Managing Medicare Coverage in the Presence of Dementia: Evidence from Medicare Part D

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Abstract

Medicare's prescription drug coverage benefit (Part D) relies on beneficiaries' ability to actively choose and change prescription drug plans, yet cognitive impairment may limit meaningful participation in this marketplace. Using national survey data linked to Medicare claims, we examined the impact of a diagnosis of Alzheimer's disease and related dementias (ADRD) and Part D plan switching and coverage-related outcomes, including plan quality and prescription drug spending compared. Individuals with ADRD experienced a 36% reduction in the likelihood of making an annual Part D plan change compared to matched older adults without ADRD, and these declines started several years before the ADRD diagnosis. These declines appear unique to ADRD as the onset of other chronic conditions that do not directly affect cognition resulted in a significant increase in the likelihood of making plan changes. When comparing coverage-related outcomes between individuals diagnosed with ADRD to those diagnosed with a different chronic disease (to account for the health shock associated with the onset of a new condition), we found that older adults with ADRD experienced a 1.8% decline in Part D plan quality and a 15.8% increase in total prescription drug spending. Increases in spending were driven both by relative increases in plan premiums and out-of-pocket drug spending. Finally, we found suggestive evidence that plan switches may have important implications for access to the specialty drugs used to manage the symptoms of ADRD. Among beneficiaries with ADRD, those who changed plans around the time of diagnosis were 20% more likely to use dementia-specific medications. These findings indicate that the current Part D market places ADRD households at risk of increased drugs spending and reduced access to needed medications, and raise concerns about the ability of individuals with ADRD to navigate aspects of the Medicare program that require consumer choice.

Introduction

Medicare Part D is the primary source of prescription drug coverage for older adults in the US, covering about 80% of Medicare beneficiaries.[1] The program is marked by a high degree of consumer choice and complexity. Although the number of available plans have been declining, the typical beneficiary has 11 standalone prescription drug plans (PDPs) to choose from, offered by 4 to 6 different insurers.[1] Furthermore, beneficiaries may elect to receive their Part D benefits from a Medicare Advantage plan (MA-PD), where, on average, there are 32 different plans from which to choose.[2] The Inflation Reduction Act of 2022 reduced variation across plan choices by implementing a uniform out-of-pocket maximum for PDPs,[3] but plans continue to vary meaningfully in their formularies, cost sharing, and pharmacy networks.

A sizeable literature has documented that many older adults struggle to navigate the complex Part D market—beneficiaries often overspend for a given level of drug coverage, infrequently change plans, and often report feeling overwhelmed by Part D choices.[4-12] Such difficulties may be amplified for the 7 million older adults with Alzheimer's Disease and Related Dementia (ADRD).[13] Mild cognitive impairments associated with the early phases of this disease affect complex decision making like the kind needed to make changes to one's prescription drug coverage, while moderate and severe dementia that are hallmarks of the later stages of the disease would preclude active participation in the annual open enrollment process.[14,15] In the absence of a caregiver who can manage Medicare coverage choices, individuals with ADRD are at high risk of becoming "stuck" in their Part D coverage.

Reduced plan switching may have important financial and health consequences for individuals with ADRD. The presence of ADRD directly alters prescription drug needs as pharmaceutical treatments are the primary approach to managing disease symptoms and slowing

cognitive declines.[16] Additionally, ADRD is associated with increased comorbid health conditions that may also increase prescription drug needs.[17] An inability to change plans in response to shifting drug needs, and annual changes insurers make to plan formularies, cost sharing structures, and premiums,[11,12] may result in large out-of-pocket drug expenses or impaired ability to access needed medications.

The onset of dementia has been shown to increase older adults' risk of adverse financial outcomes and reduced take-up of subsidized Medicare benefits,[18-21] yet little is known about the impact of ADRD-related cognitive declines on older adults' ability to manage their Medicare drug coverage. The purpose of this study is to estimate the association between ADRD and the likelihood of changing Part D plans. Additionally, this study examines the association between ADRD and outcomes related to plan choice, including selected plan quality, out-of-pocket drug spending, and the use of medications prescribed to manage the symptoms of ADRD.

Study Data and Methods

This cohort study used survey data linked with Medicare claims and enrollment information to examine changes in outcomes among individuals with ADRD before and after ADRD onset, relative to Medicare beneficiaries who did not have ADRD.

Data

Data included the 2006-2020 waves of the Health and Retirement Study (HRS), a nationally representative longitudinal survey conducted at the household level.[22] These data contain detailed information on numerous topics including health, finances, and family structures. Additionally the survey contains a cognitive assessment tool that can be used to detect the presence of mild cognitive impairment and dementia.[23] HRS data were linked at the

beneficiary level to Medicare claims and enrollment data, specifically the Master Beneficiary Summary files (including the Chronic Condition Warehouse [CCW] file) and the Part D event files.

Additional data sources included the Centers for Medicare and Medicaid Services (CMS) Part D landscape, monthly enrollment, performance, and crosswalk files,[24-27] which provided annual details on plan characteristics and availability.

Sample

The sample comprised HRS respondents age 65 and older whose survey responses could be linked with Medicare claims and who were enrolled in Medicare Part D, either through a PDP or an MA-PD plan, during 2007-2020. More recent data was not used to avoid confounding for the Covid-19 pandemic. We excluded beneficiaries who had ADRD prior to 2007 or at HRS entry and individuals enrolled in Medicaid as plan choices and the need to switching differ in this population (Appendix 1, Appendix Figure A1).

Identifying Beneficiaries with ADRD

The primary exposure is the onset of ADRD, captured in two ways. First, we used a claims-based diagnosis of ADRD obtained from the CCW file. Claims-based diagnoses may under-identify instances of ADRD, particularly for individuals enrolled in MA and populations with reduced access to medical care.[28] Consequently, we also identify individuals as having dementia using the cognitive assessment scale in the HRS (i.e., the modified TICs) and previously validated cutoffs.[23,29] In our main analysis, individuals flagged as having dementia using either measure are considered exposed to ADRD, and we used the earliest instance of

being flagged as the initial year of exposure. In analyses that focus on the receipt of a clinical ADRD diagnosis, we restrict the sample to individuals flagged using the CCW-based measure.

Identifying Comparison Beneficiaries

Primary Comparison Sample

Because Medicare coverage choices may be made at the household level,[30] we selected comparator beneficiaries from households that never experienced ADRD during the study window. To improve comparability, we construct a "stacked" dataset where each exposed beneficiary is paired with comparison beneficiaries residing in the same state (Part D markets are state specific) and with the same marital status (to account for shared decision making between spouses) at baseline. For partnered individuals, we further matched on gender such that only one beneficiary from each comparator household is paired with an exposed beneficiary. Comparator households could be matched to more than one treated beneficiary.

Other Chronic Condition Comparison Sample

Because the onset of ADRD may be associated with changes in health status in addition to cognitive changes, comparisons of outcomes related to prescription drug access between households with and without ADRD may be biased. To address this, we constructed an additional comparison group within the sample of households not exposed to ADRD. Specifically, we identified individuals that experienced a different chronic disease diagnosis during the study window using the CCW file, focusing on conditions that likely alter patients' prescription drug needs but do not directly affect cognition such as rheumatoid arthritis, acute myocardial infarctions, or chronic kidney disease (Appendix 1). This comparison group was paired with the subgroup of ADRD individuals who were identified as having dementia via the CCW file to

improve comparability. To preserve sample, we did not match exposed individuals to comparators on additional beneficiary characteristics.

Outcomes

The primary outcome was an indicator for whether an individual changed their Part D coverage compared to the prior year. Plan changes were identified using the contract and plan IDs in the enrollment data. In a sensitivity analyses, we restricted the outcome to plan changes that can only be "active," meaning that the observed ID changes are not caused by plan exits or consolidations (identified via the Part D crosswalk file). This more restrictive definition is likely an underestimate of actual active plan switching because we cannot differentiate between true passive changes in contract/plan IDs and active switches that occur in response to a plan disruption.[7]

Other outcomes included Part D plan characteristics and measures of drug use and spending that could be affected by plan switching. Specifically, we examined the CMS 5-star quality score of beneficiaries' plans. We also examined total drug spending, defined as the sum of total out-of-pocket drug spending (obtained from the Part D event file) plus annual Part D premiums (obtained from the Part D Landscape file). Finally, among individuals with ADRD (defined using a claims-based diagnosis or HRS cognition scores), we examined the use rates of the drugs used to treat ADRD symptoms. Using the Part D event files, we constructed an indicator for whether an individual filled at least one prescription for any of the following medications: Donepezil, Rivastigmine, Galantamine, and Memantine (Appendix 1).[16]

Analytic Approach

Association between ADRD and Part D Plan Changes

We used a stacked difference-in-differences (DID) event study approach to examine how the frequency of Part D changes differed over time for individuals who experienced ADRD relative to individuals with the same marital status and living in the same state who did not. This approach is summarized in Equation 1.

$$Y_{i,c,t} = \eta_{t-\tau(c)} D_{i,c} + \gamma_{i,c} + \theta_{t,c} + \varepsilon_{i,c,t} \quad \text{Eq. 1}$$

$Y_{i,c,t}$ is an indicator for whether individual i in matched cohort c in year t changed their Part D plan. $D_{i,c}$ is an indicator for whether the individual ever has ADRD in the study period, and $\eta_{t-\tau(c)}$ represents a series of indicators denoting event years measured relative to the first year of ADRD onset for the exposed beneficiary in cohort c. We included dummies for years -5 to 3, with years prior to -5 years serving as the omitted reference period to allow for the estimation of effects that predate a formal ADRD diagnosis. $\gamma_{i,c}$ is a person fixed effect (indexed by cohort because individuals without ADRD can serve as controls in more than one cohort), and $\theta_{t,c}$ are cohort-specific year fixed effects. $\varepsilon_{i,c,t}$ represents robust standard errors clustered at the individual level.

