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# Estimating Self-Selection in Medicare Advantage

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## Abstract

We explore the fundamental question of selection in Medicare Advantage by exploiting quasi-experimental variation from the Initial Enrollment Period for Medicare eligibility to evaluate and describe participation in Medicare Advantage. Using a novel source of administrative claims data between 2007 and 2017, we investigate the transition from commercial insurance to Medicare Advantage for a comprehensive subset of commercially insured enrollees. We use the sharp cutoff at age 65 for one of the largest commercial and Medicare Advantage insurers in the United States to implement a “positive correlation” test. Our findings using baseline characteristics at age 64 reveal that enrollees in Medicare Advantage are advantageously selected on multiple measures of health status such as Charlson Comorbidity Index (CCI) scores, out-of-pocket costs, utilization, while differentially selected on demographic characteristics. Initial Medicare Advantage enrollees are also likely to join from capitated commercial plans such as Health Maintenance Organizations (HMOs), and commercial plan type is the largest explanatory factor for participation. Subsequent analyses reveal non-linearity in selection with enrollees with largest out-of-pocket costs and highest utilization opting out of Medicare Advantage. Finally, we examine the evolution of selection in Medicare Advantage over time with a focus on the passage of the Affordable Care Act where we find no effects in influencing selection.

**Keywords:** Medicare, Medicare Advantage, Medicare Part C, Self-Selection, Adverse Selection, Insurance, Social Policy, Safety Net, Affordable Care Act

**JEL Code:** I13, I18, G22

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## 1. Introduction

Medicare Advantage<sup>1</sup> is a large privately administered but publicly funded health insurance program available to the elderly in the United States beginning at age 65<sup>2</sup>. Unlike other social insurance programs, enrollment is a voluntary choice available during an annual Open Enrollment period for Medicare enrollees that concurrently co-exists and competes with the publicly administered and publicly financed Medicare program, often referred to as fee-for-service Medicare, Traditional Medicare, or public Medicare. The central policy goal behind the introduction and the continuation of the Medicare Advantage program is to enhance consumer choice by offering a diversity of plans while concurrently working to curtail the rate of increase for health expenditures. It was envisioned that Medicare Advantage would reduce costs by streamlining the bureaucracy of “single payer” systems like Traditional Medicare and by incentivizing efficient care through the use of capitated payments, which provide fixed payments per enrollee per month for their health care, as opposed to the payment per procedure approach of the traditional fee-for-service program (Newhouse et al., 2015).

Since the inception of the Medicare Advantage program in the 1980s, a major concern for policymakers and stakeholders has been the possibility of differential or advantageous selection vis-à-vis Traditional Medicare (Newhouse et al.; 2014; Geruso and Layton, 2017; Gruber, 2017). Because Medicare Advantage enrollees are healthier than Traditional Medicare enrollees (Nicholas, 2013), and thereby incurring lower costs, advantageous selection can result in overpayments from the Centers for Medicare and Medicaid Services (CMS) to Medicare Advantage plans because: 1) payments are partially calibrated from the expected costs of all Medicare enrollees (i.e., both Traditional and Medicare Advantage enrollees) and 2) the presence of substantial upcoding<sup>3</sup> by Medicare Advantage providers. Moreover, although the precise

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<sup>1</sup> Previously known as Medicare Part C before 2003 and also referred to as private Medicare.

<sup>2</sup> Individuals with end stage renal disease can enroll into Medicare at any age depending on certain eligibility conditions.

<sup>3</sup> Upcoding is the process of medical billers submitting a claim for a more expensive service than the one that was performed, e.g., reporting an initial patient office visit with CPT code 99222 (visit requiring moderate-level medical decision making) vs code 99221 (visit requiring low-level medical decision making) or reporting a higher complexity DRG code for inpatient visits. Recent evidence indicates that private Medicare enrollees generate 6%-15% higher diagnosis risk-scores than would be expected under fee-for-service Medicare (Geruso and Layton, 2020).

policies have changed over time, enrollees historically had considerable flexibility to repeatedly switch between Traditional and Medicare Advantage plans directly promoting positive or advantageous selection. This advantageous selection into Medicare Advantage undermines the policy goal of reducing healthcare costs, and in fact, for a significant time-period the Medicare Advantage program was seen as a “policy disappointment (Newhouse and McGuire, 2014).”

Exploring whether Medicare Advantage has succeeded is important for health policy because it has increasingly played and plays a pivotal role in the provision of healthcare for the elderly in the United States. As of 2019, approximately 34% of the post 65 population is enrolled in a Medicare Advantage plan (Abaluck et al., 2021). **Figure 1** plots the increases in enrollment and contracts for Medicare Advantage over time. The geographic penetration of Medicare Advantage is broad and in certain counties remains the dominant form of Medicare in the United States (**Figure 2**). Likewise, the historical trend of Medicare Advantage suggests continuing increases in enrollment and the share of enrollees vis-à-vis public Medicare is projected to rise as well (Neuman and Jacobson, 2018). Consequently, the Medicare Advantage program plays an influential role in shaping the healthcare options for the elderly – and due to its large size – has important spillover implications for other insurers, providers, and enrollees outside of the Medicare Advantage program. There have been numerous reforms to the Medicare Advantage program since its inception in 1985 and most recently with the Patient Protection and the Affordable Care Act (ACA), e.g., changing the lock in periods before enrollees can switch between plan types and changes to Medicare Advantage’s risk-adjusted capitation payments (Glazer and McGuire, 2017; Morrissey et al., 2013). While some of these reforms appear successful in addressing the selection problem, an important policy question remains: how much advantageous selection remains in Medicare Advantage?

Despite the large increases in enrollment, much remains unknown about Medicare Advantage. A hurdle for researchers and policymakers in the analysis of Medicare Advantage enrollees vis-à-vis Traditional Medicare enrollees has been that claims from Medicare Advantage plans are not submitted to CMS and it has been difficult to obtain linked baseline characteristics preceding the transition into Medicare. Moreover, the unavailability of baseline characteristics from largely employer provided commercial insurance plans preceding age 65 make it difficult to separate: 1) differences resulting from moral hazard incentivized by enrollment in either Traditional Medicare or Medicare Advantage programs (i.e., differences in

health behaviors and utilization incentivized from different prices, broader/narrower networks, and other benefit differences between the two programs) and 2) unobserved self-selection. Therefore, researchers exploring selection have had to rely on imperfect data and to invoke stronger econometric assumptions in comparing enrollees in Traditional Medicare to Medicare Advantage.

Our study, on the other hand, uses novel data from Optum's de-identified Clinformatics® Data Mart Database (CDM), a commercial claims database containing administrative health claims for members of large commercial and Medicare Advantage health plans. Because CDM contains the universe of claims from its associated commercial and Medicare Advantage plans, we can observe enrollees as they switch from commercial to Medicare coverage at age 65. Our strength is the panel feature of the dataset that allows us to track enrollees as they approach this transition using baseline characteristics measured at age 64 during the Initial Open Enrollment period for Medicare at age 65. We exploit this sharp cutoff at age 65 between 2007 and 2017 to credibly identify and describe selection into Medicare Advantage. More importantly, we are able to employ the well-known "positive-correlation" test (Cawley and Phillipson, 1999; Einav and Finkelstein, 2011; Harris and Yelowitz, 2014; Harris et al., 2017) with a quasi-experimental research design. Our choice of time-period is also important because beginning in 2006 enrollees are restricted from switching between Medicare and Medicare Advantage<sup>4</sup> for at least a year. This restriction, in addition to focusing on the initial transition into Medicare, produces our much cleaner and less confounded research design than previously found in the literature. Another advantage of our study time-period is that it coincides with the last major change to the Medicare Advantage program introduced by reforms passed with the ACA. Thus, we are able to investigate initial selection and then explore how the ACA Medicaid Expansions influence selection into Medicare Advantage.

The richness of CDM allows us to move beyond crude measures of selection focusing narrowly on mortality and observe selection on previously unobserved characteristics such as previous commercial plan type along with the distributional effects of health and expenditures on self-selection. We explore how health status, as measured by diagnoses and other variables,

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<sup>4</sup> In preceding time periods, enrollees could switch plans with a month's notice which was problematic since that strongly encouraged switching and reinforced advantageous selection.

influence selection using unconfounded baseline characteristics from commercial insurance at age 64 preceding entry into Medicare. We confirm that increases in out-of-pocket expenditures have a statistically and economically significant effect on reducing the probability of joining Medicare Advantage. Next, we go beyond simply measuring selection at means to look at the distribution and describe the typology of selection. In doing so, we find that chronic conditions that have high prevalence generally reduce participation in Medicare Advantage. Finally, we find that the ACA Medicaid Expansions did not have a statistically or economically significant impact in whether commercially insured enrollees joined Medicare Advantage.

The main finding of our study is that we demonstrate the existence of considerable selection in the modern and reformed Medicare Advantage program as sicker commercially insured enrollees, as assessed using the Charlson Comorbidity Index (CCI), are less likely to enter Medicare Advantage. Higher out-of-pocket expenses also discourage entry, and these effects are highly non-linear as enrollees in the highest quartile are significantly less likely to enroll into a Medicare Advantage plan. These findings are also confirmed with services utilization, with enrollees in the highest quartile of procedures significantly less likely to join a Medicare Advantage plan. Consistent with earlier studies, we show that non-Whites are more likely to join. Because we observe plan type pre-Medicare enrollment, we importantly capture many unobservables that have been previously unavailable to researchers. For example, a novel facet of our study is that we also show that the largest predictor of joining a Medicare Advantage plan is the type of commercial insurance (i.e., HMOs vs PPOs) held by an enrollee before transitioning to Medicare, which indicates that selection is complex and to an extent based on forward-looking behavior.

Our study contributes to the literature by combining previously unobserved enrollee characteristics with a credible empirical research design to evaluate the mechanics of selection into Medicare Advantage by demonstrating the existence of considerable selection on monetary and non-monetary attributes. By using linked longitudinal employer supplied commercial insurance data we unpack the black box of selection into Medicare Advantage, relying on quasi-experimental variation that results at age 65 when enrollees transition into Medicare Advantage and/or Traditional Medicare Advantage plans. Moreover, previous studies that compare selection in Medicare Advantage have had to rely on comparisons between existing Medicare enrollees moving between Traditional Medicare and Medicare Advantage plans which invokes strong

assumptions regarding the of relative randomness of movers. Our analysis mitigates the main sources of biases that are unable to be addressed with current datasets and provides credible evidence of selection into Medicare Advantage. This is a novel contribution of our data source and allows us to be the first paper to explore the selection into Medicare Advantage for a broad cohort of enrollees using a strong research design employing the Initial Enrollment period. As far as we are aware, no other study has directly examined how enrollees transition at age 65 on a national basis from commercial insurance into Medicare Advantage.

Our study further contributes to the academic and policy conversation on public insurance since we generate policy relevant estimates of selection exploiting the plausibly exogenous variation induced by the Initial Enrollment period for Medicare at age 65. We generate credible estimates on selection using the positive-correlation test for the Medicare Advantage program that are valuable both for theory and practice of future Medicare policy. More importantly, our estimates are lower bounds given the structure of our data and research design despite the stylized facts of insurance such as the existence of differences in risk aversion which promotes healthier people in more generous plans (Finklestein and McGarry, 2006) in addition to well documented behavioral biases such as inertia in insurance markets (Handel, 2013) that contribute towards reducing selection.

Finally, much is unknown about the transition from commercial insurance into public and private Medicare. Analogous to Medicare Advantage enrollees, the commercially insured have been difficult to study because of the challenges in obtaining linked commercial claims over a long-time horizon. Understanding the behavior of the commercial insured is salient for healthcare policy makers because employer supplied commercial enrollees are a large composition of the insured in the United States and therefore contribute a significant portion of the enrollees into both the public and private Medicare program. In addition to their large composition, the decision calculus of how commercial enrollees choose Medicare is important because they are in better health than enrollees outside of the labor force and/or enrollees in Medicaid. Beyond health insurance, the public-private nature of Medicare Advantage offers similar challenges and complexities to other insurance markets and thereby jointly observing commercially insured and Medicare Advantage enrollees offers new insights into the behavioral responses of the near-elderly.

## **2. Conceptual Framework**

## **2.1 The Evolution of the Medicare Advantage Program**

The origins of the Medicare Advantage program begin with the passage of the Tax Equity and Fiscal Responsibility Act of 1982 (TEFRA) and the introduction of Medicare Part C plans in 1985 (McGuire, Newhouse, and Sinakio, 2011). The motivation for introducing Medicare Part C, now Medicare Advantage, and maintaining this public-private partnership is to provide consumer choice for enrollees in terms of insurers and different plan offerings along with simplicity in administration in exchange for entering into a managed care plan to capture potential efficiencies and reduce moral hazard. Ultimately, Medicare Advantage enables enrollees to manage all of their health coverage from hospitals in Medicare Part A to doctors in Medicare B, and pharmaceutical coverage in Medicare D [since 2006] along with Medigap insurance into a single plan. The potential efficiencies of managed care emerge by changing the fee-for-service or the “unmanaged care” nature of Traditional Medicare, which encourages moral hazard in utilization, with managed care where insurers can control utilization through gatekeeping of care, network restrictions, and structuring capitation contracts with their providers.

