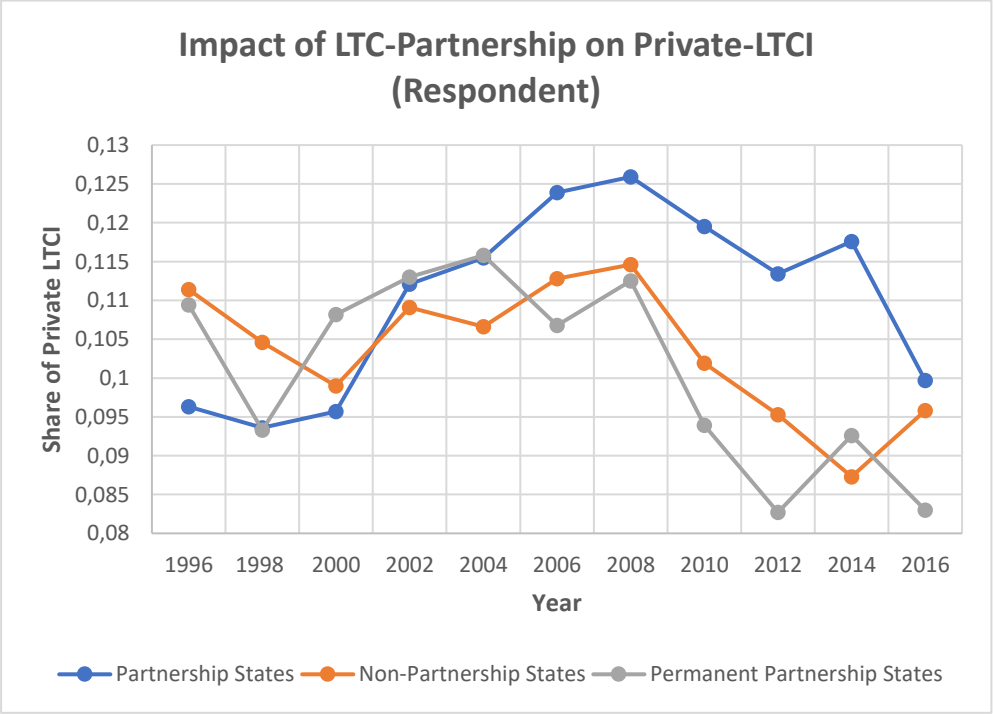
Table 2: Coverage of Private Long-Term Care Insurance and Medicaid

Coverage of Private Long-Term Care Insurance and Medicaid									
		LTCI Coverage				Medicaid Coverage			
		Partnership States	RWJF States	Non-Partnership States	N	Partnership States	RWJF States	Non-Partnership States	No. of obs
All		**11.09**	**9.96**	**9.73**	**148972**	**7.81**	**11.56**	8.29	148423
Gender	Female	11.43	10.18	10.03	84552	9.09	13.26	9.52	84232
	Male	10.64	9.8	9.33	64420	6.12	9.155	6.67	65687
Age	50-62	8.91	8.4	8.04	74919	7.26	11.62	8.58	74710
	63-75	13.2	11.87	11.48	74053	8.36	11.14	8.00	73713
Education	HS or less	7.73	6.94	7.25	81815	11.42	16.68	11.35	81392
	Some/More degree	15.27	13.35	12.83	67157	3.3	5.58	4.45	67031
Marital Status	Unmarried	8.57	8.23	8.24	51063	16.07	21.00	17.05	50733
	Married	12.39	10.97	10.49	97909	3.57	6.2	3.8	97690

Retirement Status	Working	9.63	9	8.95	59004	2.67	6.9	3.75	59961
	Retired	13.11	11.64	11	70827	9.92	13.68	10.31	71580
Children	No	12.69	11.8	12.43	10208	10.6	15.36	13.44	10144
	YES	11.03	9.85	9.54	136552	7.54	11.2	7.76	136083
Race	Other	7.33	7.41	7.94	36866	15.9	22.17	17.6	36587
	White	12.23	11.03	10.4	112106	5.36	7.15	4.84	111836
Income	Low	5.97	5.49	5.72	55047	18.4	27.6	20.21	54623
	Medium	11.83	9.36	10.55	40978	2.4	4.31	2.53	41820
	High	16.01	14.69	13.16	52947	0.78	1.14	1.23	52893
Wealth	Low (<$144k)	5.98	5.64	6.38	74036	14.2	22.32	16.00	73600
	Medium($144k-$523k)	13.28	10.16	9.6	44708	1.41	3.09	1.71	44625
	High (>$523k)	21.42	18.15	17.88	30228	0.49	1.14	0.45	30198

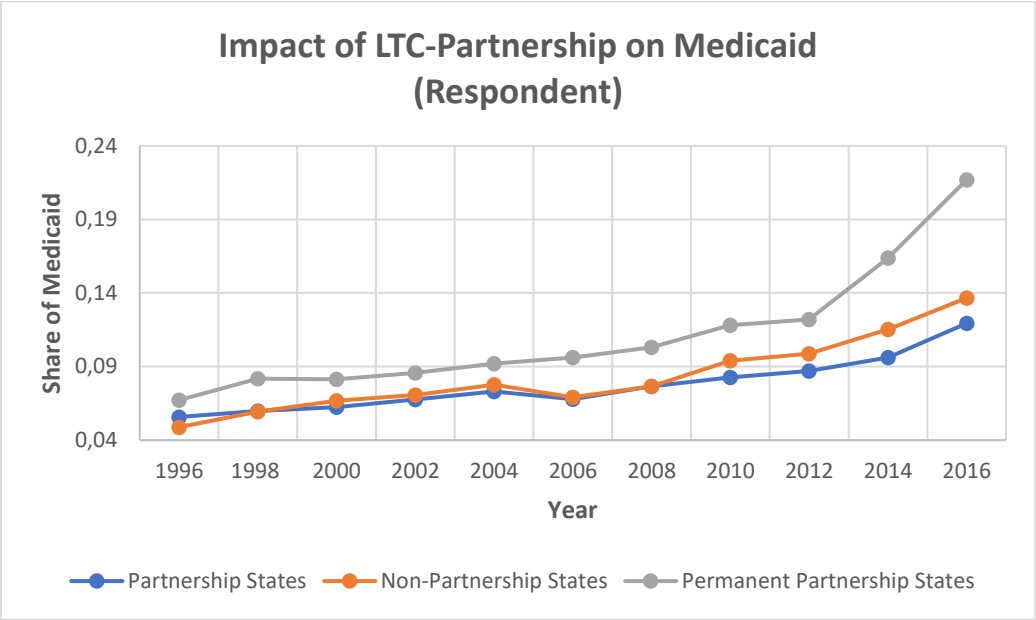
Note: This table provides comparison of averages across types of states for both the outcomes using Health and Retirement Study, Waves 3-13, year 1996-2016. All observations are weighted using survey weights at person level.

Figure 2(a). Effect of LTCIP on private LTCI



Note : Trends in the percentage of long-term care insurance coverage of new-partnerships (NewPP_states), permanent partnerships, and non-partnership (NP_states) using Health and Retirement Study, Wave 3-13, 1996-2016. Each point indicates the average of private-LTCI coverage across three categories of states.

Figure 2(b). Impact of LTCIP on Medicaid Uptake



Note: Trends in the percentage of Medicaid coverage of new-partnerships states, permanent partnerships states, and non-partnership states using Health and Retirement Study, Wave 3-13, 1996-2016. Each point indicates the average of Medicaid uptake across three categories of states.

Figure 3(a) Event Study: Impact of LTCIP on private long-term care insurance.