Association between ADRD and Plan-Related Outcomes

We used a similar approach to examine the association of an ADRD diagnosis with drug-coverage-related outcomes. We estimated the relative changes in plan quality and out-of-pocket drug spending among individuals with a CCW-based ADRD diagnosis relative to individuals without ADRD who were diagnosed with a different chronic disease. In this specification, event time was defined by the year of initial ADRD or other chronic disease diagnosis for treated and controls individuals, respectively. Models examining quality also contained a control variable

for the mean plan rating in the state, while models examining total spending controlled for mean plan premiums.

Association between Plan Changes and Use of ADRD Drugs

To explore the relationship between plan switching and the use of ADRD-specific drugs, we divided the full ADRD sample into two groups: those who made at least one Part D plan change during the 2 years prior to their ADRD onset through the 2 years following, and those who did not. We defined event time for the plan switching group as years relative to the first plan change. Within this framework, we used a DID event study model with person and year fixed effects to estimate the change in ADRD-specialty drug use following a plan change relative to individuals with ADRD who did not change plans (Appendix 1).

Additional Analyses

We tested whether the association between ADRD and plan switching varied by marital status because cognitively intact spouses may be able to mitigate any effects of impaired decision making due to ADRD. We also examined the association between other chronic disease diagnoses and plan switching to examine whether observed associations are unique to ADRD. We conducted sensitivity analyses including examining the subset of plan changes that could only reflect active switches, restricting analyses to those enrolled in standalone Part D plans only, and requiring a balanced panel of observations for longer pre and post periods (Appendix 1).

Limitations

This study has limitations. Although it uses a claims-based diagnosis and a cognitive assessment approach to identifying ADRD, measurement error likely persists. Importantly, inclusion of individuals with undocumented ADRD in our comparison group would likely bias

our estimates toward finding no difference. The estimates in this study are not causal and should be interpreted with caution.

Results

Exhibit 1 describes the characteristics of our primary study sample before and after matching on baseline state of residence and marital status. After matching, individuals with and without ADRD were generally more similar on observable characteristics, but differences remained. Individuals with ADRD were older (80.1, SD=7.75 vs. 75.2, SD=6.99), more likely to have less than a high school education (32.3% vs. 19.2%), less likely to live in an urban area (43.4% vs. 58.1%), and had lower income (median values of 23,800 vs. 32,400) and assets (median values of 168,000 vs. 205,000) compared to matched individuals without ADRD. Mean switching rates in the year prior to the onset of ADRD in the two groups were similar for the two groups (19.59% vs. 19.60%). The final analytic sample contained 1,662 individuals with ADRD and 5,123 individuals without (see Appendix Table A1 for a description of the plan-related outcomes sub-sample).

Using the DID event study framework designed to account for baseline differences between study groups, we observed declining switching rates for individuals with ADRD compared to those without that begin in advance of documented ADRD (Exhibit 2). Four years prior to the onset of ADRD, individuals who eventually had ADRD were 4.89 percentage points less likely to switch plans (95% Confidence Interval [CI]: -7.73,-2.06) compared to those who never had ADRD. These differences increased following the onset of dementia—pooling estimates from the year of ADRD onset and later produces a mean relative decline in annual plan switching rates of 7.30 (95% CI: -9.83,-4.77) for individuals with ADRD relative to those without, a 36.1% decline compared to the mean annual switching rate of 20.2%. Estimated

differences were smaller but directionally similar when examining active plan changes (-4.36 95% CI: -6.30,-2.43; Appendix Figure A2.). Results were also similar when limiting analyses to those enrolled in standalone PDPs (Appendix Figure A3) and requiring a balanced panel for longer periods of time (Appendix Figure A4). No differences in plan change rates were noted between single and coupled individuals who experienced ADRD (Appendix Figure A5). Notably, the onset of other chronic diseases was associated with an increase in the frequency of plan switching in the year following the initial diagnosis (Appendix Figure A6).

Compared to individuals diagnosed with other chronic conditions, beneficiaries with a claims-based ADRD diagnosis experienced changes in their Part D plan quality (Exhibit 3A). In the year following diagnosis, individuals with ADRD were in plans with 0.06 fewer stars (95% CI: -0.12, -0.004) compared to individuals with a different chronic condition, a relative decrease of 1.84% compared to the sample mean of 3.47 stars. Similarly, individuals with ADRD experienced relative increases in total prescription drug spending that began about 3 years before the initial diagnosis (Exhibit 3B). In the year following diagnosis, individuals with ADRD spent an average of $180.03 (95% CI: $88.06, $271.99) more per year than individuals with other chronic conditions, representing a 15.5% increase in spending relative to the sample mean. Increases in spending were attributable to increases in both plan premiums and total out-of-pocket spending (Appendix Figure A7). Results were similar when limiting analyses to beneficiaries in standalone PDPs (Appendix Figure 8).

Among the full sample of individuals with ADRD, the use of specialty ADRD medications increased following a change in Part D coverage (Exhibit 4). In the year following a plan change, switchers were 3.91 percentage points (95% CI: 0.87, 6.95) more likely to fill an ADRD medication prescription compared to never switchers, representing a 19.8% increase

relative to the mean rate of medication use following ADRD onset of 20%. Results were similar when plan switches were defined using only "active" plan switches (Appendix Figure A9).

Discussion

Medicare Part D enrollees with ADRD were 36% less likely to make changes to their prescription drug plans following the onset of dementia compared to matched Part D enrollees without ADRD; these reductions in plan switching appeared to start several years before the documentation of ADRD. Reduced propensity to change plans appeared to be unique to ADRD, and not simply a by-product of worsening health status, as similar patterns were not found among individuals with other chronic conditions. Indeed, individuals with other conditions were more likely to change plans following initial diagnosis compared to those without, consistent with changes in health status prompting beneficiaries to re-evaluate and adjust their coverage choices.[31-33]

These findings align with earlier work demonstrating that the cognitive declines associated with ADRD may place individuals at increased risk of several adverse outcomes related to household finances and health coverage, and suggest that the loss of cognitive capacity may also impede the active management of prescription drug coverage.[18-21] We did not find evidence that the declines in plan changes were smaller among coupled individuals where a spouse could manage Medicare coverage. The reasons for this are unclear, though evidence suggests that households are slow to transfer financial decision making responsibilities, even in the presence of severe cognitive declines,[34] and high levels of caregiver burden and fatigue may impede plan switching.[35]

The onset of ADRD was associated with small declines in Part D plan ratings and increases in total drug spending compared to individuals diagnosed with other chronic diseases. The current study cannot determine whether the estimated reductions in plan switching are the cause of worsened coverage-related outcomes, but plan switching can be an important tool to counteract poor customer experiences or insurers' tendency to reduce plan generosity over time.[11] The observed 20% increase in the use of medications used to manage ADRD symptoms following a plan change further supports the notion that plan switching has important implications for prescription drug access.[36]

Study findings raise concerns about the appropriateness of delivering publicly subsidized drug coverage through a marketplace that heavily depends on consumer choice and annual coverage adjustments for individuals with dementia. The implementation of a Part D out-of-pocket spending cap in the 2022 Inflation Reduction Act helps prevent catastrophic consequences from poor coverage choices,[37] but a number of policy interventions could further protect households experiencing ADRD. Previous research has demonstrated the effectiveness of sending personalized letters to Medicare beneficiaries with specific plan recommendations to increase Part D plan switching.[38] A similar approach, that targets family caregivers of individuals with ADRD, could improve switch rates while also educating caregivers about the importance of actively managing Medicare coverage choices. Alternatively, CMS could further standardize coverage across Medicare Part D plans, particularly for the medications typically used by individuals with ADRD. Such standardization would help ensure equitable access to these medications, a policy goal that may become increasingly important as new and more effective ADRD treatments become available. Finally, these findings underscore the value of individuals with ADRD receiving a timely diagnosis that would both allow households to discuss

transferring Medicare-related decision-making responsibilities and enable CMS to implement targeted interventions.

In conclusion, the onset of ADRD was associated with reduced Medicare Part D plan switching, and these reductions may be associated with increases in total drug spending. Plan switches around the time of ADRD onset were associated with increased use of ADRD-specific medications in the year following the change, suggesting that active management of Medicare coverage may be an important facilitator of accessing ADRD treatments. Findings raise concerns about the ability of individuals with ADRD to successfully navigate aspects of the Medicare program that require active consumer choices.