Since the introduction of Medicare Advantage plans, the Centers for Medicaid and Medicare Services serves as the payer in both Medicare Advantage and Traditional Medicare with direct administration in Traditional Medicare and indirect administration for Medicare Advantage. For Traditional Medicare, patients are direct billed and reimbursements to providers are managed by CMS based on established payment schedules. For Medicare Advantage, CMS sets a county benchmark capitation rate based on individual risk for each beneficiary enrolled to manage the plan. Insurers in Medicare Advantage competitively bid on contracts to CMS and insurers are paid based on a capitation schedule that adjusts for patient health risk to cover anticipated costs of care. On the insurer side, each insurer submits a proposed bid which the insurer would receive from CMS for a Medicare Advantage enrollee based on county-level characteristics. Capitation payments are monthly and since 2006 based on a multitude of factors including the enrollee risk score (a composite score that predicts future reimbursements across different beneficiary types), the insurer bid, and an adjustment for “upcoding.” An insurer that has a contract in a county can offer different types of plans with different rates of benefits coverage provided that it meets a minimum standard set by CMS.

Even within each county, the public is presented with different Medicare Advantage plans to better adjust to their personal demand for medical care. The most common Medicare



Advantage plans are Health Maintenance Organization (HMO) plans, Preferred Provider Organization (PPO) plans, Private Fee-for-Service (PFFS) plans, and Special Needs Plans (SNPs). Originally Medicare Advantage offered only HMOs, but after various reforms other plan types were offered after 1997, notably, PPOs and Point of Service (POS) plans which offer fewer restrictions on enrollee utilization. PFFS plans, which are similar to Traditional Medicare but privately administered, were also introduced after 1997 but mostly disappeared by 2011 due to 2008 changes that required PFFS to build provider networks (Pelech, 2017). After 1997, Accountable Care Organizations (ACOs) also emerge as a hybrid between HMOs and traditional Fee-for-Service plans and have since gained prominence.

Over time numerous reforms have been attempted to achieve the core goal of reducing advantageous selection. The passage of the Medicare Modernization Act in 2003 resulted in the renaming of Medicare Part C plans into Medicare Advantage plans along with the introduction of Medicare Part D prescription drug insurance plans. It also introduced significant reforms to address selection such as expanding the risk adjustment calculation, reforms to the insurer bidding process, and restricting enrollees moving between plans on short notice.<sup>5</sup> The incorporation of risk adjustments using Hierarchical Condition Characteristics (HCC) conditions for enrollees in 2004 for determining reimbursement resulted in improving the algorithm from simple demographic adjustments to one using detailed claims data.

The historical construction of Medicare Advantage has been opaque and mysterious – as plans were not rated based on health outcomes or quality of care. However, since 2007, Medicare Advantage plans have had STAR ratings that have assisted enrollees in proxying and observing plan quality. The introduction of Medicare Part D and prescription drug coverage in 2006 ushered in a period of high enrollment into Medicare Advantage. Between 2010 and 2017, large commercial insurers (e.g., United Healthcare, Humana, Blue Cross Blue Shield) had a market share that grew from 50% of the Medicare Advantage market to 58%.<sup>6</sup>

Because of continuing concerns related to selection, reforms to Medicare Advantage were included in the Patient Care and the Affordable Care Act (ACA) of 2011 which generally

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<sup>5</sup> Before 2006 enrollees could choose plans and potentially move between Medicare Advantage and Traditional Medicare every month within a month's notice.

<sup>6</sup> See <https://www.kff.org/medicare/issue-brief/medicare-advantage-in-2021-enrollment-update-and-key-trends/>

focused on reducing payments to Medicare Advantage programs. However, these reductions have since been frozen and the evidence on the effectiveness of these cuts is mixed (Skopec et al., 2019). The introduction of the ACA also introduced a penalty for upcoding. Recent reforms have also focused on further adjustments to the risk selection model to incorporate greater weighting to blended claims from CMS and Medicare Advantage organizations.<sup>7</sup>

## **2.2 Theoretical Framework**

Insurers in the Medicare Advantage program have some market power, both on their offerings and their contracts with providers, because some of the increases in Medicare reimbursements directly transfer to the plan or provider rather than enrollees. The composition of benefits, which are required to be “comparably similar” to fee-for-service Traditional Medicare, is influenced by the individual Medicare Advantage plan and there is discretion in the selection of physicians, hospitals, pharmaceuticals, and other extra benefits (such as gym memberships) covered by the plan. Finally, insurers in their “downstream” interactions with providers have considerable discretion in setting capitation payments to physicians, levels of coverage, and provider participation. Insurers can also adjust patient cost-sharing<sup>8</sup> for services that are more likely to be used by higher cost enrollees to induce advantageous selection in their plans.

On the enrollee side, three months before their 65<sup>th</sup> birthday, individuals have the choice of selecting a plan whether they opt to enter Fee-for-Service Traditional Medicare or choose from the Medicare Advantage plans offered in their area. After the Initial Enrollment period, there is an annual Open Enrollment period that allows enrollees to switch into/out of Traditional Medicare as well as switch to a different Medicare Advantage plan if they elect to stay in Medicare Advantage. After the first year, the typical Open Enrollment period begins in October and ends in early December with the ability to move or remain in the current plan for the next calendar year. The choice facing consumers considering Medicare Advantage plans is the ability to have plans with more generous cost sharing and additional benefits such as vision, dental, and gym memberships in exchange for narrower networks and managed care.

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<sup>7</sup> See <https://www.cms.gov/newsroom/fact-sheets/2021-medicare-advantage-and-part-d-rate-announcement-fact-sheet>

<sup>8</sup> Any required co-pays, co-insurance, or deductibles

The challenge facing policymakers, however, has been to set-up the structure of Medicare Advantage to concurrently meet three goals: (1) allow health insurers in these plans to be profitable (i.e., similar levels of profit as their commercially insured plans); (2) allow consumers choice while offering a comparable option to Traditional Medicare; and (3) using managed care to ensure that comparable Medicare Advantage enrollees have lower costs than Traditional Medicare. For Medicare Advantage's entire history, and embodied within its ensuing reforms, the focus has been on reducing advantageous selection by increasing the stringency on evaluating payments vis-à-vis Traditional Medicare. Yet, a considerable body of evidence suggests that (3) has not been met and MA insurers have been overpaid as a result of the selection problem.

Theoretically, the goal is to set risk adjusted capitation payments to account for the expected costs of the potential enrollees. Historical risk adjustment in the Medicare Advantage program has often focused on aggregate demographic characteristics at the county level, which has been insufficient to adequately address differential selection and cream-skimming into Medicare Advantage plans (Glazer and McGuire, 2000). Even the introduction of risk scoring in 2004 has been problematic because it has been unable to fully capture the health of comparable enrollees resulting in imperfect risk scoring. Imperfect risk scoring creates an opportunity to “cream skim” and set plan design so that the healthiest participants select into Medicare Advantage plans (Glazer and McGuire, 2000; Einav et al., 2016).

### **2.3 Advantageous Selection in Medicare Advantage versus Traditional Medicare**

Empirical analyses of Medicare Advantage have been affected by the limited availability to Medicare Advantage claims data and have had to rely on analyses of movers from Medicare Advantage to Traditional Medicare<sup>9</sup> and/or aggregate comparisons of their respective enrollees to evaluate selection between Medicare Advantage and Traditional Medicare. While mover variation tends to be problematic because it is likely driven by non-random consumer decisions and is potentially endogenous, it has been the best source of data to assess selection to date. These historical comparisons using mover variation reveal the presence of positive (i.e., advantageous) selection (Brennen et al., 2018; Curto et al., 2019). A considerable body of

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<sup>9</sup> And similarly on ex-ante claims of enrollees that leave Traditional Medicare to join Medicare Advantage.

research examines differences between enrollees in Medicare Advantage versus Traditional Medicare.<sup>10</sup> For example, an analysis on movers reveals that considerable selection exists in Medicare Advantage (Morrisey et al., 2013; Rahman et al., 2015). Differences in utilization of preventative care also suggest selection into Medicare Advantage (Chung et al., 2018), whereas emergency care utilization is lower in Medicare Advantage (Parashuram et al., 2018). Others examining health outcomes find that Medicare Advantage enrollees have lower utilization and improved outcomes vis-a-vis Traditional Medicare enrollees (Huckfeldt et al., 2017). Using New York Hospital Records to examine variation in Medicare Advantage plan exits, Duggan, Gruber, and Vabson (2018) find considerable negative selection as movers from Medicare Advantage used more hospital services upon exit compared to patients staying in Medicare Advantage plans. Despite the introduction of risk selection in 2004, overpayments to Medicare Advantage insurers did not decline because advantageous selection can occur on other margins that are not captured within the calculated risk selection scores. This can occur because the variance of enrollee costs increases as risk scores increase.

While it is well known that participants in Medicare Advantage are “advantageously selected” compared to enrollees in Traditional Medicare based on observable characteristics of participants along with evidence from Medicare Advantage movers (Brown et al., 2014), it is unknown how this selection occurs in the transition from commercial insurance to Medicare Advantage/Traditional Medicare. However, the evidence from movers indicates that plan design plays an important role in inducing a particular type of individual to enroll in Medicare Advantage vis-à-vis Traditional Medicare. For example, Medicare Advantage plans typically offer fewer nursing home services (Meyer et al., 2018). The introduction of Medicare Part D prescription drug coverage in 2006 contributed another level of integrated services, i.e., combining prescription, hospital, and physician coverage into a single plan, that may increase the value of Medicare Advantage to many individuals while simultaneously providing an additional margin from which insurers can differentially select versus Traditional Medicare plans (Han and Lavetti, 2017; Lavetti and Simon, 2018). In addition to plan design, insurers also rely on advertising to seek out enrollees with specific characteristics or preferences, thereby abetting

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<sup>10</sup> A comprehensive literature review comparing Traditional Medicare and Medicare Advantage enrollees is available by Agarwal et al. (2021) and an older review is available by Gold and Casillas (2007).

advantageous selection (Aizawa and Kim, 2018). Insurers can also vary the services and structure of plans offered to induce enrollees that will utilize different sets of costly types of services to either opt in or out of their plans (Park et al., 2017). There is also limited evidence that Medicare Advantage plans experience similar consumer inertia (Sinaiko et al., 2013) found in other healthcare insurance decisions (Heiss et al., 2021). Finally, due to the differential pricing in Medicare Advantage versus Traditional Medicare, Medicare Advantage plans pass through a portion of their surplus to consumers, with Medicare Advantage plans found to split approximately 30% to 50% of their surplus to enrollees (Cabral et al., 2018; Curto et al., 2021). While advantageous or positive selection into Medicare Advantage is problematic because it results in overpayment to private insurers and increasing costs to the Medicare program, the pass through indicates that a portion of those savings are extended to enrollees through rebates.

#### **2.4 Identification Challenges in Measuring Selection in Medicare Advantage**

While the lack of linked claims data has made examining enrollees who move from Medicare Advantage to Traditional Medicare the best available approach, mover variation is problematic because of both self-selection and the potential existence of a “Medicare Advantage treatment effect” as demonstrated by Curto et al. (2019). Using data from the Health Care Cost Institute (HCCI) and CMS, Curto et al. (2019) apply various ex-post selection on observable methods such as propensity score matching and weighting to compare Medicare Advantage enrollees to Traditional Medicare, and they observe a moderating effect of Medicare Advantage on spending. Notably, they show lower spending for Medicare Advantage in urban counties than in rural counties<sup>11</sup> and that the observed lower level of health care spending in Medicare Advantage than in Traditional Medicare reflects a lower utilization of services. The authors posit the mechanism behind lower utilization is likely accomplished by excluding and narrowing the list of providers through narrow networks.

Similarly, a recent study by Abaluck et al. (2022) exploits Medicare Advantage plan terminations<sup>12</sup> and the re-enrollment of those enrollees into alternate Medicare Advantage plans to identify the effect of Medicare Advantage plan choice on enrollee mortality. They find

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<sup>11</sup> They hypothesize that insurer market power is less effective in areas with fewer providers and networks.

<sup>12</sup> Primarily the cancellation of MA Private Fee-for-Service (PFFS) plans induced by Congressional legislation requiring insurers offering PFFS plans to build comparable networks to Traditional Medicare for their PFFS plans.

considerable geographic variation in the quality of Medicare Advantage plans.<sup>13</sup> While they estimate a narrow Local Average Treatment Effect (LATE) for enrollees forced to switch due to plan cancellation, they provide additional evidence on the existence of a Medicare Advantage plan treatment effect which influences longevity and potentially implying differential healthcare utilization between plans as well.