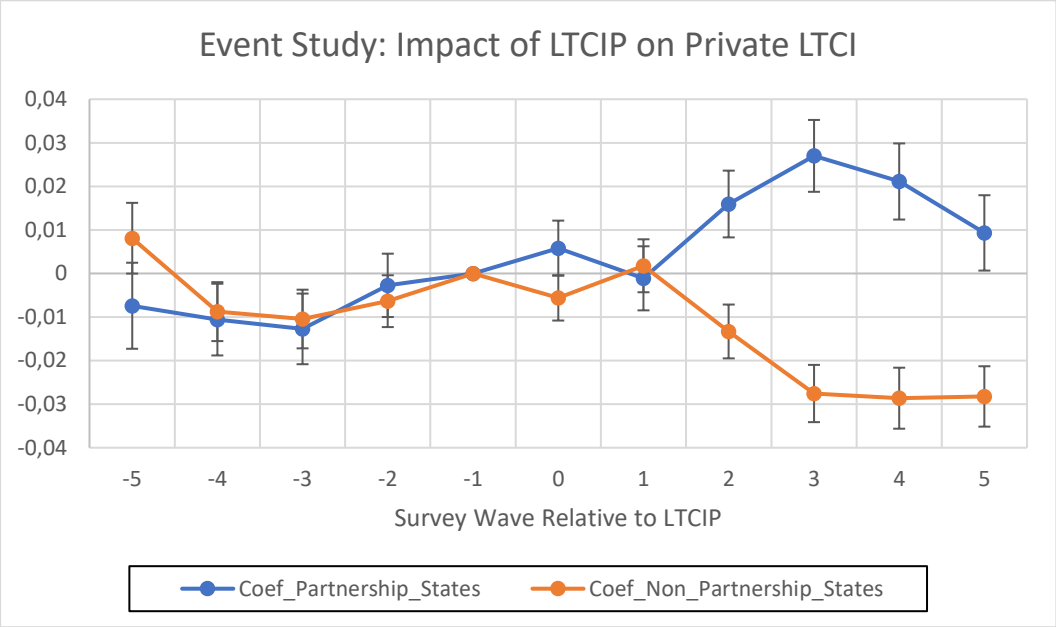
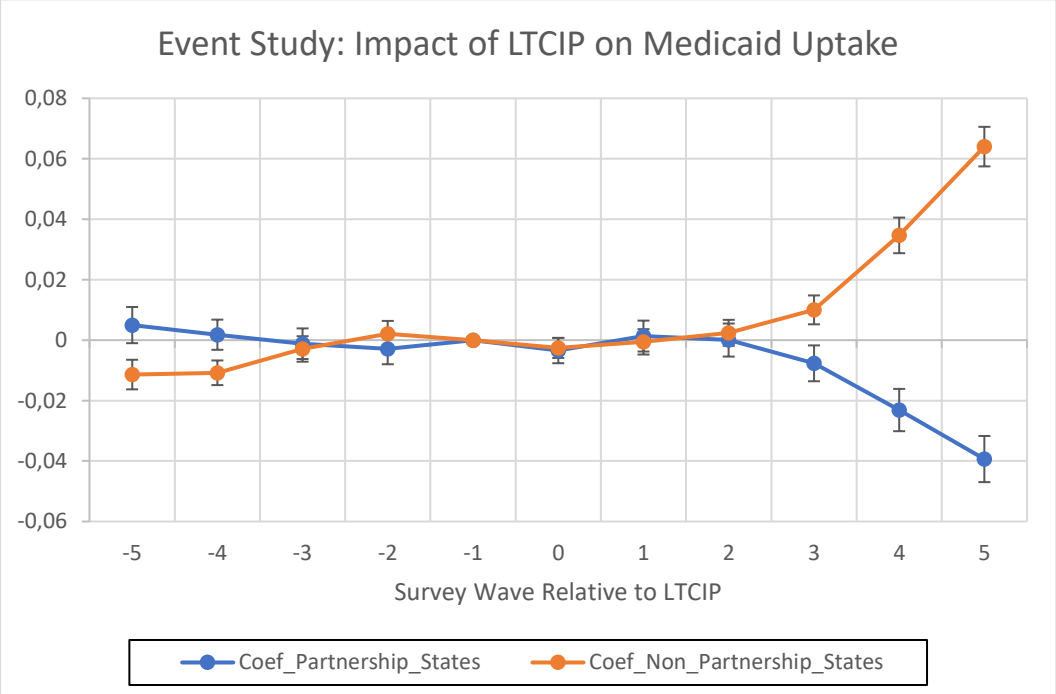


Figure 3(b) Event Study: Impact of LTCIP on Medicaid.



Notes: Each point in the figure 3(a) and 3(b) indicates the effect of LTCIP relative to event time estimated using non-parametric event study in equation (1), with survey wave for the year 2006 reporting the LTCIP for the first time after DRA-2005 is designated as Wave 0. As the HRS is a biannual survey, the points on X-axis are two years apart. The bars associated with each point on the plot represent 95% confidence interval for the associated coefficient. Each figure has coefficients plotted for two categories, LTCIP states vs Non-Partnership states. All the coefficient estimates are weighted using survey weights at person-level.

Table 3: Baseline Results – impact of LTCIP on private LTCI and Medicaid

	Dependent Variables							
	Private-LTCI				Medicaid (or Public-LTCI)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Partnership	0.0144***	0.02***	0.0164***	0.01***	0.0107***	-0.016***	-0.0147***	-0.0029
	(0.00349)	(0.00467)	(0.00462)	(0.00371)	(0.00253)	(0.00393)	(0.00363)	(0.00296)
State + Year Fixed Effects	NO	YES	YES	YES	NO	YES	YES	YES
Control Variables	NO	NO	YES	YES	NO	NO	YES	YES
Individual Fixed Effects	NO	NO	NO	YES	NO	NO	NO	YES
Number of Obs.	148,972	148,972	148,972	148,972	148,472	148,472	148,472	148,423

*significant at 10%; ** significant at 5%; *** significant at 1%, robust standard error clustered at state and household level. All the coefficient estimates are weighted using survey weights at person-level.

Note: The estimates are obtained using the sample from Health and Retirement Study, Waves 3-13, 1996-2016. Each coefficient indicates OLS estimates of equation (2). There are two dependent variables namely Private long-term care insurance (LTCI) and public long-term care insurance or Medicaid. The variable 'Partnership' is a treatment variable, which is a binary indicator for whether there is LTCIP available in the state and year after the passage of Deficit Reduction Act (DRA-2005). It is also called as 'New-Partnership' or 'LTCIP'. At first, we estimate the impact of LTCIP on Private-LTCI in which Column (1) includes no variables other than treatment or partnership. Column (2) introduces states and years fixed effects into the model. Column (3) adds control variables namely age, gender, age^2, income, health status, marital status, race, and education. Column (4) introduces Fixed Effect Model that removes time-constant characteristics. Whereas, Columns (5)-(8) follow the similar procedure for Medicaid uptake.

Table 4: Effect Over Time – impact of LTCIP on private LTCI and Medicaid

	Private LTCI		Medicaid	
	(1)	(2)	(3)	(4)
Partnership	-0.000172	0.00343	-0.00198	0.00112
	(0.00615)	(0.00424)	(0.00428)	(0.0037)
Partnership*2010	0.0188**	0.00874	0.00151	-0.000673
	(0.0076)	(0.00541)	(0.00544)	(0.00483)
Partnership*2012	0.0302***	0.0114*	-0.00679	0.00236
	(0.00844)	(0.00596)	(0.00614)	(0.00544)
Partnership*2014	0.0243***	0.0119*	-0.0209***	-0.0165***
	(0.00896)	(0.00645)	(0.00728)	(0.00618)
Partnership*2016	0.00121	0.00323	-0.0375***	-0.0211***
	(0.00905)	(0.00703)	(0.00793)	(0.007)
Controls & State + Year FE	YES	YES	YES	YES
Individual FE	NO	YES	NO	YES
Number of obs.	148,972	148,972	148,472	148,423

*significant at 10%; ** significant at 5%; *** significant at 1%, robust standard error clustered at state and household level. All the coefficient estimates are weighted using survey weights at person-level.

Note: The estimates are drawn from the sample of Health and Retirement Study, Wave 3-13, 1996-2016. The outcomes are regressed on treatment and other covariates. Both outcome variables are binary variables. Treatment is interacted with four waves post-LTCIP to find the impact of policy over time. Column (1) and (3) include State and Year fixed effects and other covariates, whereas Column (2) and (4) add individual fixed effects and removes time-constant characteristics to obtain the estimated coefficients. Other covariates include age, gender, age^2, income, health status, marital status, race, and education.