Notes

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Exhibit 1- Sample Characteristics

	Overall sample		Matched sample[a]	
	Individuals without ADRD[b]	*Individuals with ADRD*[c]	*Individuals without ADRD*[d]	*Individuals with ADRD*[c]
N	9,486	1,667	5,123	1,662
Number of matched pairs/uses	N/A	N/A	77,653	1,662
Age (Years), mean ± SD	69.4 ± 6.47	80.2 ± 7.73	75.2 ± 6.99	80.1 ± 7.75
Gender				
Male	4,276 (45.1%)	633 (38.0%)	28,307 (36.5%)	630 (37.9%)
Female	5,210 (54.9%)	1,034 (62.0%)	49,346 (63.5%)	1,032 (62.1%)
Marital status[e]				
Single	3,440 (36.3%)	914 (54.8%)	41,963 (54.0%)	915 (55.1%)
Coupled	6,046 (63.7%)	753 (45.2%)	35,690 (46.0%)	747 (44.9%)
Education[e,g]				
Less than High School	1,344 (14.2%)	539 (32.3%)	14,890 (19.2%)	537 (32.3%)
General Educational Development	421 (4.4%)	65 (3.9%)	3,455 (4.4%)	65 (3.9%)
High School Graduate	2,926 (30.8%)	537 (32.2%)	26,274 (33.8%)	535 (32.2%)
Some College	2,405 (25.4%)	292 (17.5%)	18,428 (23.7%)	293 (17.6%)
College and Above	2,375 (25.0%)	234 (14.0%)	14,571 (18.8%)	232 (14.0%)
Race/Ethnicity[e,f]				
Non-Hispanic White	7,168 (75.6%)	1263 (75.8%)	56,760 (73.1%)	1,255 (75.5%)
Black (or African American)	1,217 (12.8%)	251 (15.1%)	9,424 (12.1%)	254 (15.3%)
Hispanic	823 (8.7%)	134 (8.0%)	9,518 (12.3%)	135 (8.1%)
Residence region at baseline[e,g]				
Urban	4,819 (50.8%)	725 (43.5%)	45,127 (58.1%)	721 (43.4%)
Suburban	2,040 (21.5%)	426 (25.6%)	16,369 (21.1%)	388 (23.3%)
Ex-urban	2,609 (27.5%)	513 (30.8%)	16,120 (20.8%)	551 (33.2%)
Household total assets in thousands, median (IQR)[e]	238 (65.4, 600)	137 (36, 423)	205 (52, 537)	168 (44.5, 500)
Household total income in previous calendar year in thousands, median (IQR)[e]	44 (23.2, 80.7)	23.9 (14.2, 40.4)	32.4 (17.1, 58.4)	23.8 (14.2, 40.8)

Medicare Part D plan switch rate, mean (SD)[h]	19.41% ± 39.5%	19.90% ± 39.9%	19.60% ± 39.7%	19.59% ± 39.7%

Notes: This table summarizes descriptive characteristics of individuals with and without ADRD in the overall sample and in the matched sample used for the stacked difference-in-differences analysis.

Abbreviations: N/A, not applicable; ADRD, Alzheimer's Disease and Related Dementias; SD, Standard deviation; IQR, Interquartile range.

[a] Individuals with ADRD (defined as having either a claim-based ADRD diagnosis or a Telephone Interview for Cognitive Status (TICS) score ≤ 6 for self-respondents or a proxy cognitive assessment score ≥ 6 for proxy respondents) were paired with individuals without ADRD (no claim-based diagnosis and cognitive score > 6) based on residency state and marital status in the year prior to ADRD onset, with additional gender matching for coupled individuals.

[b] Descriptive statistics were calculated using variables measured in 2007 or the nearest available year before or after 2007, which represents the most common year preceding ADRD onset in households with ADRD.

[c] Descriptive statistics were calculated using variables measured from the year preceding ADRD onset.

[d] Descriptive statistics were calculated using variables measured in the year preceding ADRD onset for the corresponding matched individuals with ADRD.

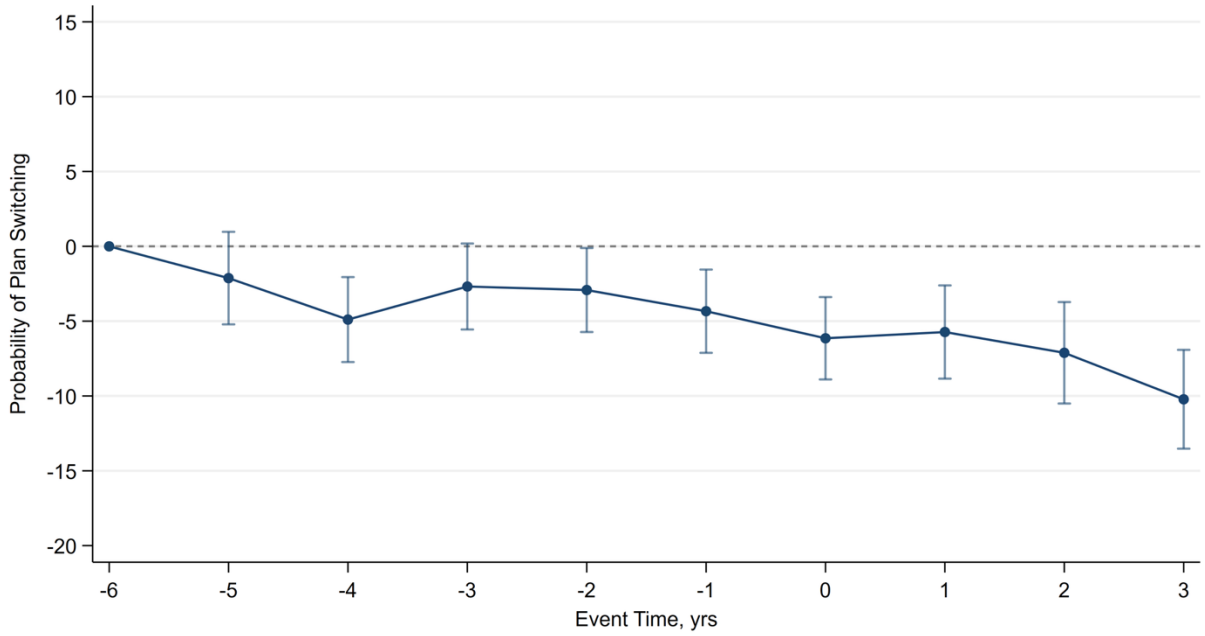
[e] Characteristics were defined based on self-reported responses to survey questions in the Health and Retirement Study (HRS).

[f] Race/Ethnicity was self-reported by individuals. Category for "other" races was omitted due to small counts.

[g] Category counts may not sum to total observations due to missing information.

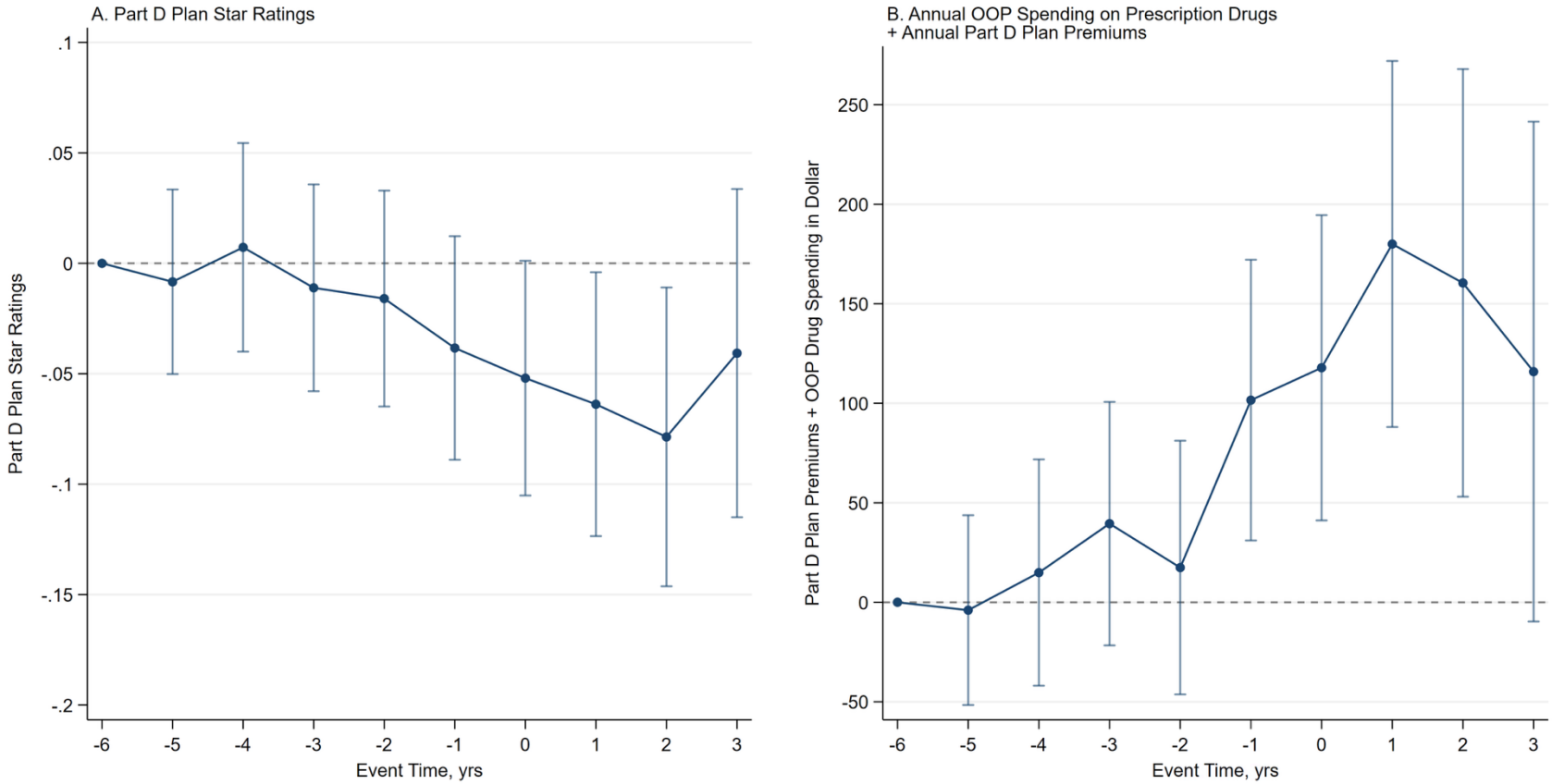
[h] Medicare Part D plan switch was defined as enrollment in a different Part D plan than in the prior year

Exhibit 2- Estimated Difference in the Probability of Changing Part D Plans for Individuals with Alzheimer's Disease and Related Dementia compared to those without.