In addition to Medicare Advantage Treatment Effects, another common challenge with both the movers research design and general comparisons after enrollees enter either public or private Medicare is insurer behavioral response and the existence of upcoding within Medicare Advantage plans. Upcoding of Medicare Advantage enrollees inflates their risk score (i.e., “makes them appear sicker”) relative to what would be expected in Traditional Medicare. This would result in an underestimate of any observed selection between Traditional Medicare and Medicare Advantage plans.<sup>14</sup> More troubling is the finding from Geruso and Layton (2020) that upcoding is increasing over time and this could falsely indicate that advantageous selection in Medicare Advantage is decreasing over time or create an overestimate of the decline of selection in Medicare Advantage.

Taken as a whole, the existence of a Medicare Advantage Treatment Effect confounds comparisons using CMS data since identification of selection requires the ability to separate out these treatment effects from selection. These treatment effects are problematic because a portion of the differences between Medicare Advantage and Traditional Medicare are resulting from the differential prices and intensity of treatment observed within each plan rather than selection effects themselves. Moreover, previous exposure to this effect influences health and serves as a confounder with both movers and people who remain in Traditional Medicare. This indicates that typical comparisons of Medicare Advantage enrollees and Traditional Medicare enrollees, while the best available approach thus far, has considerable limitations in identifying selection that is endemic to all previous studies employing this research design. While employing various selection on observable and other weighting techniques can help and abate confounders and triangulate the magnitude of selection, insurer behavioral responses such as upcoding are econometrically problematic because isolating, identifying, and measuring selection is difficult

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<sup>13</sup> Using mortality as their quality outcome.

<sup>14</sup> In fact, CMS incorporates an annual reduction in MA plan payments based on an estimate of MA upcoding.

under these conditions. Fundamentally, mover variation, just like naïve comparisons of Traditional Medicare enrollees and Medicare Advantage enrollees, suffers from the core issues of non-random selection into these plans. Therefore, by observing enrollees at age 64 we can overcome this upcoding bias – and, in fact, derive an estimate of hypothetical upcoding – as well as avoid Medicare Advantage Treatment Effects, non-random selection, and otherwise improve the comparison between Medicare Advantage and Traditional Medicare enrollees.

### **3. Empirical Strategy**

#### **3.1 Research Design**

We use the Initial Enrollment Period for Medicare beginning at the 65<sup>th</sup> birthday to measure selection into Medicare Advantage. Our setting is crucial because it captures the beginning of the transition to Medicare. Medicare eligibility at age 65 offers a plausibly exogenous policy change that strongly induces enrollees<sup>15</sup> to select into a plan either through Medicare Advantage or through Traditional Medicare. The Initial Enrollment Period begins seven months before the 65<sup>th</sup> birthday and extends three months after the eligible enrollee's birthday. While some individuals whose birthday begins in the first month can enter Medicare Advantage at 64, other enrollees who select a plan towards the end of the Initial Enrollment period can enter at age 65 and 3 months and the plan would begin with a three-month delay at age 65 and six months. Each year after the Initial Enrollment Period, a general Open Enrollment Period occurs between October and December 31<sup>st</sup>, where enrollees have a choice of continuing their Medicare Advantage plan, choosing an alternative Medicare Advantage plan, or joining Traditional Medicare.

During the Open Enrollment Period, any person eligible for Medicare chooses either a Medicare Advantage or Traditional Medicare plan.<sup>16</sup> This choice of coverage lasts for a year until the next year's Open Enrollment Period. Therefore, the Medicare Advantage program naturally promotes advantageous selection given Traditional Medicare's more generous financial benefits for sicker enrollees because as health declines enrollees can move from Medicare

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<sup>15</sup> Failure to enroll during the initial enrollment period for Medicare Part B produces a lifetime of premium penalties with an each year delay increasing the cost of Medicare Part B premiums by 10% (see <https://www.medicare.gov/your-medicare-costs/part-b-costs/part-b-late-enrollment-penalty>).

<sup>16</sup> Enrollees can sign up for Traditional Medicare coverage and continue to maintain commercial coverage.

Advantage to Traditional Medicare. Thus, we restrict our analysis to the year preceding the Initial Open Enrollment to maintain a consistent cohort for our analysis.

Our research design relies on the sharp cutoff arising from this quasi-experimental variation. This design is less likely to be influenced by biases that typically exist in naïve comparisons or mover-design studies between Medicare Advantage and Traditional Medicare enrollees, since evaluating at age 65 prevents non-mortality attrition from Medicare Advantage.<sup>17</sup> Moreover, the use of cohorts right at the cutoff of Medicare Eligibility allows us to minimize biases from upcoding, Medicare Advantage treatment effects, and non-random moving given that these enrollees have no direct prior Medicare experience to inform their selection.

Finally, comparisons from enrollees moving from Medicare Advantage to Traditional Medicare captures a different Local Average Treatment Effect (LATE) for individuals that originally selected into Medicare Advantage but move out into Traditional Medicare. Analyses for these individuals are likely to be different than the much broader change into Medicare Advantage from quasi-experimental variation of Medicare eligibility into Medicare Advantage. Our estimate is more likely to capture a credible lower bound Average Treatment Effect (ATE) of selection effects in Medicare Advantage for commercially insured individuals.

### **3.2 Data**

Our study uses de-identified individual-level claims data from Optum's de-identified Clinformatics® Data Mart Database (CDM). CDM contains all administrative medical claims for enrollees of its associated commercial and Medicare Advantage plans and covers more than 50 million distinct individuals from 2007 to 2017. These individually linked claims can be tracked over time, as long as the beneficiary maintains continuous coverage in a CDM associated plan, such as from the transition from commercial insurance to a Medicare Advantage plan. While our demographic characteristics are limited for enrollees, which is consistent with most health insurance studies using medical claims data, we do observe enrollee characteristics such as the year of birth, gender, race, state of residence, and the exact dates of group/plan participation.

For our analysis, we use data beginning in 2007 until the end of 2017, which is the last year available to us. These dates coincide with the introduction of the last significant reforms to

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<sup>17</sup> After 2007, Medicare Advantage enrollees were not allowed to switch out of their plan for at least 10.5 months.



Medicare Advantage passed in 2006<sup>18</sup> and precedes the introduction of the ACA reforms in 2011. Our ability to observe granular group and plan participation dates allows us to generate a sharp cutoff for Medicare's Initial Enrollment Period and generate cohorts at the age-65 cutoff to identify selection during the transition into Medicare Advantage. To maintain consistency within cohorts and to minimize compositional biases from non-random selection out of Medicare Advantage, we focus on a subset of the database at the transition by restricting our criteria to enrollees that were continuously enrolled in a commercial plan within CDM for a full year before age 65.

Since we rely on the quasi-experimental variation at the Initial Enrollment period at age 65 to explore the transition into Medicare Advantage, we use age as our time variable. We identify individuals at age 65 by calculating: i) the difference between the six-digit plan termination date and the enrollee's date of birth for all plans reported as a commercial plan and ii) the difference between the 6-digit plan start date and the enrollee's date of birth for all plans reported as a Medicare Advantage plan. Using the unique enrollee identifier reported across all plans,<sup>19</sup> we can identify enrollees that maintained continuous commercial coverage for 12 months before transitioning to Medicare Advantage plans during the Initial Enrollment Period (i.e., our treatment group). Similarly, we can identify commercial enrollees that are continuously enrolled in a commercial plan for 12 months before dropping out of the CDM sample at age 65 (i.e., our control group). The final analytical sample consists of all enrollees that were continuously enrolled in a commercial plan for 12 months prior to either transitioning to a Medicare Advantage plan or dropping out of the sample at age 65. As discussed above, because individuals have some flexibility around their Medicare enrollment date, we further extend the sample to include individuals that either enroll into Medicare Advantage or drop out of the CDM sample with a commercial plan termination date within a 2-month window age 65. Using this criterion, we create our dependent variable on whether an enrollee directly transitioned from commercial insurance to Medicare Advantage. After these restrictions, the final study cohort

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<sup>18</sup> This was mitigated by increasing the lock-in period to a full year and disallowing reenrollment until the next annual open enrollment period after 2006.

<sup>19</sup> For example, many enrollees change employers or plan types and will be enrolled in multiple plans in CDM at different points in time across the longitudinal sample. These enrollees will maintain a unique identifier in the database even if there are gaps in coverage by plans associated with CDM.

represented enrollees from over 11 years between 2007-2017 and contained 560,037 distinct beneficiaries.

The final analytical file was constructed by linking all reported medical claims associated with this study cohort. We use these claims to construct measures of observable health and unobservable health from the preceding 12 months prior to their Initial Enrollment Period date. These detailed individual claims data include the place of service, precise medical procedures, and diagnosis codes associated with each claim. We employ multiple measures to assess health such as utilization, out-of-pocket spending, and a prospective Charlson Comorbidity Index (CCI).

### **3.2.1. Charlson Comorbidity Index (CCI)**

The CCI allows us to assess selection on health using claims-based diagnosis of clinical conditions (using pre-Medicare Advantage claims allows us to avoid the potential threats of upcoding). We rely on Quan et al.'s (2005) algorithm to convert from ICD-10 diagnoses codes to CCI risk scores. The CCI is well-validated and an often-used measure of health status (Chaudhry et al., 2005; Charlson et al., 2014; Price et al., 2020; Hughes et al., 2015) originally used to predict longitudinal mortality risk. We can distinguish between severity and intensity by looking at the component CCI elements and the aggregate composite score. In our analysis, we use the granular components of CCI to generate a typology of selection, and in our regression analysis we employ the composite CCI. To overcome potential concerns regarding the functional form of the index, we also transform the CCI to capture non-linear effects health on selection. We plot CCI scores by participation in Medicare Advantage in **Figure 3** and observe differences in the score distribution indicating non-linear differences by participation.

### **3.2.2. Out-of-pocket Costs (OOP)**

We aggregate all patient copays, coinsurance, and deductibles reported on claims to create our out-of-pocket cost variable. We use out-of-pocket expenditures as a measure of care intensity and unobserved health status, calculating out-of-pocket costs for the preceding 12 months before age 65 to generate a measure of intensity. We plot out-of-pocket costs in **Figure 4** and show bunching for the Medicare Advantage enrollees near zero. We then generate indicator variables for quintiles to examine potential non-linear dynamics between costs and selection.

### **3.2.3. Utilization**

We separate utilization by counting procedures across claims that were provided at offices, outpatient, inpatient, emergency and classify the remaining at other points of services. We also create a variable that examines total procedures to capture overall utilization. Because of potential non-linearity among patient decisions to seek care, we also separate total procedures into quintiles to evaluate the intensity of utilization and selection. Similar to out-of-pocket costs, in **Figure 5** we demonstrate distributional differences in services utilization by future Medicare Advantage participation.

### **3.2.4. Plan Characteristics**

In addition to comprehensive patient-level claims, we also observe the plan type of commercial insurance (e.g., HMOs, PPOs, etc.) held prior to enrollment in Medicare, and we include these categories in the analysis. Plan type in commercial insurance could play a role in selection since most Medicare Advantage plans tend to be HMOs and could also capture the risk profile of enrollees. Exploring the relationship between plan characteristics and Medicare Advantage participation is another approach to observe forward-looking behavior from enrollees (or potentially inertia).

Finally, in **Table 1** we present our descriptive statistics. Notably, the typical person in a commercial plan at age 64 pays approximately \$980 a year in total out-of-pocket costs. The median CCI is 0 indicating a relatively healthy population. We begin by examining differences in enrollees that join Medicare Advantage versus those that do not enroll in a CDM associated Medicare Advantage plan in Figures 3 and 4. **Figures 3-5** demonstrate the differences in the CCI and out-of-pocket spending by Medicare Advantage enrollment indicating potential non-linearities driven by health status. Furthermore, these figures show our unconditional treatment effects graphically, along with showing the substantial non-linearity with enrollees at the higher end of out-of-pocket costs prior to Medicare's Initial Enrollment Period more likely to forgo Medicare Advantage versus enrollees with lower out-of-pocket costs.