Table 5: Impact of LTCIP on Intensive Margins and Out-of-Pocket Medical Expenses

	Intensive Margins				**OOP Med Expenses (Extensive Margins)**			
VARIABLES	LTCI Monthly Premium		LTCI with Home & Nursing care		OOP>$500		OOP>$1k	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Partnership	1.456	-0.128	0.0143***	0.0063**	-0.015**	-0.028***	-0.022***	-0.03***
	(1.284)	(1.556)	(0.00428)	(0.00341)	(0.007)	(0.006)	(0.007)	(0.006)
State & Year FE + Controls	YES	YES	YES	YES	YES	YES	YES	YES
Individual FE	NO	YES	NO	YES	NO	YES	NO	YES
Number of obs.	143,964	143,729	147,944	147,895	148,972	148,972	148,972	148,972

*significant at 10%; ** significant at 5%; *** significant at 1%, robust standard error clustered at state and household level. All the coefficient estimates are weighted using survey weights at person-level.

Note: The estimates are obtained using the sample from Health and Retirement Study, Waves 3-13, 1996-2016. Each coefficient indicates OLS estimates for outcomes: Monthly Premium, type of insurance (or long-term care insurance for both nursing home and home care), out of pocket medical expenses above $500, and above $1k. Column (1), (3), (5), and (7) include State and Year fixed effects and other covariates, whereas Column (2), (4), (6), and (8) add individual fixed effects and removes time-constant characteristics to obtain the estimated coefficients. Other covariates include age, gender, age^2, income, health status, marital status, race, and education.

Table 6 : Heterogeneity in effect of LTCIP on Private LTCI and Medicaid

		Private LTCI		**Medicaid**	
		(1)	(2)	(3)	(4)
State & Year FE + Controls		YES	YES	YES	YES
Individual FE		NO	YES	NO	YES
Health	**Good/Best/Excellent**	0.0153***	0.0139***	-0.0125***	-0.0102***
	Fair/Poor	0.02***	-0.002 †††	-0.021***	0.017*** †††
Gender	**Female**	0.0157***	0.01***	-0.0131***	-0.00320
	Male	0.017***	0.009*	-0.0163***	-0.0023
Age	**50-62**	0.01*	0.0147***	-0.01**	-0.00685*
	63-75	0.0242*** †††	0.0077*	-0.02*** ††	-0.0014
Year of Partnership	**2008**	0.0171***	0.01***	-0.0145***	0.00593**
	2010	0.0154**	0.0091**	-0.0148***	-0.0166*** †††
Education	**High School/Less**	0.00824	-0.00304	-0.0139***	0.0129***
	Some/More College	0.0226*** ††	0.0240*** †††	-0.013***	-0.02*** †††
Income	**Low (< $30K)**	0.013**	-0.0052	0.002	0.029***

	Middle ($30K-$60K)	0.006	0.00075	-0.0146*** ††	-0.0136*** †††
	High (> $60K)	0.02***	0.03*** †††	-0.0179*** †††	-0.025*** †††
Wealth	**Low (< $138.5K)**	0.0105**	-0.007*	-0.0148***	0.021***
	LM ($144K-$421K)	0.01	0.0006 †	-0.0167***	-0.0162*** †††
	UM ($421K-$981K)	0.11	0.033*** †††	-0.0118***	-0.025*** †††
	High (> $981K)	0.05*** †	0.044*** †††	-0.0053 †	-0.029*** †††
Retirement Status	**Working**	0.00830	0.0127***	-0.0157***	-0.008**
	Retired	0.0262*** ††	0.0074**	-0.0136***	0.0009 †††
Marital Status	**Not Married**	0.0119*	0.00134	-0.0128**	0.0157***
	Married	0.019***	0.0142*** †††	-0.0156***	-0.0135*** †††
Have Children	**NO**	0.0232	0.0358***	-0.0282***	0.000891
	YES	0.0152	0.0078** †††	-0.0132***	-0.003
Ethnicity	**Non-White**	0.0115*	-0.0114**	-0.0204**	0.0271***
	White	0.0174***	0.015*** †††	-0.0134***	-0.0107*** †††

denotes significantly different from zero (significant at 10%; ** significant at 5%; *** significant at 1%) ; + denotes that bottom category estimates are significantly different from top category ones (+ significant at 10%; ++ significant at 5%; +++ significant at 1%)

Note: The estimates are obtained using the sample from Health and Retirement Study, Waves 3-13, 1996-2016. Each coefficient indicates OLS estimates for outcomes private long-term care insurance and Medicaid. Both outcome variables are binary variables. Column (1) and (3) include State and Year fixed effects and other covariates, whereas Column (2) and (4) add individual fixed effects and removes time-constant characteristics to obtain the estimated coefficients. Other covariates include age, gender, age^2, income, health status, marital status, race, and education. Robust standard error clustered at state and household level. All the coefficient estimates are weighted using survey weights at person-level. Each category on the left hand side of the table indicate a separate regression that includes interactions between subgroup indicators and treatment variable (LTCIP or Partnership).

Figure 4(a): Heterogenous effect on private-LTCI by year of LTCIP adoption (2008 vs 2010)

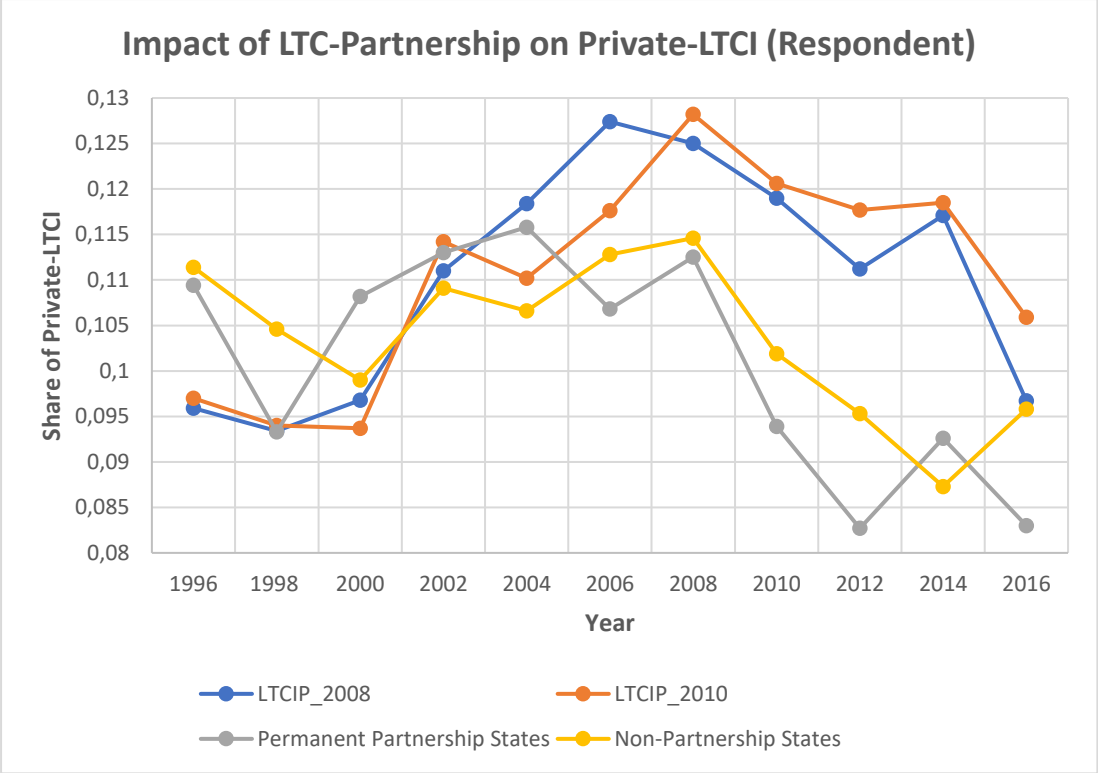
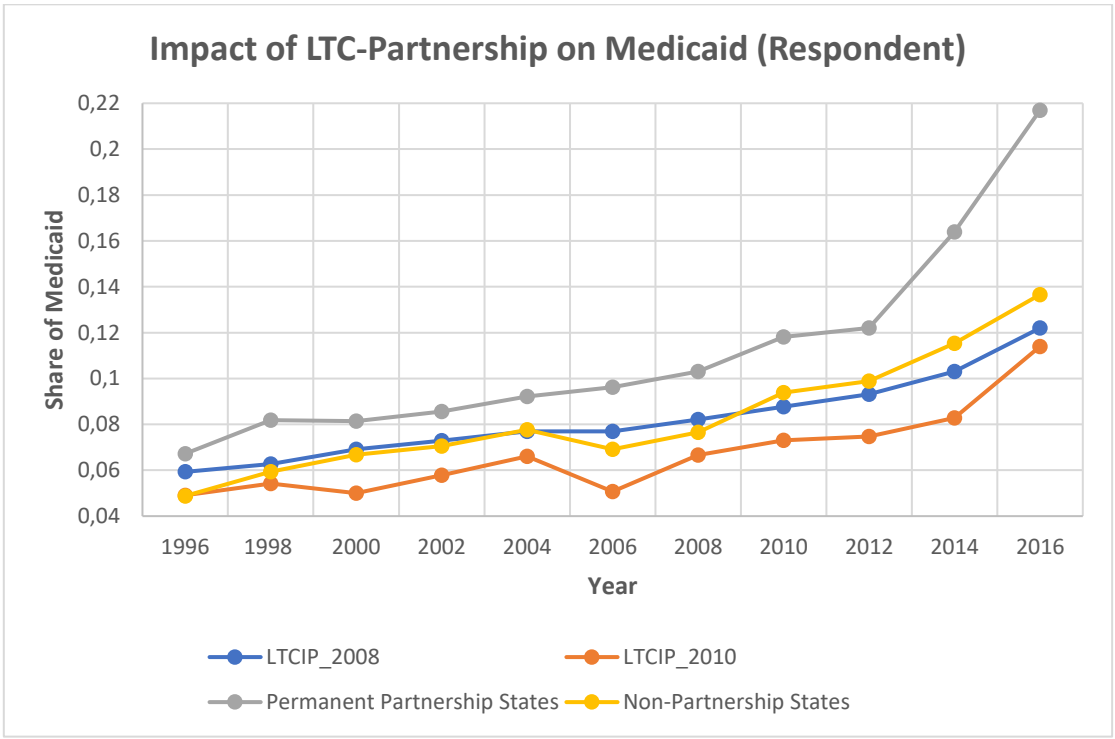