Notes: Figure reports estimated differences in probability of Part D plan switching for individuals with ADRD compared to those without. Event time was defined relative to the first year in which an individual was identified as having ADRD based on either a CCW-based ADRD diagnosis or cognitive assessment in the HRS. Estimates were calculated using linear stacked event study regression models, which included individual-by-group and calendar-year-by-group fixed effects.

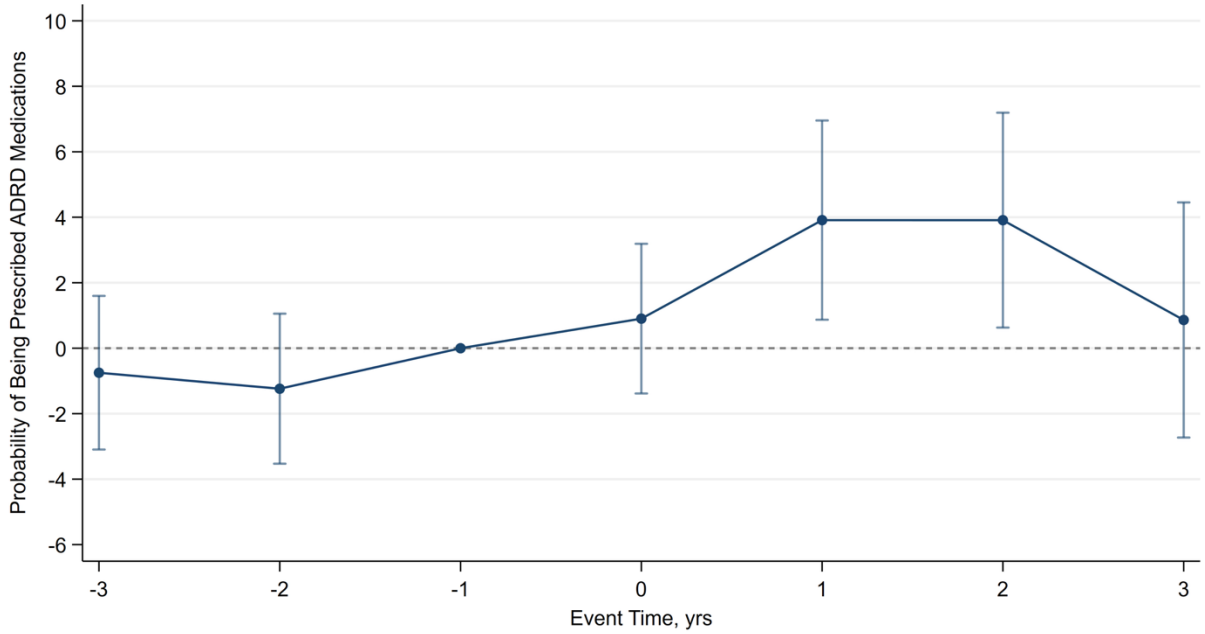
Exhibit 3- Estimated Difference in the Plan Quality and Total Drug Spending for Part D Enrollees with Alzheimer's Disease and Related Dementia compared to those Other Chronic Conditions.



Notes: Figure plots estimated differences in plan 5-star quality scores and total prescription drug spending (ie, annual plan premiums plus total out-of-pocket drug spending) for individuals with a CCW-based ADRD diagnosis compared to individuals with a non-cognitive CCW-based chronic disease diagnosis. Event time was defined relative to the first year of the ADRD/chronic disease diagnosis. Estimates were calculated using linear stacked event study regression models, which adjusted for state-level average plan

ratings (Panel A) or county-level average plan premiums (Panel B) and included individual-by-group and calendar-year-by-group fixed effects.

Exhibit 4- Estimated Changes in Probability of Being Prescribed ADRD Medications among Part D Enrollees with Alzheimer's Disease and Related Dementia following a Plan Change compared to Those Who did not Change Plans



Notes: Figure reports estimated differences in probability of being prescribed ADRD specialty medications for Part D enrollees with ADRD following a plan change, compared to those who did not switch. Event time was defined relative to the first year of plan change 2 years prior to or after ADRD onset. Estimates were calculated using linear event study regression models, which included individual and calendar year fixed effects.

Appendix

This supplemental material has been provided by the authors to give readers additional information about their work.

Appendix 1. Additional Details on Methods

Primary Sample Construction

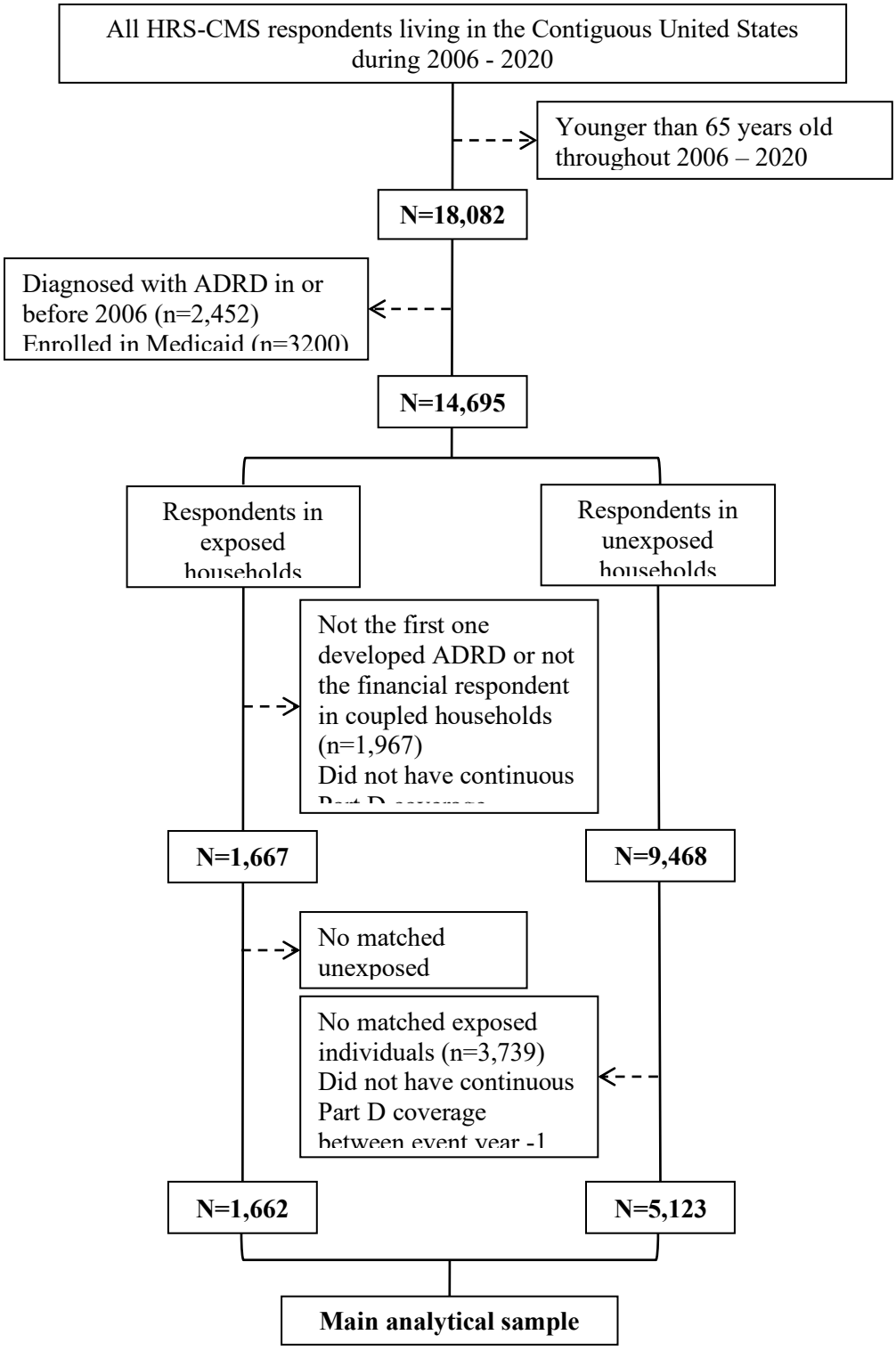
The aim of this study is the compare Medicare prescription drug coverage changes over time for individuals with Alzheimer's Disease and Related Dementias (ADRD) to older adults who never develop this condition. To accomplish this aim, we construct the following dataset from individuals in the Health and Retirement Study (HRS) with linked Medicare claims and enrollment info.

Among the 19,492 adults who participated in the HRS during the study period and consented to linkage with Medicare claims, we excluded individuals who were younger than 65 years throughout 2006–2020. We also excluded individuals residing in households in which the first ADRD onset occurred in or before 2006, as well as those enrolled in Medicaid. The remaining sample was then divided into two groups: households in which at least one respondent experienced ADRD onset and households that never experienced ADRD onset.