## **3.3 Estimation Strategy**

### **3.3.1 Selection into Medicare Advantage**

Our first objective is to analyze selection between enrollees that transition into a CDM associated Medicare Advantage plan versus those enrollees who do not choose to continue in a CDM associated plan and/or transition into Traditional Medicare. Our outcome variable ( $MA$ ) is a binary dependent variable that measures whether the individual continues into a CDM associated Medicare Advantage plan at age 65. We test for selection by comparing differences in Medicare Advantage participation by health, demographic, and financial outcomes of enrollees. We begin by estimating linear probability models (LPM) given by **Equation 1** for whether a particular enrollee indexed by  $i$  in state  $s$  in year  $t$  enrolls in a CDM associated Medicare Advantage ( $MA$ ) plan as a function of health characteristics as measured by the *CCI Risk Score* and demographics. Finally, we calculate Huber-White robust standard errors to correct for heteroscedasticity with our limited dependent variable outcome and to account for autocorrelation within states over time.

$$(1) \quad PR(MA = 1) = \alpha_s + \tau_t + \beta_1 CCI \text{ Risk Score}_i + \lambda Demographics_{it} + e_{it}$$

We then proceed to include other characteristics beyond *CCI Risk Scores*, as predictors in these selection models, to account for selection on unobservables using a rich set of characteristics with other composite measures of health such as *OOP* (out-of-pocket spending), *PLAN* (type of commercial plan), and utilization. These additional variables allow us to observe selection on multiple dimensions because they are likely to capture intensity of illness (through out-of-pocket costs and overall service utilization) and other previously unobserved factors such as plan type that can possibly influence health. Subsequently, we include these additional enrollee characteristics in our augmented selection equation (**Equation 2**). Our augmented selection equation estimates enrollment as a function of traditionally used metrics such as CCI Risk Score, demographic characteristics, along with state and year fixed effects. By using previously unobserved attributes to researchers, we seek to recover a credible estimate on selection in Medicare Advantage from commercial insurance.

$$(2) \quad PR(MA = 1) = \alpha_s + \tau_t + \beta_1 CCI_i \text{ Risk Score} + \beta_2 OOP_i + \beta_3 PLAN_i + \lambda Demographics_{it} + e_{it}$$

For both **Equation 1 and 2**, in the baseline models we employ simple functional forms where we use untransformed variables for CCI, out-of-pocket costs, and utilization. As **Figures 3-5** show, there is considerable skew in the distribution of these variables by participation in Medicare Advantage. Therefore, we collapse the *CCI Risk Score* into three categories (0, 1, and 2+). Our choice of functional form where we use each individual category of the CCI allows us to nonparametrically capture how different diseases and underlying health conditions influence the selection mechanism. To capture the distributional components, we transform our out-of-pocket and utilization into quintiles to capture the differences in distributions for each of those variables by Medicare Advantage participation. As a consequence, rather than just examining selection at the average, we can examine how the distribution of health, as measured by out-of-pocket costs, utilization, and *CCI Risk Score* influences selection into Medicare Advantage. *A priori*, canonical models of insurance and theory predict that selection should be positive with the upper part of the distribution.

A coefficient of zero on key health and demographic characteristics implies no selection on observable for these characteristics' characteristics, whereas a positive coefficient implies adverse health compared to the non-transition and suggests negative selection. Conversely, a negative coefficient for out-of-pocket or CCI implies that individuals that transition into Medicare Advantage are sicker or have higher utilization and confirms the idea of negative selection into Traditional Medicare/other MA plans. Our specification with out-of-pocket cost quintiles allows us to examine selection based on the observed cost distribution. Overall, positive selection on plan type and negative selection on health and financial characteristics tends to overall imply advantageous selection into Medicare Advantage from commercial insurance.

Our analysis has several limitations. Since we only observe individuals transitioning from commercial insurance to a CDM associated Medicare Advantage plan, our comparison group consists of individuals who either: i) enrolled in Medicare FFS, ii) enrolled in a Medicare Advantage plan not captured in CDM, or iii) partially enrolled in Medicare and continue with commercial coverage. Consequently, this introduces bias into the analysis because some observations in the comparison group are also treated, but we are unaware of their precise treatment status. Fortunately, given that our comparison group is partially treated, this suggests that the bias in our analysis is downward, and that our estimates of selection into Medicare

Advantage are lower bounds and remain policy relevant despite this bias.<sup>20</sup> Over a longer horizon, we only observe the decision to participate in Medicare Advantage over the Initial Enrollment Period. There is a possibility some individuals in the future might move from Traditional Medicare into Medicare Advantage, and that others might move from Medicare Advantage to Traditional Medicare. While this optionality creates challenges for the estimates of the “deep” selection parameters, it does not bias our estimates of selection during the Initial Enrollment Period. And finally, since we only observe commercially insured individuals, our estimates of selection are not reflective of the population since we cannot observe the behavior of Medicaid enrollees or the uninsured.

### **3.3.2 The Affordable Care Act and Selection into Medicare Advantage**

Lastly, we exploit causal variation from the implementation of the ACA Medicaid Expansion<sup>21</sup> which significantly reduced the rate of uninsured individuals (Courtemanche et al., 2017; Miller and Wherry, 2017) through more Medicaid enrollees and the introduction of the health insurance marketplace to examine the evolution of selection into Medicare Advantage. Our data on ACA Expansions comes from the Kaiser Family Foundation (KFF, 2021). The geographic variation in expansion versus non-expansion states allows us to examine how selection varies across the country and over time because of the ACA Medicaid Expansion. This is especially pertinent because uptake in Medicare Advantage is higher in urban areas. Beyond differential uptake, the geography of selection is important because variation in costs by geography has been a contentious issue in the conversation of the efficacy of health policy in the United States (Phillipson et al., 2010; Sheiner, 2014). Following Carrey and Miller (2020), we examine how the passage of the Affordable Care Act, the last reform to Medicare Advantage that overlaps our data, influences selection into Medicare Advantage. We generate two new terms of this analysis, *EXPANSION* which reflects whether a state expands their Medicaid eligibility and *POST* which is the post period of the ACA Medicaid Expansion.

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<sup>20</sup> That is, the magnitude of any estimated effect would be larger than reported if we could successfully identify and remove individuals that enrolled in a Medicare Advantage plan not captured in CDM.

<sup>21</sup> While the ACA also reformed capitation payments for Medicare Advantage plans, those reforms affect both expansion and non-expansion states.

We estimate the basic selection equation in (3) using a generalized two-way differences-in-differences research design. The key parameter of interest is the coefficient  $\beta_1$  on the *EXPANSION \* POST* interaction which captures the difference-in-difference estimate. We employ our specification with a full set of demographic, plan, and utilization characteristics in **Equation 3**. For our ACA analysis, we cluster Huber-White standard errors at the state-level to account for the treatment assignment of the ACA policies which occur at the state-level. For robustness, we re-estimate Equation 3 omitting states that had already expanded Medicaid comparable to the ACA expansion, thus only comparing states with new expansions to non-expansions.

$$(3) \quad PR(MA = 1) = \alpha_S + \tau_t + \beta_1 EXPANSION * POST_{it} + \beta_2 EXPANSION_{st} + \beta_3 POST_t + \beta_4 CCI_{it} + \beta_5 OOP_{it} + \beta_6 Plan_{it} + \lambda Demographics_{it} + e_{it}$$

Next, we reduce the structural assumptions and re-estimate **Equation 3** as an event-study framework to examine the temporal evolution of the ACA and selection into Medicare Advantage in **Equation 4**. In this specification, the ACA contains leads and lags from the implementation of the ACA Expansion year (for nearly all of the states in our analysis this is 2014). Our parameter of interest  $\theta$  represents the event study coefficients. In addition to the event-study model, we also re-estimate **Equation 4** employing the Callaway and Sant'Anna (2021) and de Chaisemartin and D'Haultfoeuille (2021; 2022) estimators to ensure that our results are not biased by the staggered implementation of the ACA Medicaid Expansions (for the few states in our analysis that have delayed expansion). In all of our event study analysis specifications, we calculate Huber-White standard errors clustered at the state-level.

$$(4) \quad PR(MA = 1) = \alpha_S + \tau_t + \sum_{t=2007}^{t=2017} \theta_t (EXPANSION * 1[\delta = t]) + \beta_2 Expansion_s + \beta_3 POST_{it} + \beta_4 CCI_{it} + \beta_5 OOP_{it} + \beta_6 Plan_{it} + \lambda Demographics_{it} + e_{it}$$

## 4. Results

### 4.1 Exploring Selection in Medicare Advantage

We begin by exploring selection into Medicare Advantage using the 17 clinical conditions that form the basis of the Charlson Comorbidity Index (CCI). The widely used index

provides a parsimonious way to measure health status and the intensity of health but at the expense of imposing a functional form restriction through applying equal weighting across each individual category that reflects a clinical condition. To overcome the aggregation issue in the CCI, we explore how each of the individual clinical conditions influence selection, and then we assess the robustness of our results to the functional form assumptions of the CCI. We estimate a typology of selection on health criteria using exogenous variation from the initial enrollment period in **Table 2** by evaluating whether health differences on each category used in the CCI influences participation in Medicare Advantage, thereby non-parametrically examining how each component of the index affects participation.

In our typology in **Table 2**, many CCI clinical conditions such as cerebrovascular disease, dementia, peptic ulcer disease, diabetes with chronic complications, hemiplegia or paraplegia, moderate or severe liver disease, metastatic tumors, and AIDS/HIV have low prevalence. For clinical conditions where we have sufficiently high prevalence, such as chronic diabetes, we observe statistically and economically significant reductions for enrollees entering into Medicare Advantage. Diabetes with complications reduces participation by 1.5 percentage points off of a mean of .095 or by about 15%. On the other hand, other diseases with high prevalence, such as non-monastic malignances, do not show a statistically significant difference for participation in Medicare Advantage at the Initial Enrollment Period. Other notable findings include AIDS/HIV which lowers the rate of participation by 5.2 percentage points off of a mean of .095 or about a 5% reduction. Paradoxically, mild liver disease produces an increase in participation by 9 percentage points or about 10%. For peptic ulcer disease, we have a very low prevalence but everyone in our sample did not continue onto Medicare Advantage. We do not have any observations at age 64 that remain continuously enrolled with metastatic cancer. Overall, our typology, which evaluates the association between each individual condition and whether an enrollee continues from commercial insurance into Medicare Advantage, indicates that given the lower prevalence of each disease, using an index is appropriate to have enough power to assess the role of health on selection and therefore validates our use of the CCI.

Given the commercial (i.e., employer provided health insurance) nature of the enrollees in our analysis, and the fact that disease diagnoses are calculated based on health in the previous year, we generally observe that 88% of the enrollees do not have a CCI based diagnosis. We also note that our typology is underpowered to detect differences in participation in Medicare



Advantage for many clinical conditions because previous evidence suggests chronically ill individuals exit the labor market and therefore are unlikely to be covered by employer supplied commercial insurance. This is important to remember since commercially insured individuals are healthier than the uninsured (Roelfs et al., 2011) and are likely to be healthier than the overall Medicaid and Medicare population as well. Again, this implies that our estimates are likely lower bounds on the degree of overall selection in Medicare Advantage. While empirical analyses on disease and enrollment is limited, we show certain clinical conditions have a higher probability of continuing onto Traditional Medicare and are unlikely to participate in Medicare Advantage. Therefore, the main takeaway in our typology is that we demonstrate, consistent with theory, that generally chronic conditions and high-cost diseases have a lower probability of enrolling into Medicare Advantage conditional on remaining in the labor force. This finding is policy relevant because the existence of statistically significant effects despite the low prevalence of disease indicates notable advantageous selection into Medicare Advantage.

Next in **Table 3**, we explore the determinants of entering a Medicare Advantage plan using financial, demographic, health, and plan variables. We begin in Column 1 by examining on the composite CCI index<sup>22</sup> which aggregates information on health based on individual clinical conditions of diseases and equal weighting across each category for severity to show how health influences participation. We find that the effect of having a CCI score of 1 is statistically indistinguishable from zero (with a CCI score of 0 as a reference category) on continuing into Medicare Advantage, however a CCI score of 2 or more is statistically and economically significant with a reduced probability of choosing a Medicare Advantage plan by 1.9 percentage points (about 19.8%) off a mean initial enrollment of 9.6%.

While CCI scores provide a degree of intensity for health status, these measures only capture illness for a subset of the diagnosed population. Out-of-pocket costs provide an alternative approach to measuring the intensity of illness or health status on a continuum as they are a measure of utilization and can serve as proxy for unobserved health status. We continue by exploring how out-of-pocket costs affect the Medicare Advantage decision in Column 2 and find that consistent with advantageous selection, individuals with higher costs are less likely to join –

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<sup>22</sup> We also attempt different bins for CCI, however given the bunching in the overall score our results are robust to alternative approaches to binning.

with a \$1000 increase in out-of-pocket costs associated with a significant reduction in the probability of enrolling in Medicare Advantage by about 0.8 percentage points (or about 8%). Because of the potential existence of non-linearity<sup>23</sup> in how out-of-pocket costs influence participation in Medicare Advantage, we separate out-of-pocket costs into quintiles to examine the distributional effects. We observe that the largest effects for out-of-pocket costs are driven by enrollees in the highest quintiles. For the top two quintiles we find that being in the second highest quintile reduces participation by 6.5 percentage points or by 44%, whereas being in the highest quintile reduces participation by 10.4 percentage points (about 71%) relative to the lowest quintile which has a mean participation rate of 14.7%. More importantly, this indicates the existence of considerable non-linearity driven by less healthier individuals. Such results are consistent with evidence of advantageous selection, as higher spenders are the least likely to join Medicare Advantage.