Figure4(b): Heterogenous effect on Medicaid by year of LTCIP adoption (2008 vs 2010)



Note : Trends in the percentage of long-term care insurance coverage and Medicaid for partnerships states (2008 vs 2010), permanent partnership states, and non-partnership states using Health and Retirement Study, Wave 3-13, 1996-2016. Each point indicates the average of private-LTCI coverage and Medicaid across four categories

of states. LTCIP_2008 indicates the group of states that adopted LTCIP prior to year 2008 ((17 states)), whereas LTCIP_2010 represents the group of states that adopted LTCIP between 2008 and 2010 (18 states).

Table 7: Robustness Checks – Linear Estimates of the effect on LTCI (Private & Public)

	Private LTCI		Medicaid	
	(1)	(2)	(3)	(4)
Tax-Subsidy				
Partnership	0.0171***	0.0114***	-0.0141***	-0.0344
	(0.00475)	(0.00383)	(0.0036)	(0.00291)
Subsidy	0.00506	0.0116***	0.00374	-0.0034
	(0.00474)	(0.00396)	(0.00357)	(0.00257)
ACA Medicaid Expansion				
Partnership	0.0176***	0.01***	-0.0051***	0.0007
	(0.00456)	(0.00367)	(0.0035)	(0.003)
ACA_ME	-0.00011	-0.0033	0.0381***	0.017***
	(0.00613)	(0.0046)	(0.00565)	(0.00476)
Partnership*ACA-ME	-0.008	-0.0065	-0.0155***	-0.019***
	(0.00695)	(0.00517)	(0.00644)	(0.00456)
Probit Model				
Partnership	0.0167***		-0.0128***	
	(0.0046)		(0.003242)	
Inclusion of Age Fixed Effects in place of Age and Age sq.				
Partnership	0.0162***	0.01**	-0.0147***	-0.003
	(0.00462)	(0.00371)	(0.00363)	(0.003)
Wealth				
Partnership	0.0163***	0.01***	-0.0146***	-0.00288
	(0.00461)	(0.00371)	(0.00360)	(0.00296)
Other Insurances				
Partnership	0.0151***	0.01***	-0.0125***	-0.00259
	(0.00460)	(0.00372)	(0.0035)	(0.00296)
Include RWJF states as a treatment group (same as Lin and Prince 2013)				
Partnership	0.0164***	0.01***	-0.0146***	-0.0029
	(0.00462)	(0.00371)	(0.00360)	(0.00296)
State + Year Fixed Effects	YES	YES	YES	YES
Control Variables	YES	YES	YES	YES
Individual FE	NO	YES	NO	YES
Number of obs.	148,972	148,972	148,472	148,423

*significant at 10%; ** significant at 5%; *** significant at 1%, robust standard error clustered at state and household level. All the coefficient estimates are weighted using survey weights at person-level.

Note: The estimates are obtained using the sample from Health and Retirement Study, Waves 3-13, 1996-2016. Each coefficient indicates OLS estimates of equation (2). There are two dependent variables namely Private long-term care insurance (LTCI) and public long-term care insurance or Medicaid. Both outcome variables are binary variables. Column (1) and (3) include State and Year fixed effects and other covariates, whereas Column (2) and (4) add individual fixed effects and removes time-constant characteristics to obtain the estimated coefficients. Other covariates include age, gender, age^2, income, health

status, marital status, race, and education. Each category title on the left-hand side of the table refers to a specification change incorporated to check if the baseline model estimates are robust to change in specifications.

Table 8: Placebo test – Impact LTCIP on other insurances

	Life Insurance	Life Insurance	Employer Health Insurance	Employer Health Insurance
	(1)	(2)	(3)	(4)
Partnership	0.0121*	0.0056	0.0049	-0.00523
	(0.00717)	(0.00525)	(0.00774)	(0.00567)
State + Year Fixed Effects	YES	YES	YES	YES
Control Variables	YES	YES	YES	YES
Individual FE	NO	YES	NO	YES
Number of obs.	148,972	148,972	148,472	148,423

*significant at 10%; ** significant at 5%; *** significant at 1%, robust standard error clustered at state and household level. All the coefficient estimates are weighted using survey weights at person-level.

Note: The estimates are obtained using the sample from Health and Retirement Study, Waves 3-13, 1996-2016. Each coefficient indicates OLS estimates for alternative insurance coverage namely Life Insurance and Employer Health Insurance. Both dependent variables are binary variables denoting ownership of such insurance products. Column (1) and (3) include State and Year fixed effects and other covariates, whereas Column (2) and (4) add individual fixed effects and removes time-constant characteristics to obtain the estimated coefficients. Other covariates include age, gender, age^2, income, health status, marital status, race, and education.