ADRD onset, the primary exposure of interest, was identified using two data sources: claims-based ADRD diagnoses and cognitive assessments from the HRS. Individuals were classified as having ADRD if they had a claims-based ADRD diagnosis or met probable dementia criteria, defined as a Telephone Interview for Cognitive Status (TICS) score of 6 or lower for self-respondents or a proxy cognitive assessment score of 6 or higher for proxy respondents. In coupled households with ADRD, we retained only the respondent who first exhibited ADRD onset; if both partners developed ADRD in the same year, we selected the household financial respondent. We further excluded individuals who did not have continuous Medicare Part D coverage from the year prior to ADRD onset through the year of onset.

To ensure comparability between households with ADRD (exposed) and those without ADRD (unexposed) in terms of Part D plan market exposure and household structure, we implemented an exact matching procedure. Exposed households were first matched to unexposed households based on state of residence in 2006 (or the first year with available data). Within each matched set, unexposed households were required to have the same marital status in the year prior to the exposed household's ADRD onset and, for coupled households, the same respondent gender. Unexposed individuals were excluded if they did not maintain continuous Part D coverage during the year prior to the exposed household's ADRD onset through the onset year (ie, event time -1 and 0). This process of primary sample construction is visualized in eFigure 1.

Figure A1- Primary Sample Inclusion Flow Chart



Part D Coverage-Related Outcomes Sample Construction

To examine the association between ADRD (and the hypothesized declines in plan switching) and coverage related outcomes, we compared individuals diagnosed with ADRD to a subgroup of comparator Medicare beneficiaries who were diagnosed with a different chronic condition that does not directly cause cognitive declines and were not diagnosed with ADRD during the study window. Specifically, we included control individuals who were diagnosed with any of the following conditions, as defined in the CMS Chronic Conditions Warehouse (CCW) Chronic Condition file:

- Acute Myocardial Infarction (AMI)
- Cancer (breast cancer, colorectal cancer, endometrial cancer, lung cancer)
- Chronic kidney disease
- Glaucoma
- Hip fracture
- Rheumatoid arthritis / Osteoarthritis (RA / OA)

Because receipt of a formal diagnosis can independently be associated with changes in coverage or health and prescription drug use, we also restricted our treated group to those individuals who were flagged as having ADRD via the CCW Chronic Condition file. This restriction improved comparability between the treatment and control groups and allowed us to construct event time for both treatment and control groups relative to similar events—the first year of the ADRD or chronic disease diagnosis. To preserve sample sizes within these subgroups, we did not apply additional matching procedures such as matching on state of residence or marital status. eTable 1 describes this study sample.

Table A1- Description of the Part D Coverage-Related Outcomes Sample

	Individuals with other chronic conditions[a]	*Individuals with ADRD*[b]
N	1,399	1,185
Age (Years), mean ± SD	73.7 ± 7.47	81.6 ± 7.65
Gender		
Male	513 (36.7%)	405 (34.2%)
Female	886 (63.3%)	780 (65.8%)
Marital status[c]		
Single	717 (51.3%)	679 (57.3%)
Coupled	682 (48.7%)	506 (42.7%)
Education[c,d]		
Less than High School	301 (21.5%)	317 (26.8%)
General Educational Development	61 (4.4%)	41 (3.5%)
High School Graduate	467 (33.4%)	408 (34.4%)
Some College	321 (22.9%)	222 (18.7%)
College and Above	249 (17.8%)	197 (16.6%)
Race/Ethnicity[c,e]		
Non-Hispanic White	1132 (80.9%)	992 (83.7%)
Black (or African American)	157 (11.2%)	125 (10.5%)
Hispanic	82 (5.9%)	60 (5.1%)
Residence region at baseline[c,d]		
Urban	580 (41.5%)	460 (38.8%)
Suburban	284 (20.3%)	280 (23.6%)
Ex-urban	533 (38.1%)	443 (37.4%)
Household total assets in thousands, median (IQR)[c]	193 (51.5, 606)	212 (58, 595)
Household total income in previous calendar year in thousands, median (IQR)[c]	32 (16.2, 61.7)	24.4 (14.4, 42.8)
Chronic conditions[f]		
ADRD	N/A	1185 (100%)
AMI	50 (3.6%)	N/A
Cancer	147 (10.5%)	N/A
Chronic kidney disease	493 (35.2%)	N/A
Glaucoma	152 (10.9%)	N/A
Hip fracture	33 (2.4%)	N/A
RA/OA	542 (38.7%)	N/A
Medicare Part D plan switch rate, mean (SD)[g]	14.76% ± 35.5%	15.08% ± 35.8%

Notes: This table summarizes descriptive characteristics of individuals diagnosed with ADRD or other chronic conditions.

Abbreviations: N/A, not applicable; ADRD, Alzheimer's Disease and Related Dementias; SD, Standard deviation; IQR, Interquartile range; AMI, Acute Myocardial Infarction, RA, Rheumatoid arthritis; OA, Osteoarthritis.

[a] Descriptive statistics were calculated using variables measured from the year preceding ADRD onset.

[b] Descriptive statistics were calculated using variables measured from the year preceding onset of other chronic conditions.
[c] Characteristics were defined based on self-reported responses to survey questions in the Health and Retirement Study (HRS).
[d] Category counts may not sum to total observations due to missing information.
[e] Race/Ethnicity was self-reported by individuals. Category for "other" races was omitted due to small counts.
[f] Some older adults were diagnosed with more than one chronic conditions on the same day. Categories are not mutually exclusive and percentages may sum to more than 100%.
[g] Medicare Part D plan switch was defined as enrollment in a different Part D plan than in the prior year.

Identification of ADRD-Specialty Drug Use

We considered the following medications to be ADRD specialty medications: Donepezil, Rivastigmine, Galantamine, and Memantine. Using Medicare Part D Prescription Drug Event (PDE) files, we identified annual use of ADRD medications based on National Drug Codes (NDCs) corresponding to these agents. NDCs were identified using the U.S. Food and Drug Administration (FDA) National Drug Code Directory, and all NDCs whose nonproprietary names matched the listed medications were included. Both brand-name and generic formulations were considered to ensure comprehensive capture of ADRD medication use. An individual was classified as an ADRD medication user in a given year if they had at least one Part D claim for any of these medications during that calendar year.

Analytic Approach for Examining the Association between Plan Switching and Specialty Drug Use

Because ADRD-related medications are not clinically indicated in individuals without ADRD, we limited these analyses to the sample of individuals flagged as having dementia during our study period using either the HRS-based measure or the CCW-based measure. We also limited our sample to person years that occurred around the time of initial dementia documentation—that is, we included up to 2 years prior to dementia onset and up to 2 years following, conditional on the beneficiary being alive, enrolled in a standalone prescription drug plan (PDP) or Medicare Advantage (MA-PD) plan, and not dually eligible for Medicaid.

Within this sample, we classified beneficiaries into two groups: those who made a Part D plan switch during the 5-year study window and those who did not. For those beneficiaries who did

switch, we defined event time as years relative to the year of the first observed plan change. We then estimated the following linear regression equation.

$$Y_{i,t} = \eta_{t-\tau(i)} S_i + \gamma_i + \theta_t + \varepsilon_{i,t} \quad \text{Eq. e1}$$

Where $Y_{i,t}$ is an indicator for whether beneficiary i filled a prescription for any ADRD drug in year t. $\eta_{t-\tau(i)}$ is a series of dummies indicating years relative to the first observed plan change during the study window (note that event time is not defined for never-switchers) with event time equal to -1 serving as the omitted (reference) time period. S_i is an indicator for being a switcher. γ_i and θ_t are person and calendar year fixed effects and $\varepsilon_{i,t}$ is a robust standard error term clustered at the person level.

The estimates obtained for event times ≥0 reflect the differential change in specialty drug use for switchers relative to non-switchers in the years following a plan switch that occurred around the time of ADRD documentation.

Additional Analyses and Sensitivity Analyses

We tried different approaches to evaluate the robustness of our findings.

First, we examined whether the association between ADRD and Medicare Part D plan switching differed by marital status, motivated by the hypothesis that cognitively intact spouses may help mitigate potential impairments in plan decision-making associated with ADRD. Marital status was defined based on whether an individual had a partner in the year prior to ADRD onset for individuals from households with ADRD, and in the year prior to the corresponding ADRD onset of their matched exposed households for individuals from households without ADRD.