Additionally, we explore how demographic characteristics (which crudely proxies socioeconomic status and captures other average health disparities) based on race and gender influence selection in Column 4. We show that African Americans and Asians are more likely to enroll in Medicare Advantage than Whites (the reference category) with no difference for Hispanics and the unknown racial category. Our results on race are consistent with previous research that shows non-white individuals are more likely to enroll into Medicare Advantage likely due to the lower upfront costs (i.e., zero premiums). After demographics, we evaluate plan type to determine how enrollees' original choice or selection in their commercial plan such as whether someone is enrolled in an HMO versus a fee-for-service type plan plays a role in participating in Medicare Advantage. Using EPOs as the reference category, we show that enrollees in PoS and PPO and other fee-for-service type plans are less likely to join Medicare Advantage by about 4.8 and 8.7 percentage points off of a mean of 12.7% for EPOs (approximately 38% and nearly 69% relative reductions in participation). However, HMO enrollees are significantly more likely to continue onto Medicare Advantage by 4 percentage

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<sup>23</sup> We also examined a cubic for out-of-pocket costs which is an alternative approach at modeling the non-linear impacts, and in that specification the coefficient is slightly larger at about 5 percentage point reductions. In these specifications, each additional dollar (\$1000s) of out-of-pocket spending plays a considerable and statistically significant role into not joining Medicare Advantage

points (about 31%). The considerable size and significance of the plan type effect suggests that initial enrollment in the type of their commercial insurance plan likely captures the unobservable consumer characteristics that drive selection. In fact, the largest effects on whether enrollees continue into Medicare Advantage are driven by their original plan type at their commercial insurer.

Lastly, we estimate our full selection equation based on these financial, demographic, and health factors to explore their joint impact on the decision to choose Medicare Advantage. In Column 5 we include all of our variables and evaluate how each criterion influences selection. In our saturated model that contains all of the characteristics, we generally find effects that are statistically similar to the “stand alone” specifications for coefficients on demographics, plan type, and out-of-pocket costs. A notable exception for our results is the coefficient and signs for CCI flip which might be due to the sparsity of the CCI index. Thus, the robustness on the effects of plan characteristics in our regression model implies a considerable portion of selection into Medicare Advantage is driven by unobservable selection into commercial insurance plans. Such findings are consistent with potential selection driven by forward-looking behavior into plans that restrict certain high-cost specialists and indicate selection potential on anticipated costs.

Given the evidence of selection on plan characteristics, we also examine utilization in the pre-period to look at the correlates of joining Medicare Advantage based on utilization in **Table 4**. This ancillary approach to using out-of-pocket costs (which might vary because of differential pricing across plans) is to examine various services and procedures to capture the intensity and overall utilization. In Columns 1 to 5 of Panel A of **Table 4** we compare the probability of joining Medicare Advantage based on point of service utilization. We generally find that increasing intensity of utilization is statistically significantly associated with a 0.1 to 0.3 percentage point reduction in joining Medicare Advantage. The larger effects are driven by Emergency and Outpatient utilization rather than Inpatient or Office utilization. Jointly estimating all sources of utilization in Column 6 shows each point of service is a significant predictor of forgoing Medicare Advantage. Accounting for plan type in Column 7 produces statistically significant results, but some attenuation occurs on the coefficients.

We also examine utilization based on overall procedures utilized at age 64 and then examine whether there exists a non-linear relationship by transforming our procedures into quintiles in Panel B of **Table 4**. Beginning with our analysis on overall procedures in Column 1,

each additional procedure is significantly negatively associated with participation in Medicare Advantage by 0.02 percentage points. To examine for non-linearity, we use quintiles on overall procedures and find that relative to the lowest quintile for claims, each additional quintile is statistically different. For example, an enrollee in the second quintile is approximately 0.1 percentage point less likely to join Medicare Advantage relative to an individual in the lowest quintile. For the third, fourth, and fifth quintile we observe significant reductions of 0.3, 1.5, and a large 7.6 percentage point reduction in joining Medicare Advantage. Inclusion of plan characteristics in Column 7 again produces effects of a similar magnitude demonstrating large non-linear effects of non-participation in Medicare Advantage for the highest quintile of enrollee utilization.

Overall, consistent with predictions from models of insurance, we tend to find positive selection based on gender, plan type, and observable and unobservable measures of health in large cohorts of commercially insured enrollees. We describe a pattern of selection based on attributes consistent with canonical models of selection such as non-linearity in out-of-pocket expenditures, utilization, and Medicare enrollment. Further, our results show us that even in the commercially insured enrollees, we find statistically and economically significant in events of previous health status, out-of-pocket expenses, and plan type to influence whether a particular enrollee continues into Medicare Advantage. Beyond earlier studies, we are able to examine what would otherwise have been unobservable enrollee characteristics on plan type and explore and describe the black box of how individuals select into Medicare Advantage.

#### **4.2 The Effect of the Affordable Care Act on Enrollment into Medicare Advantage**

Our analysis on the spillover effects of the Affordable Care Act on enrollment in the Medicare Advantage program is motivated by the existence of potential general equilibrium effects introduced by the ACA demand shock and by the introduction of managed care into various state Medicaid programs both on the beneficiary and the insurer side. While aggregate changes such as reducing national-level reimbursements are absorbed by time fixed effects, other policies that might influence the stock of health capital, labor supply (both of providers and beneficiaries), and other behavioral responses (i.e., employer mandates) can shape the cost-benefit decision to pursue Medicare Advantage and could influence the decision to enroll.

We examine how the ACA Medicaid Expansions influence selection into Medicare Advantage which is presented in **Table 5**. In Panel A we use the full sample of expansion and non-expansion states to evaluate how the ACA Medicaid Expansion influences the decision of the commercially insured individuals at age 64 as they approach the initial enrollment period to enroll into a Medicare Advantage plan. In all specifications, we consistently find evidence that the effect of the ACA Expansion to enroll into a Medicare Advantage plan was not statistically different from zero. While the point estimates are zeros in all specifications, the inference from our analysis is limited by the sample size. Based on our estimates and due to our limited power as a result of our research design, we can only conclude that the ACA Medicaid Expansion did not have any *large* changes in Medicare Advantage enrollment.

Since the ACA was the last major reform to the Medicare Advantage program and produced a large-scale increase in the number of insured individuals, we examine if the dynamics of the ACA have any impact on how individuals enroll in Medicare Advantage in Expansion versus non-Expansion states. Because a handful of states already expanded their Medicaid programs to a comparable degree facilitated by ACA prior to the enactment of ACA, and for robustness, we re-run this analysis in Panel B of **Table 5** excluding states that enacted comparable Medicaid Expansions before ACA enactment and compare the Expansion to Non-Expansion states. We again find strong evidence of no effects with similar economically and statistically insignificant effects on participation in Medicare Advantage programs for the commercially insured enrollees at age 64 during the Initial Enrollment Period. Such findings are consistent with earlier results on Medicare beneficiaries which indicate the ACA did not have spillover impacts.

For our robustness check on the difference-in-difference research design, we estimate event-study regressions using the year of ACA expansion as the treatment variable and generating leads and lags of three years from treatment timing. To ensure that our estimates are robust to concerns of negative weighting in two-way fixed effects models and differential treatment timing (i.e., most of the ACA expansion was adopted initially with a handful of states that introduce differential timing), we also employ the de Chaisemartin and D'Haultfoeuille (2021; 2022) and Callaway and Sant'Anna (2022) estimators. Our event study for the TWFE also provides auxiliary evidence in support of the research design by exploring the existence of parallel trends between Expansion and Non-Expansion states. **Figure 6** graphically plots these

coefficients for our baseline regression and across the three estimators and we observe zero effects across the estimators and confirming the findings of **Table 5**.

## **5. Discussion**

We investigate whether the modern Medicare Advantage program after the Medicare Modernization Act of 2003 has been effective in abating the longstanding and persistent advantageous selection among enrollees. To explore selection in Medicare Advantage, we use commercially insured enrollees from CDM database using the commonly employed “positive correlation” test on a series of observable of financial, demographic, and health characteristics combined with a quasi-experimental research design that exploits Medicare’s Initial Enrollment Period at age 65. Using our novel linked data from CDM, which contains detailed baseline enrollee characteristics on utilization, CCI scores, and out-of-pocket expenses, we generate policy relevant estimates that strongly demonstrate the continued existence of selection into Medicare Advantage on these multiple dimensions of enrollee health.

Our findings offer suggestive evidence of forward-looking behavior from enrollees as they transition from commercial insurance into the Medicare program as measured by the Charlson Comorbidity Index, out-of-pocket spending, and utilization, with much of the large selection effects driven by unobservable health (i.e., plan type). We also show considerable differences in overall services utilization preceding the transition to Medicare Advantage with future enrollees indicating differential selection. Taken as a whole, we indicate selection is still prevalent on measures of health and non-linearly increasing in intensity as measured by out-of-pocket expenditures and the CCI.

As a result, in this paper we test and demonstrate economically and policy significant compositional differences in Medicare Advantage and commercial insurance and show that despite numerous reforms, considerable advantageous selection persists in Medicare Advantage for commercial enrollees. Our findings are salient in the recurring discourse surrounding Medicare Advantage and addressing the remaining selection in the program. Although certain theoretical models (She et al., 2022) provide bleak predictions in terms of entirely solving the selection problem, the improved use of claims data can potentially ameliorate these selection concerns especially data preceding the transition into the Medicare program. The emergence of improved claims data could play a larger role in improving the reimbursement and setting of

prices for Medicare Advantage such that goals set by policymakers, beneficiaries, and healthcare providers are adequately attained. The large and increasing enrollment in Medicare Advantage overtime makes it particularly important to observe this selection and its evolution and to potentially mitigate the unfavorable reimbursements to the Medicare program.

Despite our findings of considerable evidence indicating advantageous selection, which implies an overpayment to Medicare Advantage vis-à-vis Traditional Medicare, and thereby suggesting inefficiency in the provision of Medicare, it is important to note that the social welfare implications of such overpayments are theoretically ambiguous. Overpayments in Medicare Advantage can be socially beneficial under a set of conditions that improves the welfare of enrollees, such as if the program achieves a higher quality of care and/or produces improved health outcomes compared to Traditional Medicare.

Similarly, overpayments can produce socially beneficial outcomes if they result in general equilibrium effects such as the introduction of positive spillovers for Traditional Medicare. These positive spillovers can potentially manifest themselves as producing higher quality of care for even non-Medicare Advantage enrollees through improving health outcomes, and more importantly, influencing prices that Traditional Medicare faces. Some demonstrably evidence exists on positive spillovers, as the structure and complexity of the public provision of health care insurance has important spillover effects in adjoining markets. These spillovers make the role of a well-functioning Medicare Advantage program important as it extends beyond its beneficiaries and has spillovers and general equilibrium effects on other facets of healthcare markets (Baicker, Chernew, and Robbins, 2013; Chernew, DeCicca, and Towns, 2008), and vice-versa with public Medicare (Clemens and Gottlieb, 2017; Clemens, Gottlieb, and Molnar, 2017). Supporters of Medicare Advantage often point out that the integrated model could provide higher-quality care by combining care under one insurer, but evidence on the spillover or higher quality care effects of Medicare Advantage is limited.

Therefore, in order for privately administered social insurance programs such as Medicare Advantage to function in a manner to serve their enrollees, at a minimum, the level of advantageous selection has to equal the value of improved quality, health, and positive spillovers. The primary challenge with potential overpayments in Medicare Advantage would be if they are driven by differences in insurer market power and advantageous selection versus differential health outcomes and positive spillovers. In the absence of improved quality and

positive spillovers, overpayments to Medicare Advantage are inefficient to taxpayers and would indicate an imperfectly functioning insurance market – and further implying the most recent reforms incorporating claims-based risk adjustment remain inadequate. Thus, in the absence of significant spillovers, our findings would imply further reforms to the Medicare Advantage program are necessary to address advantageous selection.

Beyond Medicare Advantage, improving the understanding of how selection into Medicare Advantage works has broad policy applications for both social insurance and societal well-being. First, it directly has implications for current discussions in health policy concerning the long debated public option for the ACA Exchange where a public option would concurrently exist with privately administered plans (with degrees of public funding). In the absence of efficiency and spillovers, the introduction of a public-private partnership into the ACA could produce advantageously selected individuals in the private option with negative selection in the public option.

Finally, our findings remain relevant in the longstanding question of whether Medicare Advantage has succeeded in solving the issue of advantageous selection. In the absence of positive spillovers, the existence of adverse selection in insurance markets under the existence of imperfectly informed consumers is problematic because it can negatively influence consumer's surplus due to misallocation in the insurance market. In addition to consumers, ensuring appropriate payments matters for future public-private partnerships to adequately generate efficacy for stakeholders. Finally, on the whole, our study indicates a need for future reform and research to address the issues of advantageous selection in Medicare Advantage.