Table 9: Possible Mechanisms driving the effects

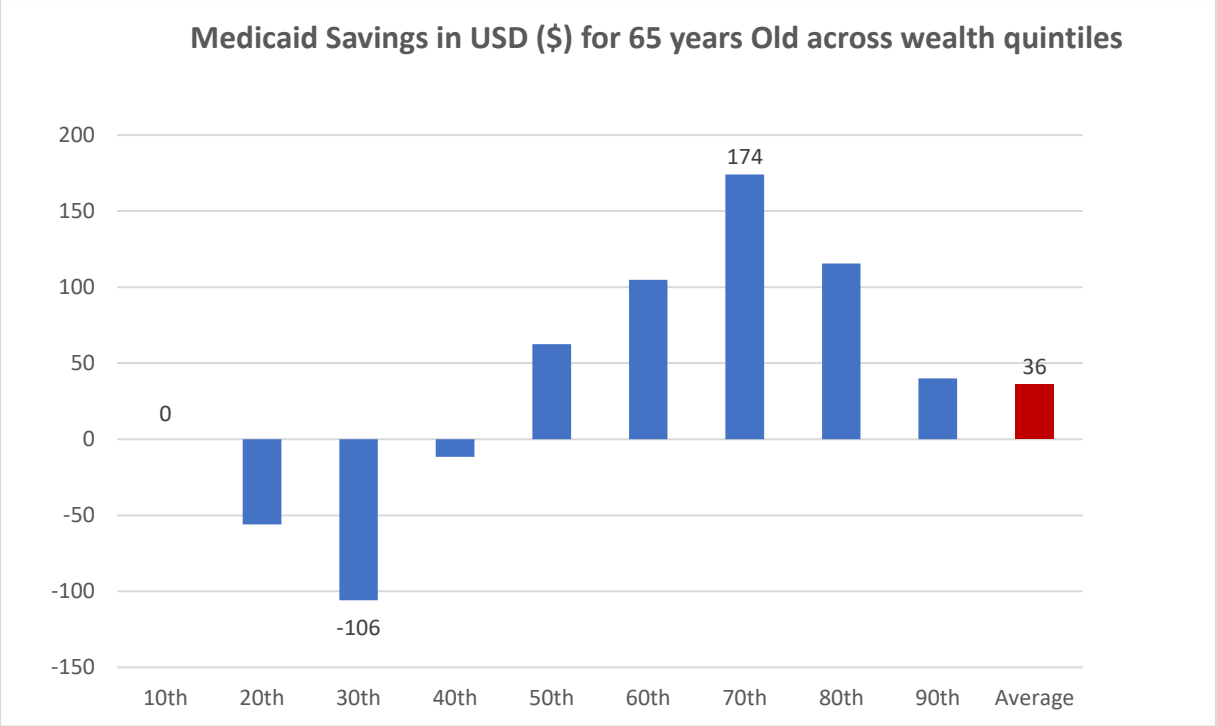
Models	(1)	(2)
State & Year FE + Controls	YES	YES
Individual FE	NO	YES
Bequest		
Partnership	-0.0017	-0.0142***
	(0.00635)	(0.00516)
log(Income)		
Partnership	0.0567***	0.023
	(0.020)	(0.0151)
Wealth		
Partnership	-4,909	4,702
	(25,994)	(12,401)
Total Savings		
Partnership	13,401	16,792
	(13,524)	(12,084)
Disability		

Partnership	-0.000888	0.00302
	(0.00248)	(0.002)
***Survival* Probability (Longevity till 100)**		
Partnership	1.208***	0.345
	(0.456)	(0.344)
Death		
Partnership	-0.0153***	NA
	(0.00492)	
Self-Reported Health Status		
Partnership	-0.031*	0.0111
	(0.0162)	(0.008762)
BMI		
Partnership	0.13	0.073***
	(0.0942)	(0.028)
Mental Health (CESD Score)		
Partnership	0.0514	-0.36**
	(0.316)	(0.2)

*significant at 10%; ** significant at 5%; *** significant at 1%, robust standard error clustered at state and household level. All the coefficient estimates are weighted using survey weights at person-level.

Note: The estimates are obtained using the sample from Health and Retirement Study, Waves 3-13, 1996-2016. Each coefficient indicates OLS estimates for bequest, wealth and health outcomes. Each category title on the left-hand side of the table refers to a specific outcome regressed on right hand side variables to check if it reveals possible mechanisms driving the effect of LTCIP. Column (1) includes State and Year fixed effects and other covariates, whereas Column (2) adds individual fixed effects and removes time-constant characteristics to obtain the estimated coefficients. Other covariates include age, gender, age^2, income, health status, marital status, race, and education.

Figure 5: Estimated total net savings from LTCIP for 65 years old individual by wealth decile



Note: These saving estimates are calculated using the estimated effects across wealth levels obtained from Column (2) of Table 7. Average Medicaid savings for 65 years old calculated using a simulation technique similar to Goda (2011). Authors calculate, with reference to year 2006, the expected present discounted value (EPDV) of long term-care costs or E(LTC) of $21021 for men and $52523 for women, using the values assumed by Brown and Finkelstein (2007) and Goda (2011) for the year 2000. Low, Middle, and High wealth levels correspond to 30th, 60th, and 80th percentile respectively. The horizontal axis represents wealth percentiles and the vertical axis represents amount saved in USD.

Table 10 : Sensitivity Analysis for Simulation Output

		Total Medicaid Savings
Main model	Baseline	$36
	+2SD	$95
	-2SD	-$23
Eg(LTC)	1.1*EPDV (or +10%)	$40
	0.9*EPDV (or -10%)	$32
Discount Rate	1.5%	$85
	4.5%	$17

Note: The expected present discounted value (EPDV) of long term-care costs or E(LTC) for men (women) is $21021 ($52523).

Table 11 : Welfare Analysis using MVPF Approach.

Sr No	Scenarios	Coverage	MVPF
1)	No LTCIP	------	$= \frac{C - P - A}{(M \pm t)}$
2)	LTCIP – Optimal	C = $142,000	$= \frac{A + C - P}{(M \pm t)}$
3)	LTCIP – Below Optimal	C < $142,000	$= \frac{A + C - P - d}{(M \pm t)}$
4)	LTCIP – Above Optimal	C > $142,000	$= \frac{A + C - P}{(M \pm t - X)}$

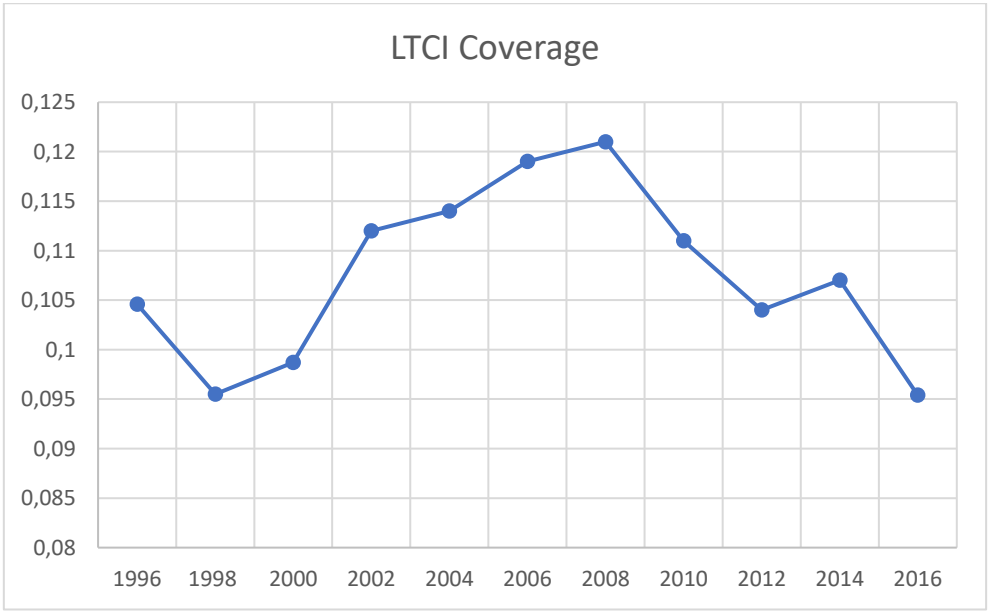
Note: This table consists of four different scenarios and their corresponding marginal values of public funds (MVPF) respectively. The coverage estimates, indicative of average individual wealth, comes from the Health and Retirement study (1996-2016).

Table 12: Intended and actual beneficiary of Medicaid via LTCIP

Class	Some LTSS	Full LTSS
Rich	*A*	B
Middle Class	*C*	D

Online Appendix of the paper 'Long-Term Care Partnership Effects on Medicaid and Private Insurance' by Joan Costa-Font and Nilesh Raut

Figure I: Coverage of private long-term care insurance (LTCI) over time.