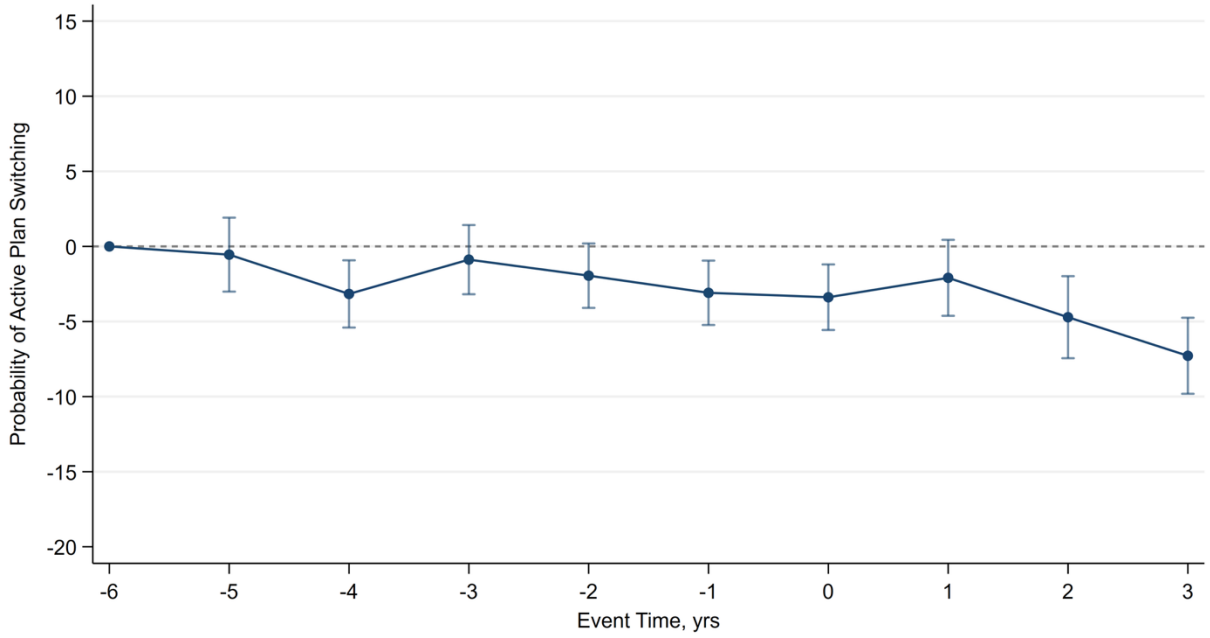
Secondly, we evaluated the relationship between other non-cognitive chronic disease diagnoses and plan switching, to assess whether the observed associations were specific to ADRD rather than reflective of chronic illness more broadly. After excluding households with ADRD, we divided the remaining sample into two groups: households with at least one of the following chronic conditions, AMI, cancer, chronic kidney disease, glaucoma, hip fracture or RA/OA, and households without any of these conditions. The two groups were then matched using the same procedure applied in the primary sample construction. We applied the same stacked DID event-study approach used in the primary analysis to examine the association between non-cognitive chronic conditions and Part D plan switching.

In addition, we examined the association between ADRD and active Medicare Part D plan switching. Insurers may alter Part D plan offerings through consolidation, termination, or restructuring. Consolidation occurs when multiple plans are merged into a single plan, while termination refers to nonrenewal of a plan. Insurers may also restructure plans by splitting an existing plan into multiple plans or rebranding plans. These insurer-driven changes can lead to changes in contract and plan IDs that are not initiated by beneficiaries. We defined an active plan switch as one in which the beneficiary's plan in the prior year was not terminated and the beneficiary enrolled in a different plan that was neither the plan into which the prior plan consolidated nor a plan resulting from the prior plan being split or rebranded.

To minimize confounding from Medicare Advantage plan features, such as provider networks and bundled coverage, we repeated the analysis restricting the sample to individuals enrolled in standalone PDPs. Furthermore, we imposed varying requirements on the length of balanced pre- and post-ADRD observation periods. Specifically, we repeated the analyses requiring at least 1, 2, and 3 years of observations both before and after ADRD onset.

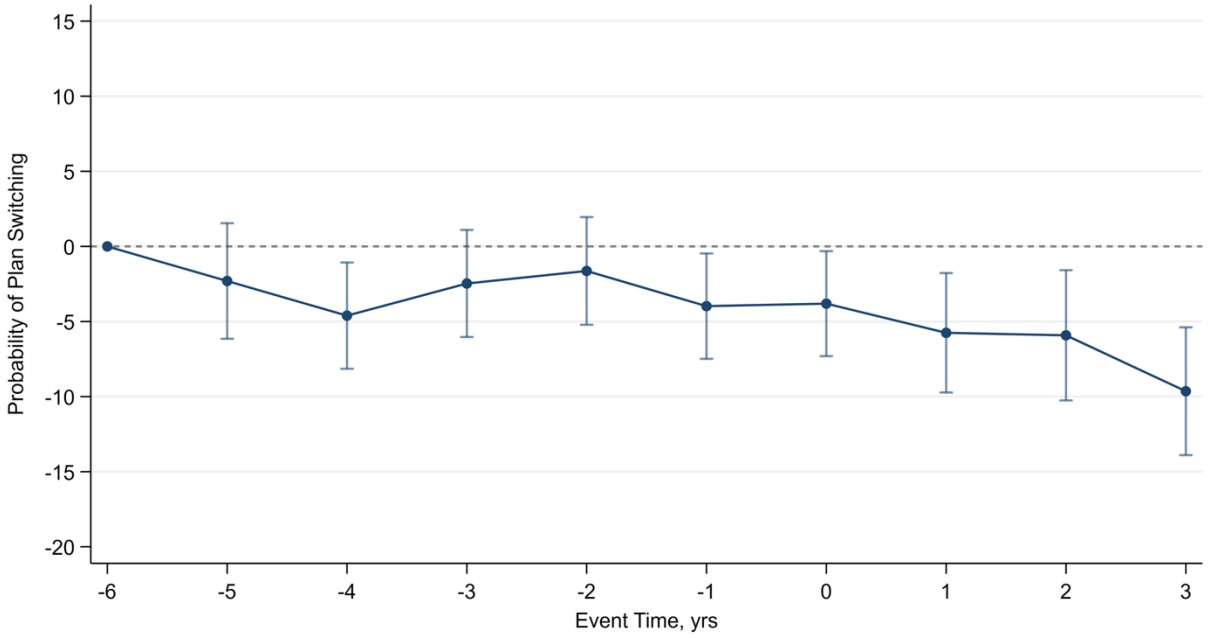
Appendix 2 – Additional Results

Figure A2- Estimated Association between ADRD and Plan Changes when Restricting to Active Plan Changes



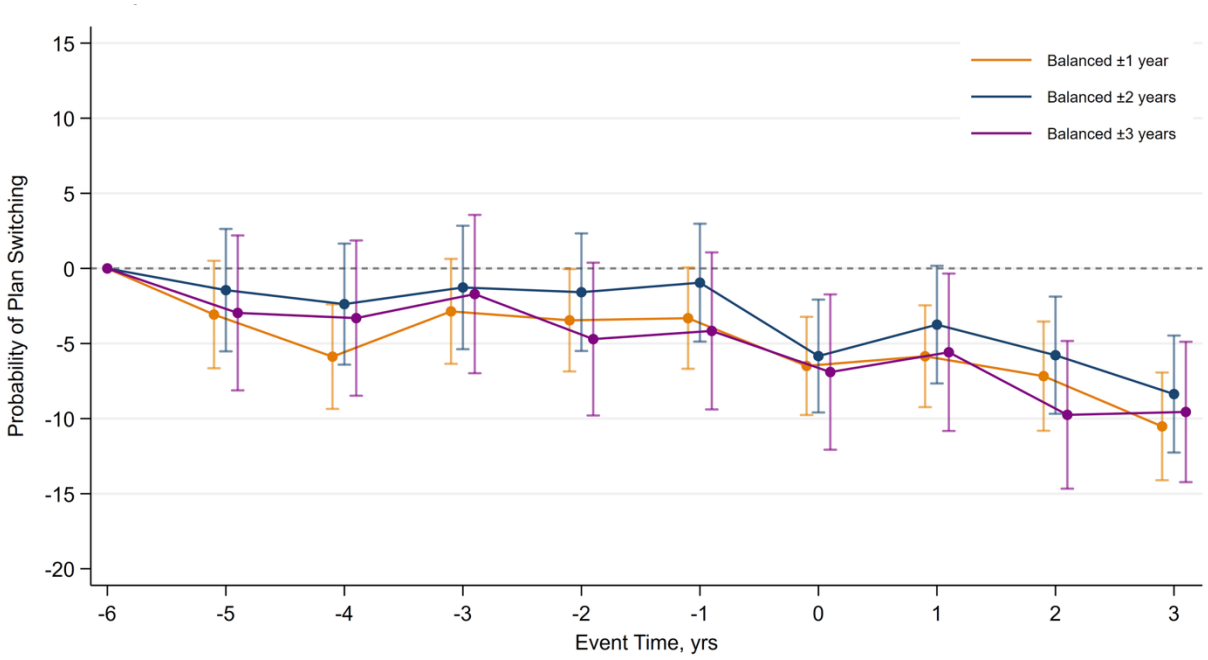
Notes: Figure reports estimated differences in probability of active Part D plan switching for individuals with ADRD compared to those without. A plan switch was classified as active if the beneficiary's plan in the previous year was not terminated and the beneficiary enrolled in a different plan that was neither the plan resulting from consolidation of the prior plan nor a plan created through splitting or rebranding. Event time is defined relative to the first year in which an individual is identified as having ADRD based on either a CCW-based ADRD diagnosis or cognitive assessment in the HRS.