## 6. References

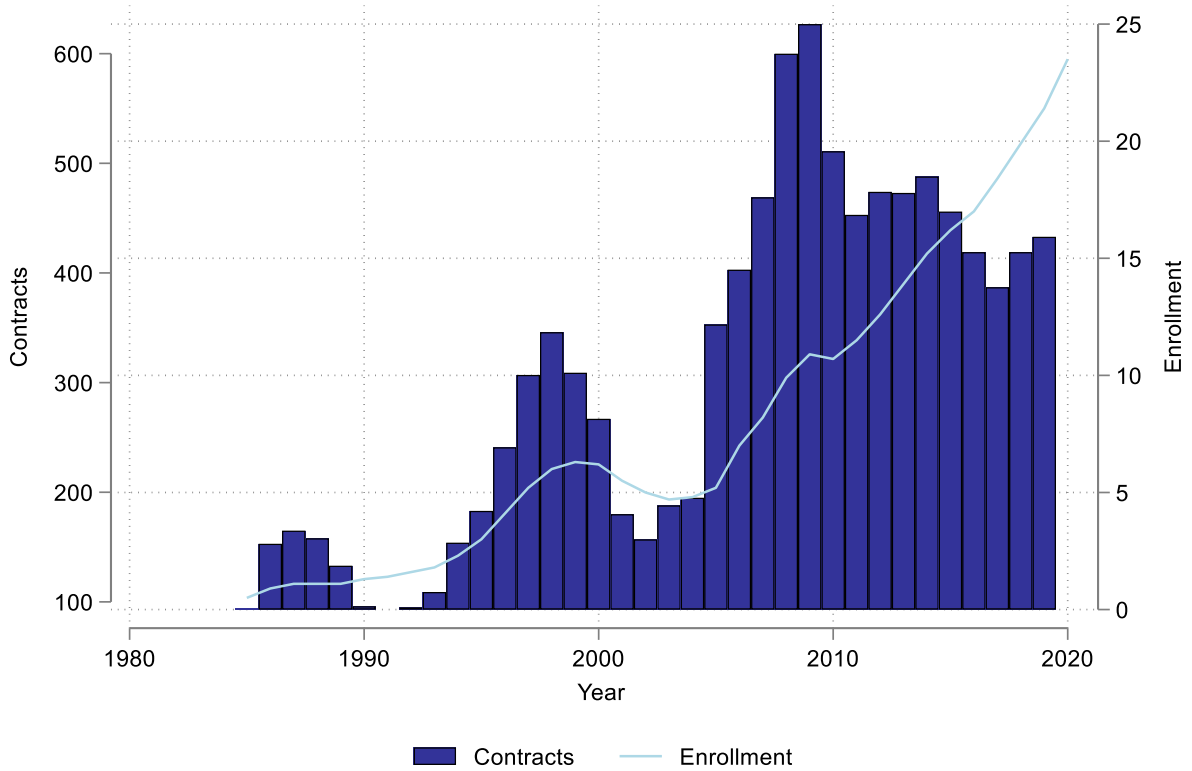
- Abaluck, J., Caceres Bravo, M., Hull, P., & Starc, A. (2021). Mortality effects and choice across private health insurance plans. *The Quarterly Journal of Economics*, 136(3), 1557-1610.
- Agarwal, R., Connolly, J., Gupta, S., & Navathe, A. S. (2021). Comparing Medicare Advantage and Traditional Medicare: A Systematic Review: A systematic review compares Medicare Advantage and traditional Medicare on key metrics including preventive care visits, hospital admissions, and emergency room visits. *Health Affairs*, 40(6), 937-944.
- Aizawa, N., & Kim, Y. S. (2018). Advertising and risk selection in health insurance markets. *American Economic Review*, 108(3), 828-867.
- Baicker, K., Chernew, M. E., & Robbins, J. A. (2013). The spillover effects of Medicare managed care: Medicare Advantage and hospital utilization. *Journal of Health Economics*, 32(6), 1289-1300.
- Brown, J., Duggan, M., Kuziemko, I., & Woolston, W. J. (2014). How does risk selection respond to risk adjustment? New evidence from the Medicare Advantage Program. *American Economic Review* 104(10), 3335-3364.
- Brennan, N., Ornstein, C., & Frakt, A. B. (2018). Time to release medicare advantage claims data. *Jama*, 319(10), 975-976.
- Cabral, M., Geruso, M., & Mahoney, N. (2018). Do larger health insurance subsidies benefit patients or producers? Evidence from Medicare Advantage. *American Economic Review*, 108(8), 2048-2087.
- Callaway, B., & Sant'Anna, P. H. C. (2021). Difference-in-differences with multiple time periods. *Journal of Econometrics*, 225(2), 200-230.
- Carey, C. M., Miller, S., & Wherry, L. R. (2020). The impact of insurance expansions on the already insured: the Affordable Care Act and Medicare. *American Economic Journal: Applied Economics*, 12(4), 288-318.
- Cawley, J., & Philipson, T. (1999). An empirical examination of information barriers to trade in insurance. *American Economic Review*, 89(4), 827-846.
- Clemens, Jeffrey, and Joshua D. Gottlieb. 2017. "In the Shadow of a Giant: Medicare's Influence on Private Physician Payments." *Journal of Political Economy* 125 (1): 1-39.
- Clemens, Jeffrey, Joshua D. Gottlieb, and Tímea Laura Molnár. 2017. "Do Health Insurers Innovate? Evidence from the Anatomy of Physician Payments." *Journal of Health Economics* 55: 153-67
- Charlson, M., Wells, M. T., Ullman, R., King, F., & Shmukler, C. (2014). The Charlson comorbidity index can be used prospectively to identify patients who will incur high future costs. *PloS one*, 9(12), e112479.
- Chaudhry, S., Jin, L., & Meltzer, D. (2005). Use of a self-report-generated Charlson Comorbidity Index for predicting mortality. *Medical care*, 607-615.
- Chernew, M., DeCicca, P., & Town, R. (2008). Managed care and medical expenditures of Medicare beneficiaries. *Journal of health economics*, 27(6), 1451-1461.
- Chung, S., Romanelli, R. J., Stults, C. D., & Luft, H. S. (2018). Preventive visit among older adults with Medicare's introduction of Annual Wellness Visit: Closing gaps in underutilization. *Preventive medicine*, 115, 110-118.
- Cooper, A. L., & Trivedi, A. N. (2012). Fitness memberships and favorable selection in Medicare Advantage plans. *New England Journal of Medicine*, 366(2), 150-157.

- Courtemanche, Charles, James Marton, Benjamin Ukert, Aaron Yelowitz, and Daniela Zapata. 2017. "Early impacts of the Affordable Care Act on health insurance coverage in Medicaid expansion and non-expansion states." *Journal of Policy Analysis and Management* 36 (1):178-210.
- Curto, V., Einav, L., Finkelstein, A., Levin, J., & Bhattacharya, J. (2019). Health care spending and utilization in public and private Medicare. *American Economic Journal: Applied Economics*, 11(2), 302-332.
- Curto, V., Einav, L., Levin, J., & Bhattacharya, J. (2021). Can health insurance competition work? evidence from Medicare advantage. *Journal of Political Economy*, 129(2), 570-606.
- de Chaisemartin, C., & D'Haultfoeuille, X. (2020). Two-way fixed effects estimators with heterogeneous treatment effects. *American Economic Review*, 110(9), 2964-2996.
- de Chaisemartin, C., & D'Haultfoeuille, X. (2021). Two-Way Fixed Effects and Differences-in-Differences with Heterogeneous Treatment Effects: A Survey. *arXiv preprint arXiv:2112.04565*.
- Duggan, M., Gruber, J., & Vabson, B. (2018). The consequences of health care privatization: evidence from Medicare Advantage exits. *American Economic Journal: Economic Policy*, 10(1), 153-186.
- Glazer, J. and McGuire, T. G. (2000). Optimal risk adjustment in markets with adverse selection: an application to managed care. *The American Economic Review*, 90(4):1055–1071.
- Glazer, J., & McGuire, T. G. (2017). Paying Medicare Advantage plans: to level or tilt the playing field. *Journal of health economics*, 56, 281-291.
- Geruso, M., & Layton, T. J. (2017). Selection in health insurance markets and its policy remedies. *Journal of Economic Perspectives*, 31(4), 23-50.
- Geruso, M., & Layton, T. (2020). Upcoding: evidence from Medicare on squishy risk adjustment. *Journal of Political Economy*, 128(3), 984-1026.
- Gold, M., & Casillas, G. (2014). What do we know about health care access and quality in Medicare Advantage versus the traditional Medicare program? *Mathematica Policy Research Reports*.
- Einav, L., & Finkelstein, A. (2011). Selection in insurance markets: Theory and empirics in pictures. *Journal of Economic Perspectives*, 25(1), 115-138.
- Einav, L., Finkelstein, A., Kluender, R., & Schrimpf, P. (2016). Beyond statistics: the economic content of risk scores. *American Economic Journal: Applied Economics*, 8(2), 195-224.
- Finkelstein, A., & McGarry, K. (2006). Multiple dimensions of private information: evidence from the long-term care insurance market. *American Economic Review*, 96(4), 938-958.
- Gruber, J. (2017). Delivering public health insurance through private plan choice in the United States. *Journal of Economic Perspectives*, 31(4), 3-22.
- Han, T., & Lavetti, K. (2017). Does Part D abet advantageous selection in Medicare Advantage? *Journal of health economics*, 56, 368-382.
- Handel, B. R. (2013). Adverse selection and inertia in health insurance markets: When nudging hurts. *American Economic Review*, 103(7), 2643-2682.
- Handel, B. R., Kolstad, J. T., & Spinnewijn, J. (2019). Information frictions and adverse selection: Policy interventions in health insurance markets. *Review of Economics and Statistics*, 101(2), 326-340.

- Harris, T., & Yelowitz, A. (2014). Is there adverse selection in the life insurance market? Evidence from a representative sample of purchasers. *Economics Letters*, 124(3), 520-522.
- Harris, T. F., Yelowitz, A., Talbert, J., & Davis, A. (2017). Adverse selection in the group life insurance market. *Economic Inquiry*.
- Heiss, F., McFadden, D., Winter, J., Wuppermann, A., & Zhou, B. (2021). Inattention and switching costs as sources of inertia in medicare part d. *American Economic Review*, 111(9), 2737-2781.
- Huckfeldt, P. J., Escarce, J. J., Rabideau, B., Karaca-Mandic, P., & Sood, N. (2017). Less intense postacute care, better outcomes for enrollees in Medicare Advantage than those in fee-for-service. *Health Affairs*, 36(1), 91-100.
- Hughes, D. R., Jiang, M., & Duszak, R. J. J. i. m. (2015). A comparison of diagnostic imaging ordering patterns between advanced practice clinicians and primary care physicians following office-based evaluation and management visits. *175(1)*, 101-107.
- Lavetti, K., & Simon, K. (2018). Strategic formulary design in Medicare Part D plans. *American Economic Journal: Economic Policy*, 10(3), 154-192.
- Miller, Sarah, and Laura R. Wherry. 2017. "Health and access to care during the first 2 years of the ACA Medicaid expansions." *New England Journal of Medicine* 376 (10):947-956.
- Meyers, D. J., Belanger, E., Joyce, N., McHugh, J., Rahman, M., & Mor, V. (2019). Analysis of drivers of disenrollment and plan switching among Medicare Advantage beneficiaries. *JAMA internal medicine*, 179(4), 524-532.
- McGuire, T. G., Newhouse, J. P., & Sinaiko, A. D. (2011). An economic history of Medicare Part C. *The Milbank Quarterly*, 89(2), 289-332.
- Morrisey, M. A., Kilgore, M. L., Becker, D. J., Smith, W., & Delzell, E. (2013). Favorable selection, risk adjustment, and the Medicare Advantage program. *Health Services Research*, 48(3), 1039-1056.
- Neuman, P., & Jacobson, G. A. (2018). Medicare advantage checkup. *New England Journal of Medicine*, 379(22), 2163-2172.
- Newhouse, J. P., & McGuire, T. G. (2014). How Successful Is Medicare Advantage? *The Milbank Quarterly*, 92(2), 351-394.
- Newhouse, J. P., Price, M., McWilliams, J. M., Hsu, J., & McGuire, T. G. (2015). How much favorable selection is left in Medicare Advantage? *American Journal of Health Economics*, 1(1), 1-26.
- Park, S., Basu, A., Coe, N., & Khalil, F. (2017). *Service-level selection: strategic risk selection in Medicare Advantage in response to risk adjustment*. NBER Working Paper.
- Parashuram, S., Kim, S., & Dowd, B. (2018). Inappropriate utilization in fee-for-service Medicare and Medicare Advantage plans. *American Journal of Medical Quality*, 33(1), 58-64.
- Pelech, D. (2017). Dropped out or pushed out? Insurance market exit and provider market power in Medicare Advantage. *Journal of health economics*, 51, 98-112.
- Philipson, T. J., Seabury, S. A., Lockwood, L. M., Goldman, D. P., Lakdawalla, D. N., & Cutler, D. M. (2010). Geographic Variation in Health Care: The Role of Private Markets [with Comment and Discussion]. *Brookings Papers on Economic Activity*, 325-361.
- Price-Haywood, E. G., Burton, J., Fort, D., & Seoane, L. J. N. E. J. o. M. (2020). Hospitalization and mortality among black patients and white patients with Covid-19. 382(26), 2534-2543.