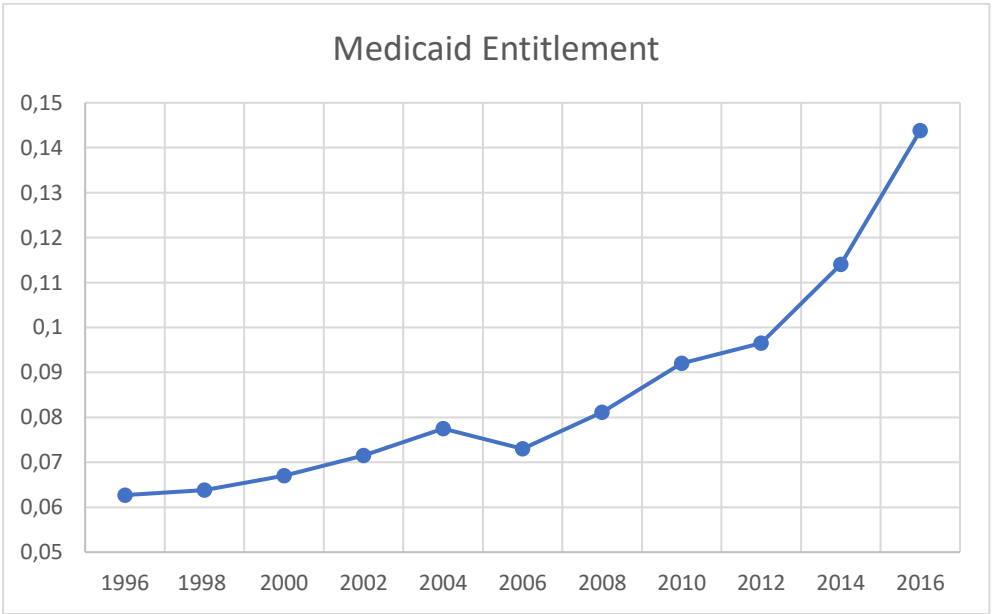


Figure III: Spouse – Effect of LTCIP on purchase of private long term-care insurance (LTCI) over time