Figure A3- Estimated Association between ADRD and Plan Changes when Restricting to Stand-alone Part D Plans Only



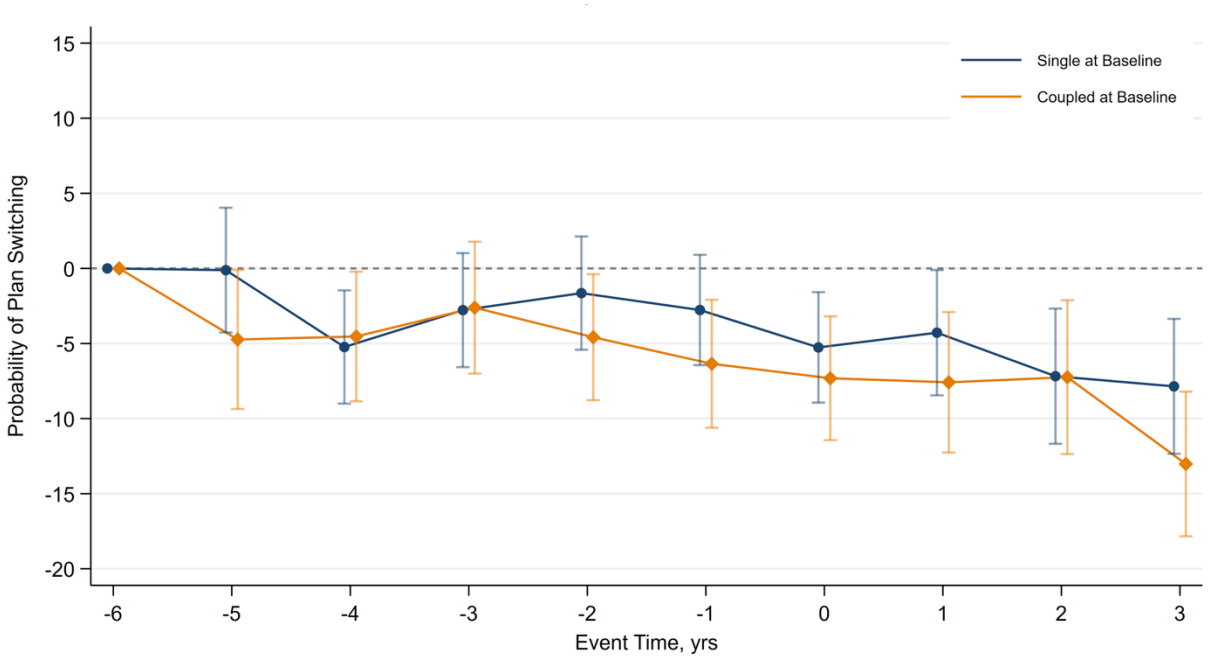
Notes: Figure reports estimated differences in probability of Part D plan switching for individuals with ADRD compared to those without when restricting to standalone PDPs only. Event time is defined relative to the first year in which an individual is identified as having ADRD based on either a CCW-based ADRD diagnosis or cognitive assessment in the HRS.

Figure A4- Estimated Association between ADRD and Plan Changes when Requiring Complete Observations for Longer Periods around Event Time=0



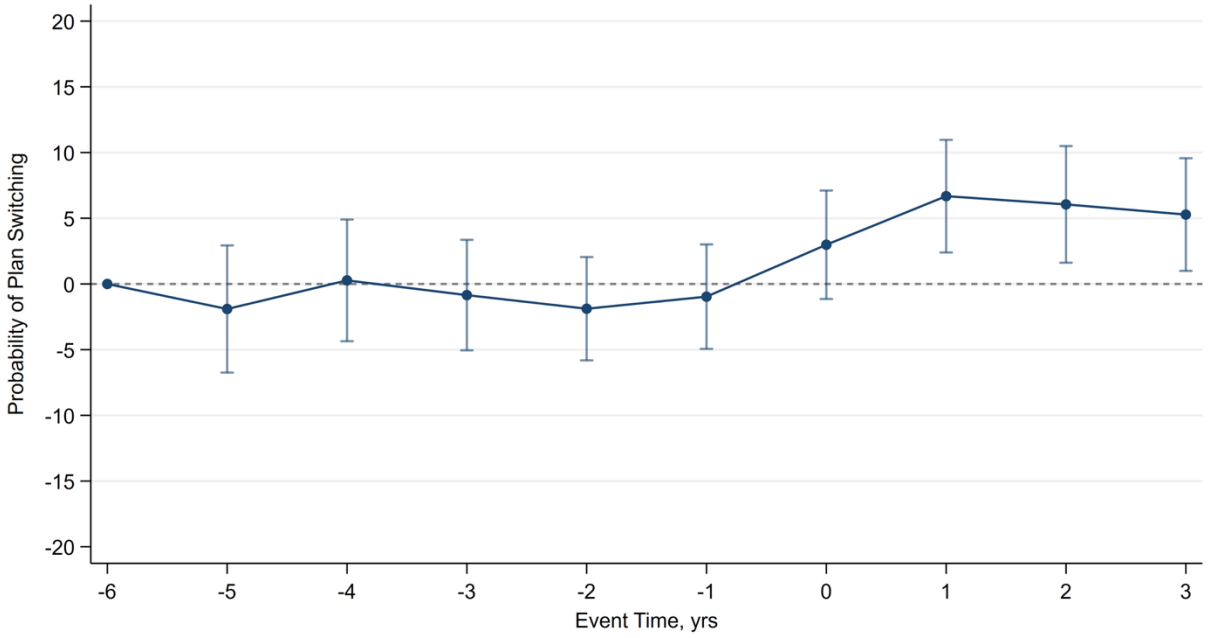
Notes: This figure presents estimates of the association between ADRD onset and Medicare Part D plan switching under varying requirements for balanced observation windows around the event. Event time is defined relative to the first year in which an individual is identified as having ADRD based on either a CCW-based ADRD diagnosis or cognitive assessment in the HRS. Estimates are shown for samples requiring at least ±1 year (orange), ±2 years (navy), and ±3 years (purple) of continuous observation before and after ADRD onset. The analytic sample includes 5,677 individuals when requiring at least 1 year of observation on both sides of ADRD onset, 4,416 individuals when requiring at least 2 years, and 3,024 individuals when requiring at least 3 years.

Figure A5- Estimated Association between ADRD and Plan Changes by Marital Status



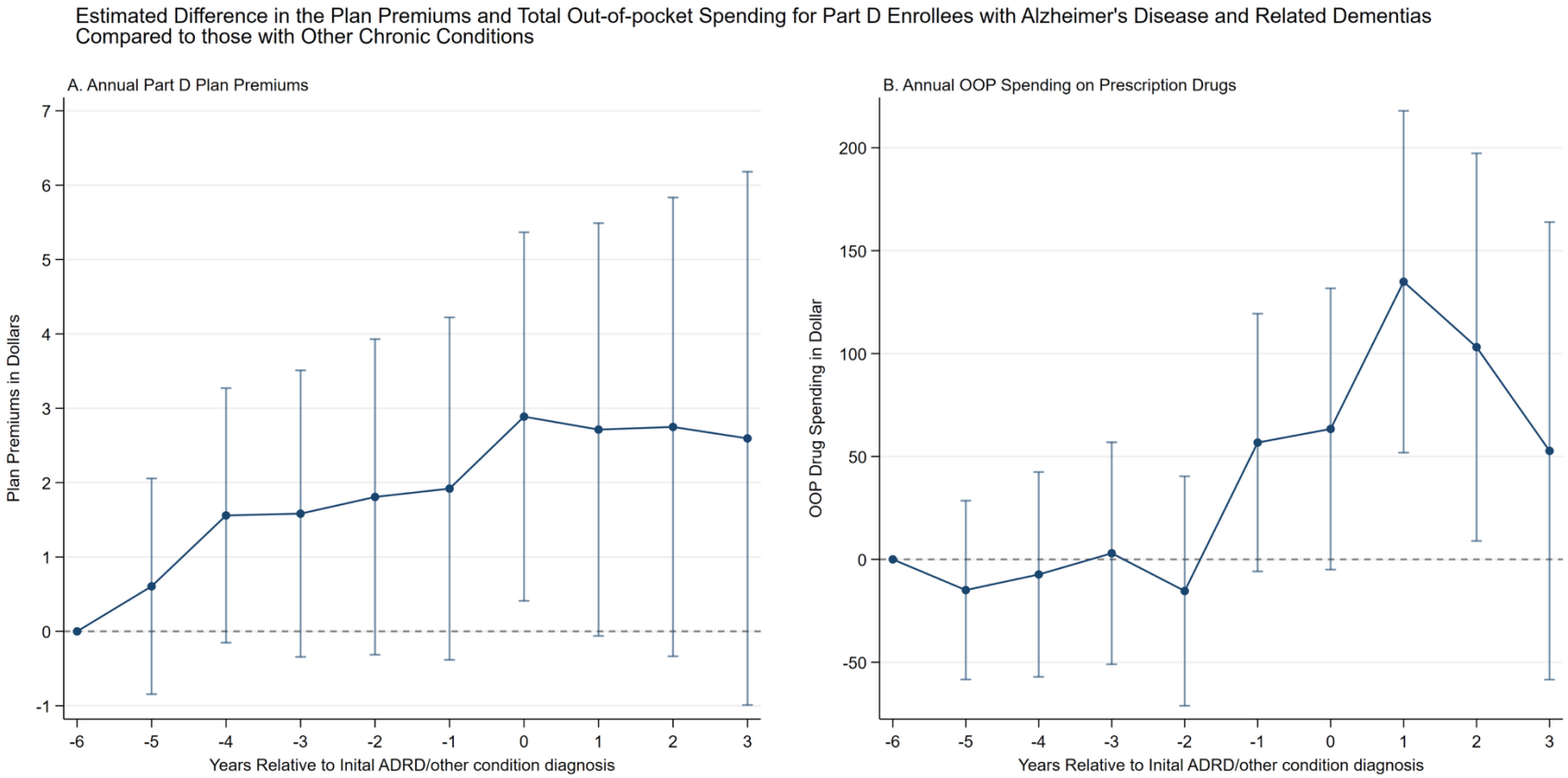
Notes: This figure presents estimates of the association between ADRD onset and Medicare Part D plan switching by marital status. Event time is defined relative to the first year of ADRD onset. Marital status is defined based on respondents' household partnership status in the year prior to ADRD onset. Estimates are derived from regression models that include interactions between event-time indicators and marital status, allowing the association between ADRD and plan switching to vary by marital status.