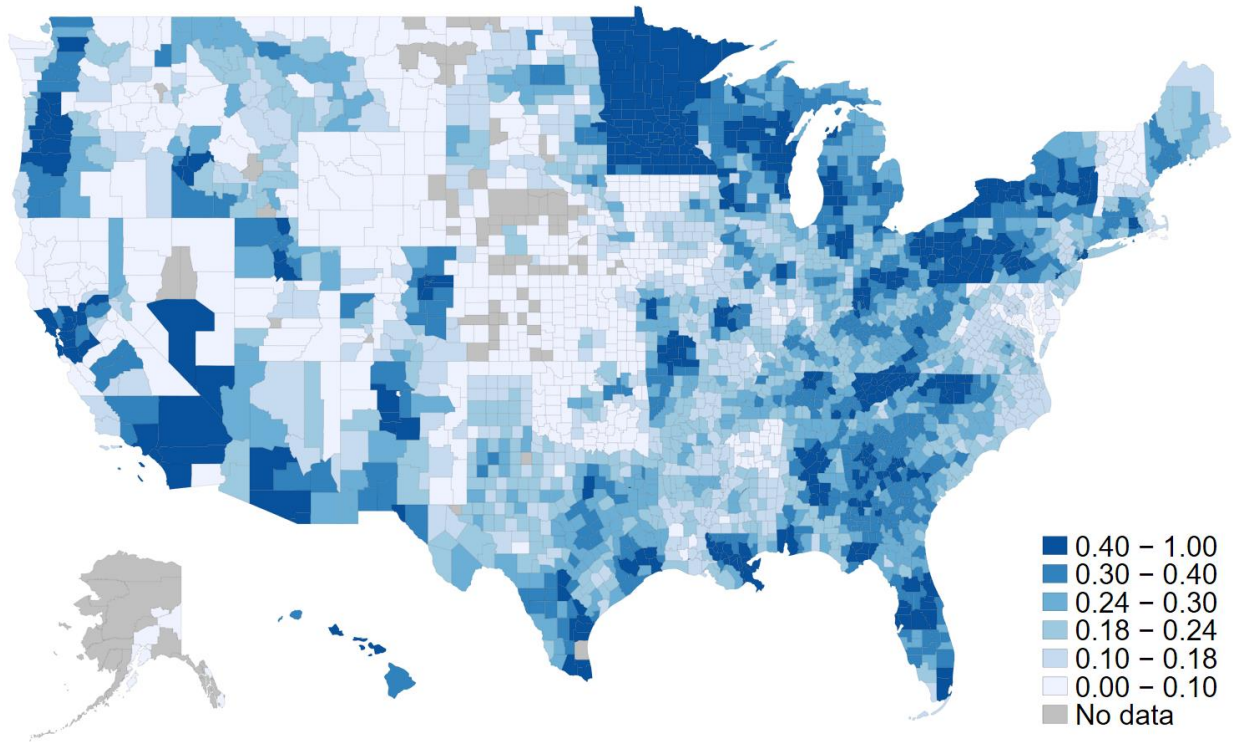
- Quan, H., Sundararajan, V., Halfon, P., Fong, A., Burnand, B., Luthi, J.-C., . . . Ghali, W. A. (2005). Coding algorithms for defining comorbidities in ICD-9-CM and ICD-10 administrative data. *Medical care*, 1130-1139.
- Rahman, M., Keohane, L., Trivedi, A. N., & Mor, V. (2015). High-cost patients had substantial rates of leaving Medicare Advantage and joining traditional Medicare. *Health Affairs*, 34(10), 1675-1681.
- Roelfs, D. J., Shor, E., Davidson, K. W., & Schwartz, J. E. (2011). Losing life and livelihood: a systematic review and meta-analysis of unemployment and all-cause mortality. *Social science & medicine*, 72(6), 840-854.
- Rothstein, J. (2010). Teacher quality in educational production: Tracking, decay, and student achievement. *The Quarterly Journal of Economics*, 125(1), 175-214.
- Skopec, L., Aarons, J., & Zuckerman, S. (2019). Did Medicare Advantage payment cuts affect beneficiary access and affordability. *The American Journal of Managed Care*, 25(9), e261-e266.
- Sheiner, L. (2014). Why the geographic variation in health care spending cannot tell us much about the efficiency or quality of our health care system. *Brookings Papers on Economic Activity*, 2014(2), 1-72.
- Sinaiko, A. D., Afendulis, C. C., & Frank, R. G. (2013). Enrollment in Medicare Advantage plans in Miami-Dade County: evidence of status quo bias? *INQUIRY: The Journal of Health Care Organization, Provision, and Financing*, 50(3), 202-215.
- She, Z., Ayer, T., Gokpinar, B., & Hughes, D. (2021). Reverse Cross Subsidization in Healthcare Capitation Programs: Evidence from Medicare Advantage. *Available at SSRN 3856673*.
- She, Z., Ayer, T., & Montanera, D. (2022). Can Big Data Cure Risk Selection in Healthcare Capitation Program? A Game Theoretical Analysis. *Manufacturing & Service Operations Management*.

**Figure 1.** Medicare Advantage Enrollment in the United States 1985-2019



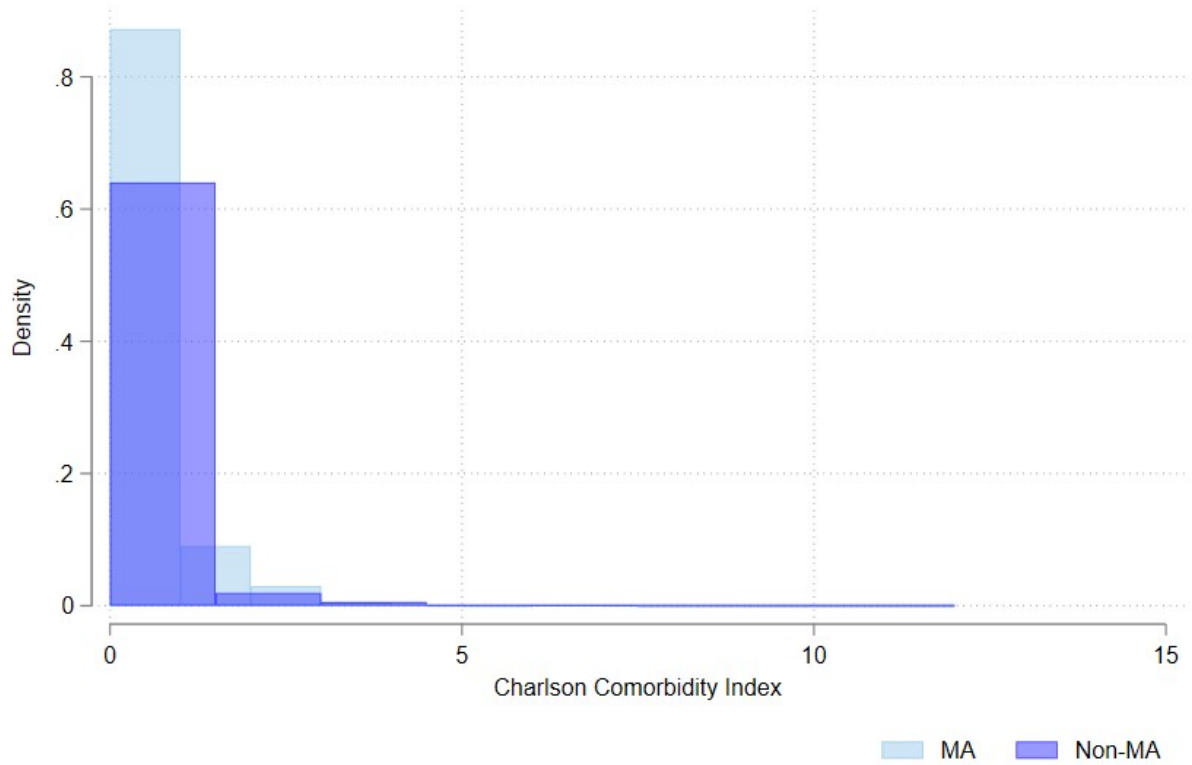
*Source:* Kaiser Family Foundation (2021) *Notes:* These calculations from KFF use data provided by CMS on enrollment and the number of Medicare Advantage contracts. We plot total Medicare Advantage contracts and enrollment (in millions) over time.

**Figure 2.** The Geography of Enrollment in Medicare Advantage



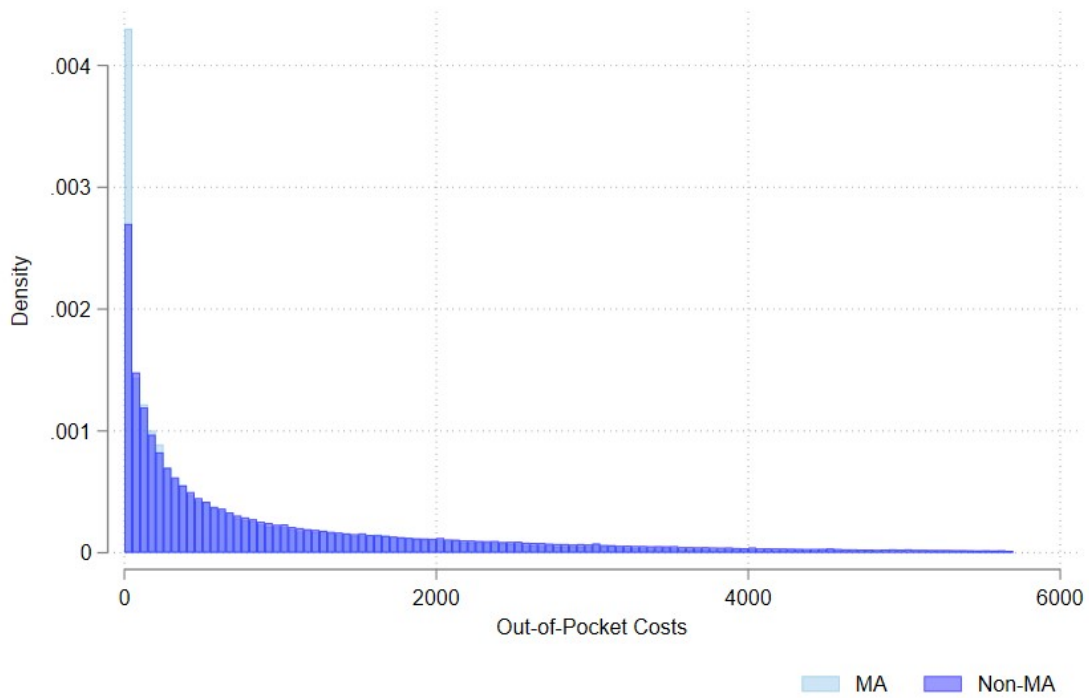
*Source:* Centers for Medicare and Medicaid Services (2023). *Notes:* In the figure above, we plot the proportion of enrollees in Medicare Advantage over the total enrollees in the Medicare program in 2017.

**Figure 3. CCI Risk Score and Participation in Medicare Advantage**



*Source:* CDM (2007-2017). *Notes:* Bar graph of clinical conditions as scored by the CCI, based on enrollment into Medicare Advantage.

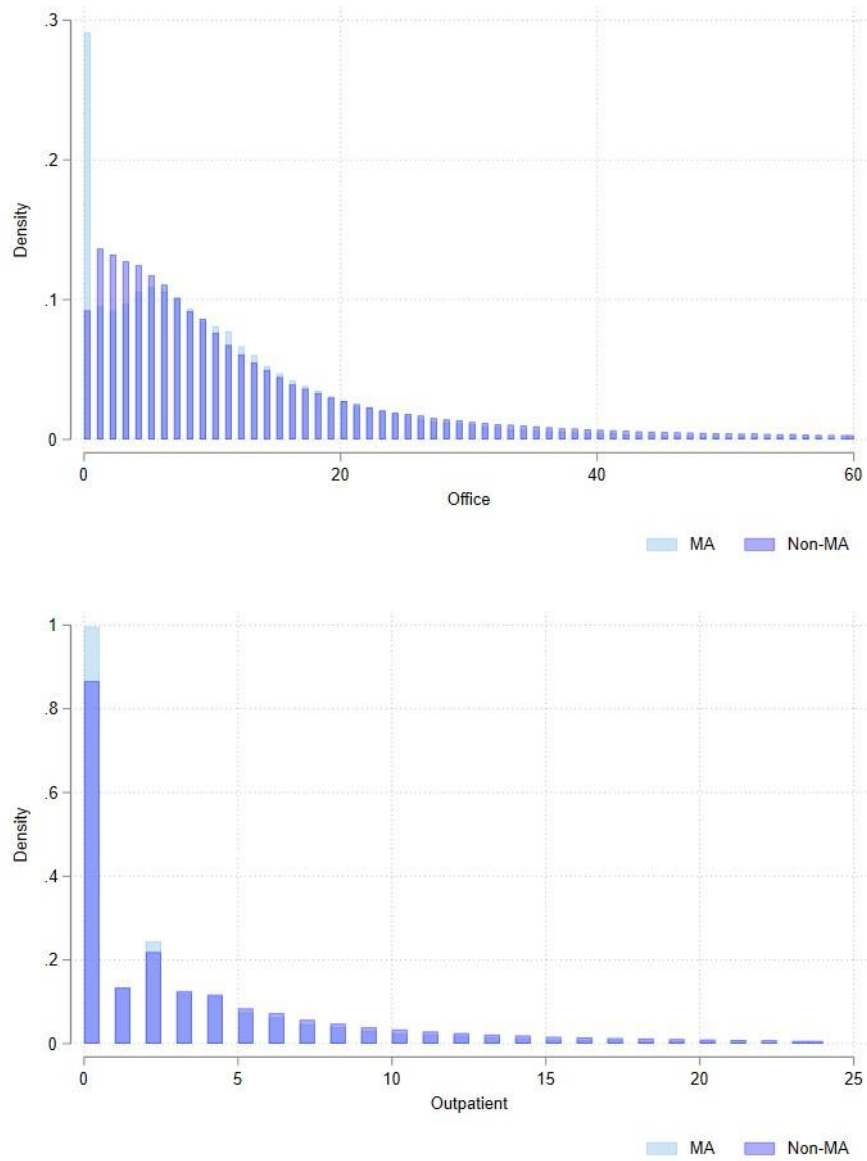
**Figure 4.** Distributional differences in Out-of-Pocket Expenses between Medicare Advantage and Non-Medicare Advantage enrollees observed at Age 64



*Source:* CDM (2007-2017). *Notes:* Kernel density estimates of the inverse hyperbolic sine transformation of (5% trimmed) out-of-pocket spend by enrollment into Medicare Advantage.