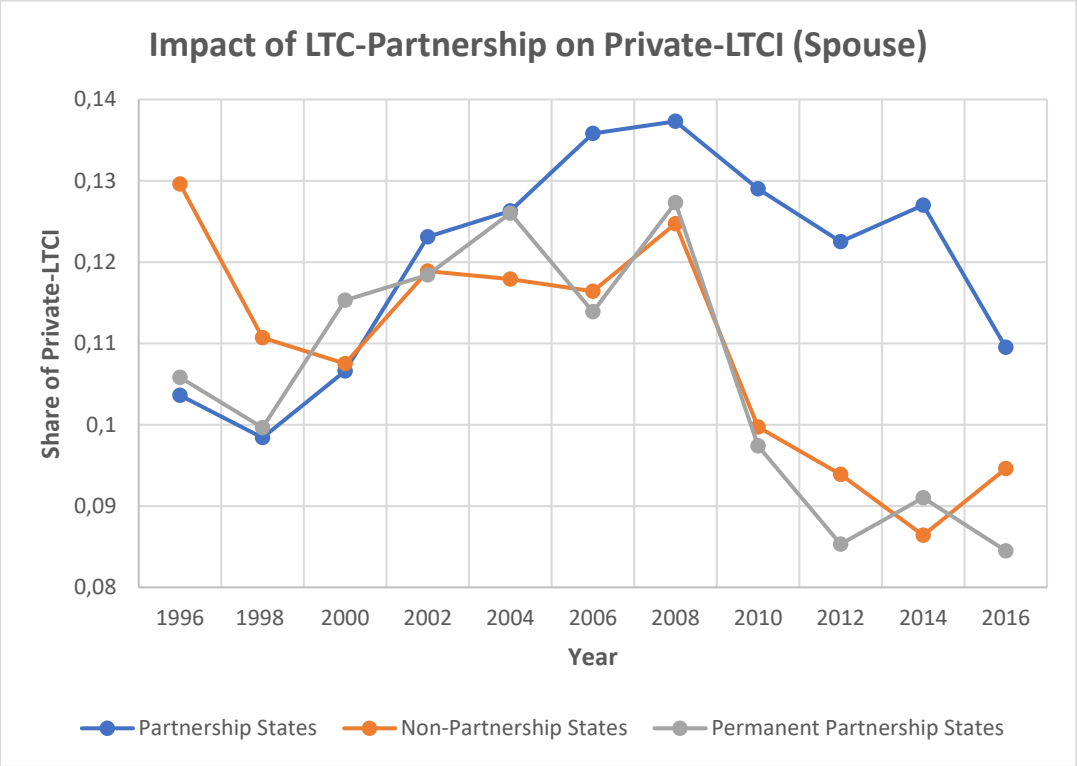


Figure IV: Spouse – Effect of LTCIP on the uptake of Medicaid over time

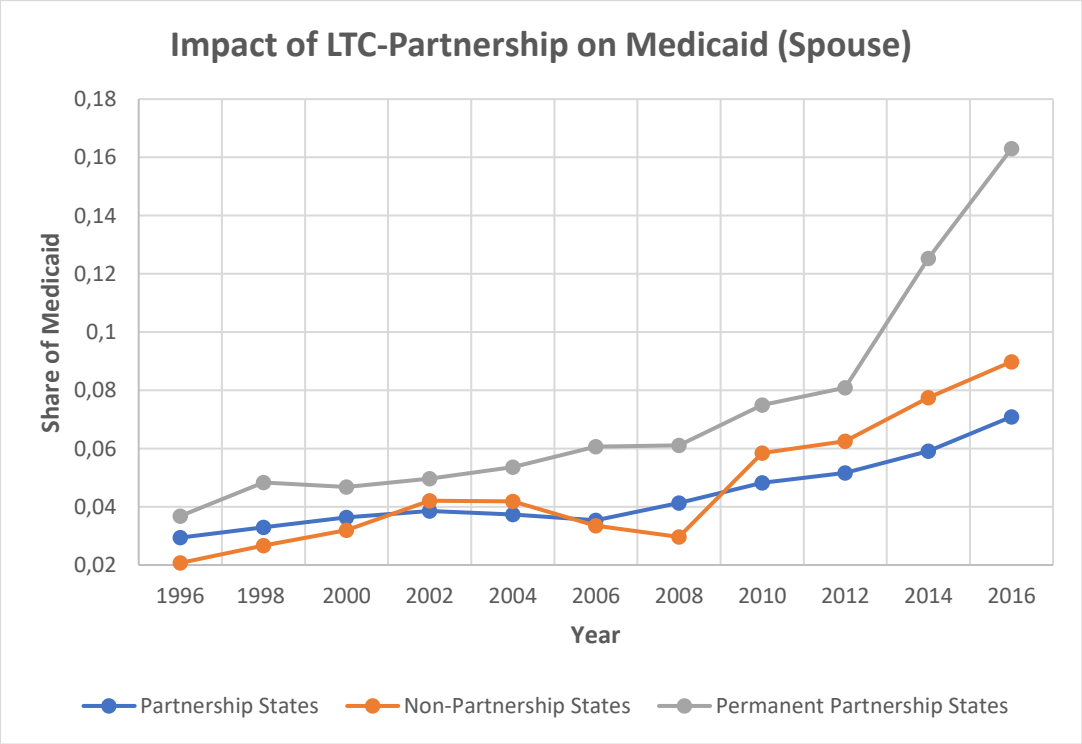


Figure V: Event Study: LTCI - Assuming LTCIP began in 2008 not in 2006

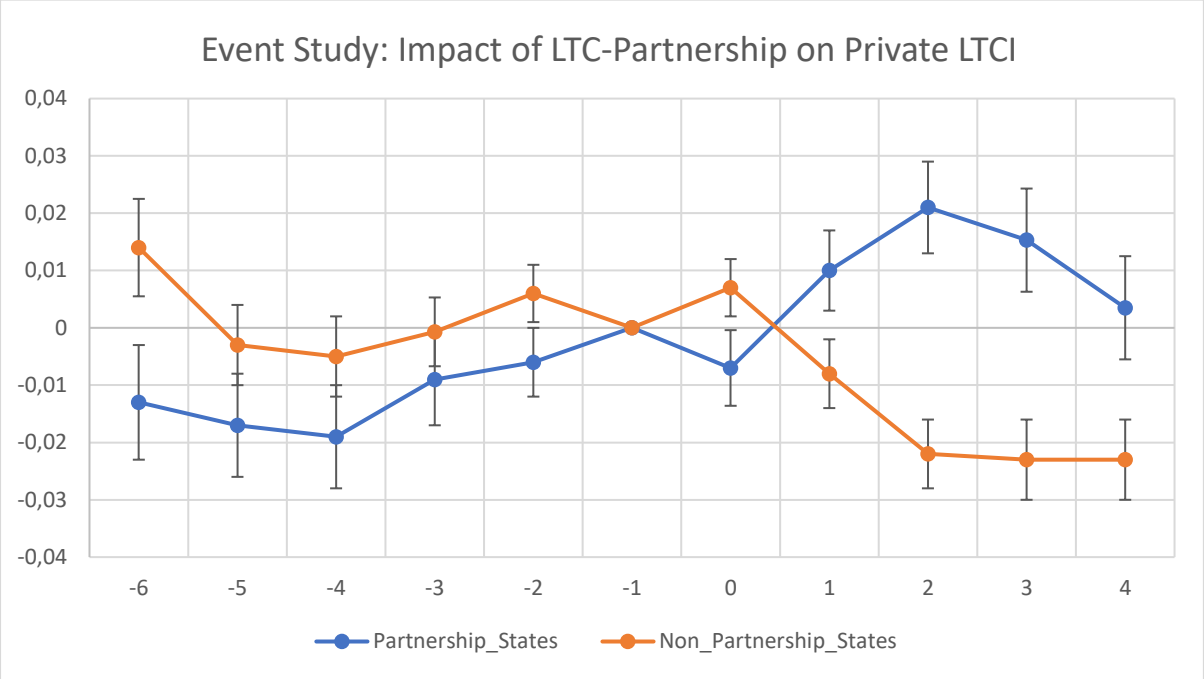


Figure VI: Event Study: Medicaid - Assuming LTCIP began in 2008 not in 2006

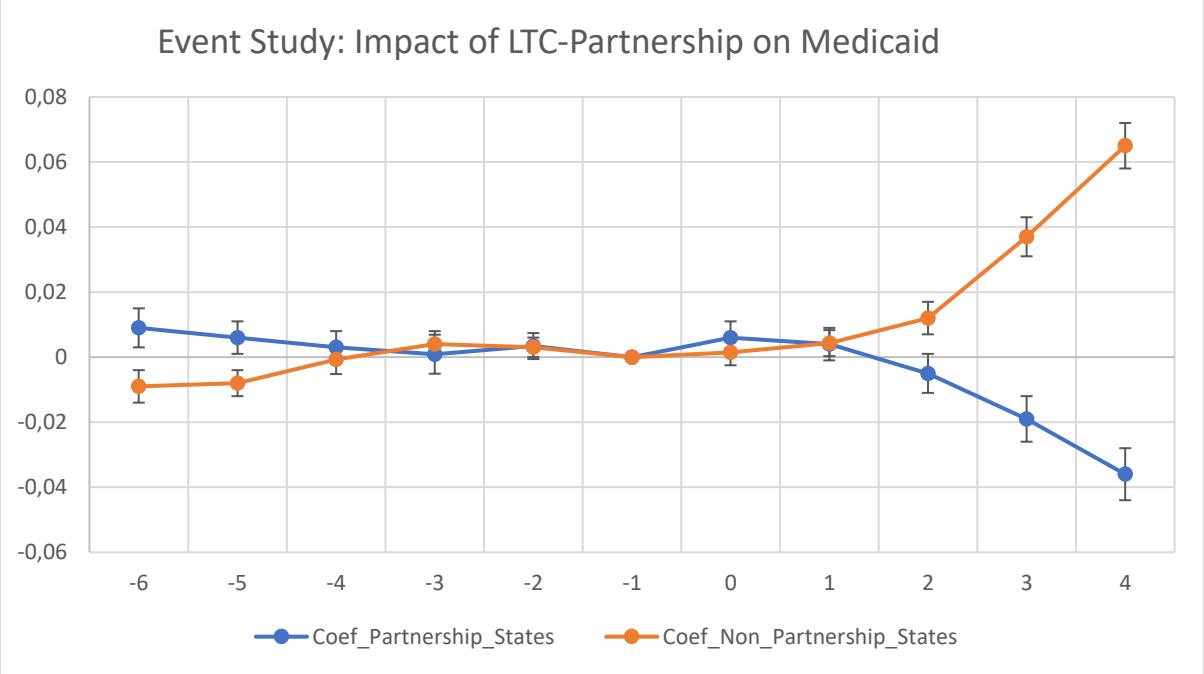
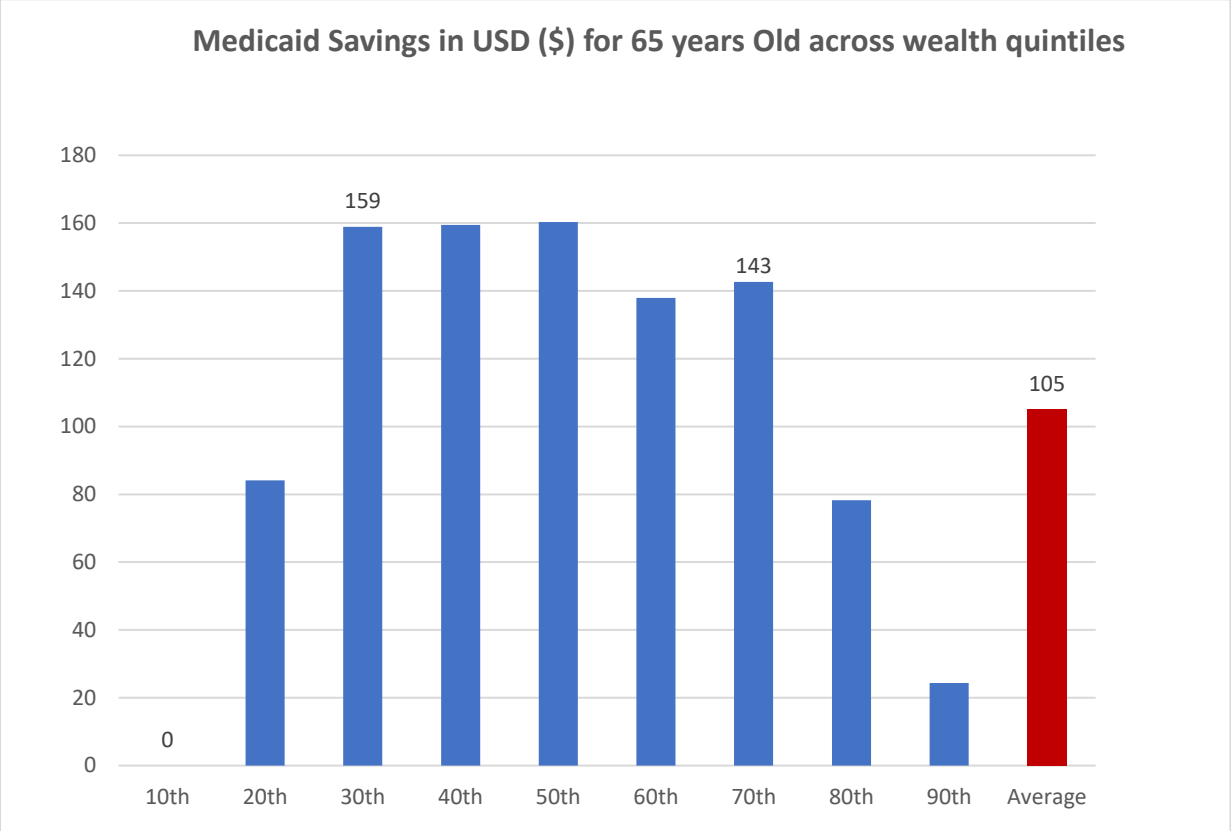


Figure VII: Estimated total net savings from LTCIP for 65 years old: Model without Person FE



Note: These saving estimates are calculated using the estimated wealth effects obtained from Column (1) of Table 7. Average Medicaid savings for 65 years old calculated using a simulation technique similar to Goda (2011). Authors calculate, with reference to year 2006, the expected present discounted value (EPDV) of long term-care costs or E(LTC) of $21021 for men and $52523 for women, using the values assumed by Brown and Finkelstein (2007) and Goda (2011) for the year 2000. Low, Middle, and High wealth levels correspond to 30th, 60th, and 80th percentile respectively. The horizontal axis represents wealth percentiles and the vertical axis represents amount saved in USD.