Figure A6- Estimated Association between Other Chronic Disease Diagnoses and Prescription Drug Plan Changes



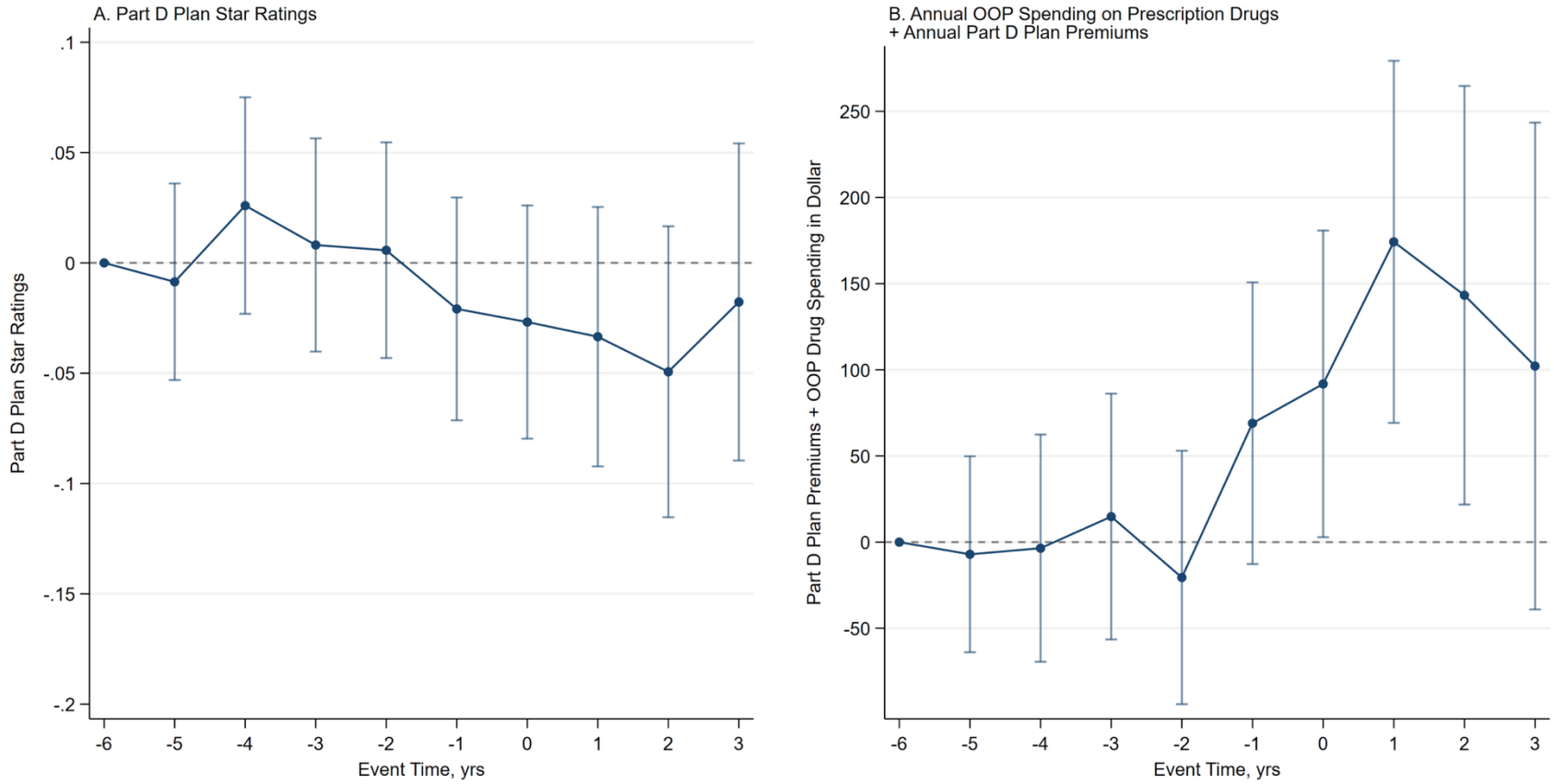
Notes: This figure presents reports estimated differences in probability of Part D plan switching for individuals with other non-cognitive chronic conditions compared to those without. After excluding households with ADRD, we identified individuals with claim-based diagnoses of at least one of the following conditions: AMI, cancer, chronic kidney disease, glaucoma, hip fracture and RA/OA. They were then matched with households without these conditions following the same procedure used in our primary sample construction. Event time is defined relative to the first year in which an individual was diagnosed with other non-cognitive chronic conditions. Estimates were calculated using linear stacked event study regression models, which included individual-by-group and calendar-year-by-group fixed effects.

Figure A7- Estimated Association between ADRD and Plan Premiums and Out-of-Pocket Spending



Notes: This figure shows estimated differences in annual plan premiums and total out-of-pocket drug spending for individuals with a CCW-based ADRD diagnosis compared to individuals with a non-cognitive CCW-based chronic disease diagnosis. Event time is defined relative to the first year in which an individual was diagnosed with ADRD or other non-cognitive chronic conditions. Estimates were obtained from the same event study difference-in-differences regressions used to produce Figure 2B in the main text.

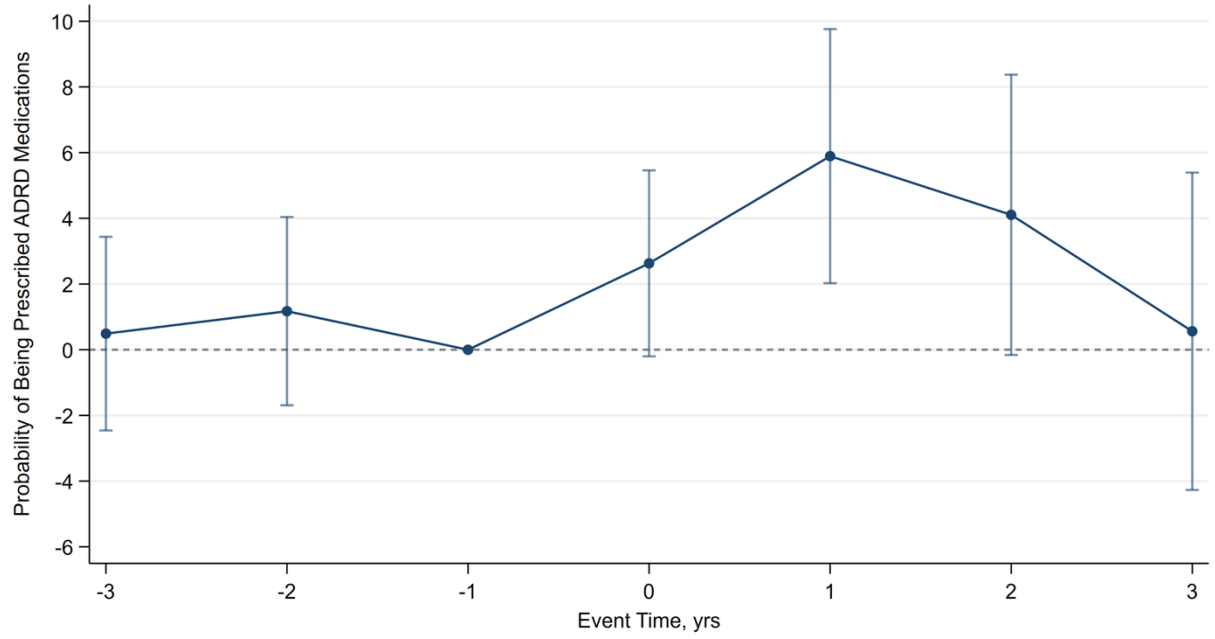
Figure A8- Estimated Association between ADRD and Plan Quality and Total Out-of-Pocket Spending when Restricting to Stand-alone Part D Plans Only



Notes: This figure shows estimated differences in annual plan premiums and total out-of-pocket drug spending for individuals with a CCW-based ADRD diagnosis compared to individuals with a non-cognitive CCW-based chronic disease diagnosis when restricting to standalone PDPs only. Event time is defined relative to the first year in which an individual was diagnosed with ADRD or other non-

cognitive chronic conditions. Similar to Figure 2B in the main text, estimates were calculated using linear stacked event study regression models, which included individual and calendar-year fixed effects.

Figure A9- Estimated Association between Plan Changes and ADRD Specialty Drug Use when Restricting to Active Changes Only



Notes: Figure reports estimated differences in probability of being prescribed ADRD specialty medications for Part D enrollees with ADRD following an active plan change, compared to those who did not switch actively. A plan switch was classified as active if the beneficiary's plan in the previous year was not terminated and the beneficiary enrolled in a different plan that was neither the plan resulting from consolidation of the prior plan nor a plan created through splitting or rebranding. Event time was defined relative to the first year of active plan change 2 years prior to or after ADRD onset. Estimates were calculated using linear stacked event study regression models, which included individual and calendar year fixed effects.