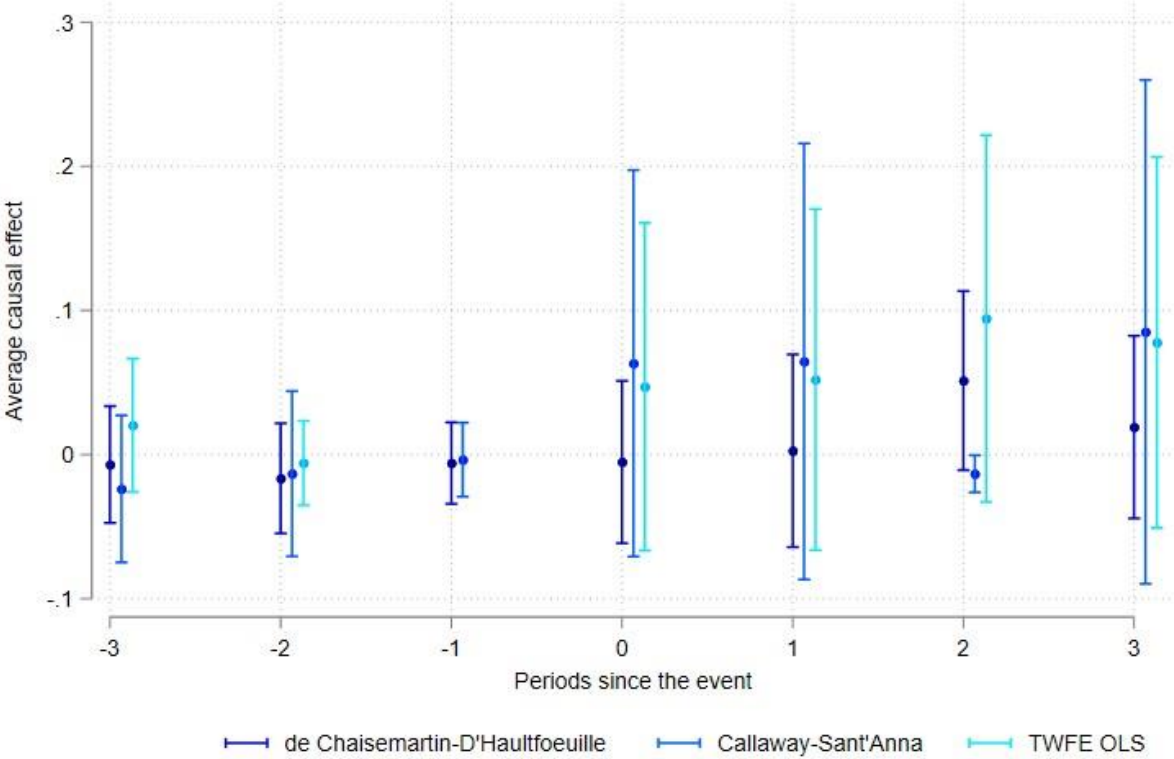


**Figure 5.** Utilization and Participation in Medicare Advantage



*Source:* CDM (2007-2017). *Notes:* Top graph shows utilization differences for (5% trimmed) office services by enrollment into Medicare Advantage whereas bottom graph shows utilization differences for (5% trimmed) outpatient services by enrollment status in Medicare Advantage.

**Figure 6.** Event Studies for Participation in Medicare Advantage after the passage of the Affordable Care Act



**Table 1.** Descriptive Statistics

Variable	Mean	Std. Dev	Variable	Mean	Std. Dev
<b>Health Status</b>			<b>Insurance</b>		
Composite CCI	0.184	0.575	Exclusive Provider Organization (EPO)	0.098	0.298
CCI = 0	0.874	0.332	Health Management Organization (HMO)	0.165	0.371
CCI =1	0.086	0.281	Preferred Provider Organization (PPO)	0.065	0.247
CCI =2 +	0.040	0.234	Point of Service (PoS)	0.672	0.47
<b>ACA Expansion</b>			<b>Utilization</b>		
Resident	0.249	0.432	Out-of-pocket costs	1462	2859
<b>Demographics</b>			Office	17.45	30.41
Male	0.474	0.499	Inpatient	2.17	12.08
White	0.758	0.428	Outpatient	5.81	14.02
Hispanic	0.055	0.229	Emergency	0.84	3.89
Black	0.076	0.265	Other	5.93	12.96
Asian	0.024	0.152	Total Procedures	63.44	121.42
Unknown	0.087	0.282	<b>Outcome</b>		
			Enrolled in Medicare Advantage	0.096	0.295

Source: CDM 2007-2017). Notes: Standard deviations are next to the means. CCI is the Charlson Comorbidity Index. Out-of-pocket costs are in dollars. Commercial insurance characteristics are measured at age 64.

**Table 2.** The Typology of Selection into Medicare Advantage on Chronic Conditions at age 64

	Average	Coefficients		Average	Coefficients
No Conditions	0.8740	.	Mild liver disease	0.0065	0.0011 (0.0050)
Myocardial Infarction	0.0048	0.0043 (0.0059)	Diabetes without chronic complications	0.0140	-0.0152*** (0.0031)
Congestive heart Failure	0.0071	0.0050 (0.0048)	Diabetes with chronic complication	0.0001	-0.0123 (0.0344)
Peripheral Vascular Disease	0.0073	-0.0011 (0.0046)	Hemiplegia or paraplegia	0.0003	0.0006 (0.0178)
Cerebrovascular Disease	0.0013	0.0107 (0.0115)	Renal Disease	0.0077	0.0024 (0.0033)
Dementia	0.0000	0.0636 (0.0737)	Any Malignancy including lymphoma and leukemia except malignant neoplasm of skin and leukemia	0.0257	0.0014 (0.0018)
Chronic Pulmonary Disease	0.0236	-0.0015 (0.0026)	Moderate or severe liver disease	0.0029	0.0095* (0.0048)
Rheumatic Disease	0.0103	0.0007 (0.0039)	Metastatic solid tumor	0.0000	0.0000 (.)
Peptic ulcer Disease	0.0000	-0.0964*** (0.0004)	AIDS/HIV	0.0041	-0.0052* (0.0021)

*Source:* CDM (2007-2017). *Notes:* The dependent variable is a binary variable that captures Medicare Advantage enrollment. The mean of the dependent variable is .096. Each of the Charlson Comorbidity Index clinical conditions are calculated from ICD-9 and ICD-10 diagnoses codes using the Quan et al. (2005) Algorithm and the means of each of the conditions are presented here for reference. We calculate Huber-White robust standard errors that are presented below the coefficients. Asterisks denote statistical significance at the conventional levels \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ .

**Table 3.** The Association between Medicare Advantage Enrollment and Enrollee Characteristics

	1	2	3	4	5	6
CCI = 1	-0.002 (0.001)					0.014*** (0.001)
CCI = 2+	-0.019*** (0.002)					0.009*** (0.002)
Out-of-Pocket		-0.008*** (0.002)				
Out-of-Pocket - Q2			-0.036*** (0.001)			-0.030*** (0.001)
Out-of-Pocket - Q3			-0.053*** (0.001)			-0.045*** (0.001)
Out-of-Pocket - Q4			-0.065*** (0.001)			-0.055*** (0.001)
Out-of-Pocket - Q5			-0.104*** (0.001)			-0.094*** (0.001)
Male				-0.012*** (0.001)		-0.012*** (0.001)
Black				0.013*** (0.002)		0.008*** (0.002)
Hispanic				0.008*** (0.002)		-0.004* (0.002)
Asian				-0.013*** (0.002)		-0.022*** (0.002)
Unknown				-0.001 (0.001)		-0.001 (0.001)
HMO					0.040*** (0.002)	0.032*** (0.002)
POS					-0.048*** (0.001)	-0.042*** (0.001)
PPO					-0.087*** (0.002)	-0.079*** (0.002)

*Source:* CDM (2007-2017). *Notes:* Dependent variable is binary outcome on whether enrollee continues to a CDM associated Medicare Advantage plan at age 65. Each column represents a separate regression. We include year fixed effects in all regression and calculate Huber-White robust standard errors. CCI is the Charlson Comorbidity Index and out-of-pocket costs are in \$1000s of dollars measured at age 64. Asterisks denote statistical significance at the conventional levels \* p<0.05, \*\* p<0.01, \*\*\* p<0.001.

**Table 4.** The Association between Medicare Advantage Enrollment and Utilization at age 64

	1	2	3	4	5	6	7
<b>Panel A: By Point of Service</b>							
Office	-0.0010*** (0.0000)					-0.0007*** (0.0000)	-0.0006*** (0.0000)
Inpatient		-0.0009*** (0.0000)				0.0001*** (0.0000)	0.0001* (0.0000)
Outpatient			-0.0017*** (0.0000)			-0.0007*** (0.0000)	-0.0006*** (0.0000)
Emergency				-0.0026*** (0.0001)		-0.0004*** (0.0001)	-0.0003*** (0.0001)
Other POS					-0.0018*** (0.0000)	-0.0005*** (0.0000)	-0.0005*** (0.0000)
<b>Panel B: Overall Utilization</b>							
Procedures	-0.0002*** (0.0000)						
Quintile (2nd)						-0.0077*** (0.0012)	-0.0076*** (0.0012)
Quintile (3rd)						-0.0038** (0.0013)	-0.0041** (0.0013)
Quintile (4th)						-0.0153*** (0.0013)	-0.0153*** (0.0013)
Quintile (5th)						-0.0761*** (0.0012)	-0.0734*** (0.0012)
Plan Type	No	No	No	No	No	No	Yes

*Source:* CDM (2007-2017). *Notes:* Dependent variable is binary outcome on whether enrollee continues to a CDM associated Medicare Advantage at age 65. Each column in Panels A and B represents a separate regression. Panel A contains number of services by the point of service whereas Panel B contains total services or number of procedures performed at age 64. All regressions contain state and year fixed effects with Huber-White robust standard errors. Plan type contains a full set of indicator variables for types of commercial insurance plan. Asterisks denote statistical significance at the conventional levels \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ .

**Table 5.** Estimating the Effect of the Affordable Care Act on Participation in Medicare Advantage

	1	2	3	4
<b>Panel A: All States</b>				
ACA	0.019 (0.034)	0.019 (0.034)	0.021 (0.035)	0.024 (0.033)
<b>Panel B: Excluding states with similar Medicaid Expansions</b>				
ACA	0.017 (0.035)	0.017 (0.035)	0.019 (0.035)	0.022 (0.033)
Covariates				
Demographics	Yes	Yes	Yes	Yes
CCI	No	Yes	Yes	Yes
Out-of-Pocket	No	No	Yes	Yes
Insurance Type	No	No	No	Yes

*Source:* CDM (2007-2017). *Notes:* Each cell represents a separate regression. All regressions include state and year fixed effects. We cluster standard errors at the level of Medicaid Expansion (states). In Panel B we exclude states that had equivalent Medicaid Expansions preceding the ACA. Demographics includes a set of five indicators for race, and CCI is a set of indicators for the Charlson Comorbidity Index. Out-of-pocket contains a set of indicators representing quintiles of cost and insurance type contains a full set of indicators for plan type. Asterisks denote statistical significance at the conventional levels \* p<0.05, \*\* p<0.01, \*\*\* p<0.001.