Table:I Descriptive Statistics for Sample, Insurance Holders, and Insurance Holders from Partnership State

	Private-LTCI				
	Sample Mean	LTCI-Purchasers	LTCI-Purchasers from Partnership states	Difference LTCIP- Mean	Difference LTCIP-LTCI
	(1)	(2)	(3)	(3) - (1)	(3) - (2)
Income	68,131	96,147	93,754	25,623	-2,393
Wealth	414,383	736,146	691,614	277,231	-44,532
Age	62.82	64.28	64.32	1.5	0.040
Male	0.431	0.416	0.413	-0.018	-0.003
Married	0.66	0.728	0.74	0.08	0.012
College/More	0.447	0.61	0.61	0.163	0.000
Children	0.93	0.92	0.924	-0.006	0.004
White	0.753	0.83	0.85	0.097	0.020
Retired	0.55	0.62	0.63	0.08	0.010
Fair/Poor Health	0.274	0.167	0.166	-0.108	-0.001
	Medicaid				
	Sample Mean	Medicaid-Takers	Medicaid-takers from Partnership states (MediciadP)	Difference MedicaidP - Mean	Difference MedicaidP - Medicaid
	(4)	(5)	(6)	(6) - (4)	(6) - (5)
Income	68,131	17,438	17023	-51,108	-415
Wealth	414,383	47,663	43120	-371,263	-4,543
Age	62.82	63.11	63.4	0.58	0.29
Male	0.431	0.34	0.338	-0.093	-0.002
Married	0.66	0.315	0.303	-0.357	-0.012
College/More	0.447	0.203	0.188	-0.259	-0.015
Children	0.93	0.903	0.91	-0.02	0.007
White	0.753	0.496	0.528	-0.225	0.032
Retired	0.55	0.777	0.821	0.271	0.044
Fair/Poor Health	0.274	0.638	0.647	0.373	0.009

Note : This table compares means of important variables across three categories using Health and Retirement Study, Waves 3-13, year 1996-2016. The present sample is restricted to age 50-75. The sub-sample mean among insurance holders from Partnership states in Column (3) and (6) compared with Sample mean (Column (1) & (4)) and subsample mean of insurance holders (Column (2) & (5)).

Table II: Adoption of Long-Term Care Partnership Insurance Across States

What States Have Approved Long-Term Care Partnership Insurance for Sale (Updated: April 2017)		
State	**Effective Date (As of April 2017)**	**Policy Reciprocity**
Alabama	03/02/09	Yes
Alaska	Not Filed	---
Arizona	07/01/08	Yes
Arkansas	07/01/08	Yes
California	Original Partnership	No
Colorado	01/02/08	Yes
Connecticut	Original Partnership	Yes
Delaware	11/02/11	Yes
District of Columbia	Not Filed	---
Florida	01/01/07	Yes
Georgia	01/01/07	Yes
Hawaii	Pending	---
Idaho	11/02/06	Yes
Illinois	Pending	---
Indiana	Original Partnership	Yes
Iowa	01/01/10	Yes
Kansas	04/01/07	Yes
Kentucky	06/16/08	Yes
Louisiana	10/01/09	Yes
Maine	07/01/09	Yes
Maryland	01/01/09	Yes
Massachusetts	Proposed	---
Michigan	Work stopped	---
Minnesota	07/02/06	Yes
Mississippi	Not Filed	---
Missouri	08/01/08	Yes
Montana	07/01/09	Yes
Nebraska	07/01/06	Yes
Nevada	01/01/07	Yes
New Hampshire	02/16/10	Yes
New Jersey	07/01/08	Yes
New Mexico	Not Filed	---
New York	Original Partnership	Yes
North Carolina	03/07/11	Yes
North Dakota	01/01/07	Yes
Ohio	09/10/07	Yes
Oklahoma	07/01/08	Yes
Oregon	01/01/08	Yes
Pennsylvania	09/15/07	Yes
Rhode Island	07/01/08	Yes
South Carolina	01/01/09	Yes
South Dakota	07/01/07	Yes
Tennessee	10/01/08	Yes
Texas	03/01/08	Yes
Utah	Not Filed	---
Vermont	Not Filed	---
Virginia	09/01/07	Yes
Washington	01/01/12	Yes
West Virginia	17/01/2011	Yes
Wisconsin	01/01/09	Yes
Wyoming	06/29/09	Yes

Source: American Association of Long-Term Care Insurance website, which comes under U.S. Government Accountability Office's Consumer Information Center. http://www.aaltci.org/long-term-care-insurance/learning-center/long-term-care-insurance-partnership-plans.php)

Table II: Baseline Models – Impact of LTC-Partnership on Private-LTCI and Medicaid

VARIABLES	(1) RLTCI	(2) RLTCI	(3) RLTCI	(4) RLTCI	(5) Medicaid	(6) Medicaid	(7) Medicaid	(8) Medicaid
Partnership	0.0144***	0.00670**	0.0164***	0.00951***	0.0107***	0.0108***	-0.0146***	-0.00282
	(0.00348)	(0.00342)	(0.00462)	(0.00371)	(0.00252)	(0.00240)	(0.00360)	(0.00296)
PermPP	-0.00243	-0.00487	-0.0491	0.0472	0.0317***	0.0251***	0.0648	0.0545
	(0.00497)	(0.00491)	(0.121)	(0.0946)	(0.00425)	(0.00373)	(0.0548)	(0.0750)
age		0.00102	0.00148	-0.00343		0.00212	0.00167	0.000979
		(0.00354)	(0.00357)	(0.00281)		(0.00258)	(0.00261)	(0.00221)
age2		2.59e-05	2.25e-05	3.71e-05**		-1.60e-05	-1.24e-05	-1.16e-05
		(2.80e-05)	(2.83e-05)	(1.63e-05)		(2.04e-05)	(2.06e-05)	(1.28e-05)
Male		-0.0140***	-0.0139***			-0.0129***	0.0127***	
		(0.00398)	(0.00395)			(0.00255)	(0.00252)	
College_edu		0.0663***	0.0663***			-0.0461***	0.0476***	
		(0.00392)	(0.00392)			(0.00264)	(0.00268)	
Married		0.0256***	0.0249***	0.0110***		-0.0811***	0.0803***	-0.0276***
		(0.00398)	(0.00397)	(0.00324)		(0.00326)	(0.00323)	(0.00255)
Income		3.32e-08**	-3.30e-08**	4.00e-09		-1.90e-08**	2.06e-08**	-6.70e-09***
		(1.66e-08)	(1.67e-08)	(3.27e-09)		(7.62e-09)	(8.28e-09)	(2.59e-09)
White		0.0231***	0.0211***			-0.0802***	0.0768***	
		(0.00353)	(0.00380)			(0.00465)	(0.00467)	
Fair/Poor Hlth		-0.0349***	-0.0333***	-0.00587***		0.113***	0.111***	0.0120***
		(0.00313)	(0.00312)	(0.00221)		(0.00381)	(0.00378)	(0.00174)
Constant	0.106***	-0.112	-0.0455	0.0844	0.0582***	0.115	0.0879	0.00574
	(0.00222)	(0.111)	(0.165)	(0.152)	(0.00175)	(0.0801)	(0.0978)	(0.120)
STATE + YEAR FE	NO	NO	YES	YES	NO	NO	YES	YES
Individual FE	NO	NO	NO	YES	NO	NO	NO	YES
Observations	148,972	148,972	148,972	148,972	148,472	148,472	148,472	148,423
R-squared	0.001	0.028	0.036	0.008	0.002	0.119	0.127	0.017
Number of respd_id				32,182				32,139

*significant at 10%; ** significant at 5%; *** significant at 1%, robust standard error clustered at state and household level. All the coefficient estimates are weighted using survey weights at person-level.

Note: The estimates are obtained using the sample from Health and Retirement Study, Waves 3-13, 1996-2016. Each coefficient indicates OLS estimates of equation (2). There are two dependent variables namely Private long-term care insurance (LTCI) and public long-term care insurance or Medicaid. The variable 'Partnership' is a treatment variable, which is a binary indicator for whether there is LTCIP available in the state and year after the passage of Deficit Reduction Act (DRA-2005). It is also called as 'New-Partnership' or 'LTCIP'. At first, we estimate the impact of LTCIP on Private-LTCI in which Column (1) includes no variables other than treatment or partnership. Column (2) introduces states and years fixed effects into the model. Column (3) adds control variables namely age, gender, age^2, income, health status, marital status, race, and education. Column (4) introduces Fixed Effect Model that removes time-constant characteristics. Whereas Column (5)-(8) follow the similar procedure for Medicaid uptake.