

**PRICING AND PASS-THROUGH IN RESPONSE TO SUBSIDIES AND
COMPETITION: EVIDENCE FROM MEDICARE ADVANTAGE
BEFORE AND AFTER THE AFFORDABLE CARE ACT***

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Abstract

After years of growth, federal payments to Medicare Advantage plans began to decline after the Affordable Care Act (ACA). We exploit variation in those payments caused by the ACA to assess whether insurers respond symmetrically to payment increases and decreases pre- and post-ACA. We find that plans changed their pricing and pass-through to beneficiaries symmetrically, with plans passing through roughly 60 cents for each dollar of payment increases or decreases. However, plans reduced less salient benefits post-ACA by more than they had increased them pre-ACA, even though they left premiums virtually unchanged. Partial pass-through suggests that plans likely operate above cost; plans in more competitive markets responded less to payment changes than plans in less competitive markets. Partial pass-through of payment cuts, combined with quality bonuses and growth in risk scores, may explain the continued growth in Medicare Advantage enrollment post-ACA.

Keywords: Insurance markets, Affordable Care Act, Medicare Advantage, Pass-through, Competitive Bidding,

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I. Introduction

Private plans play an increasingly prominent role in Medicare. The majority of Medicare beneficiaries receive their care through the Medicare fee-for-service (FFS) program, in which the government pays healthcare providers directly for their care. However, over a third of Medicare beneficiaries today are enrolled in private plans through the Medicare Advantage program, up from one in five beneficiaries a decade ago (Jacobson et al. 2017). As enrollment in private plans has grown, federal payments to those plans have increased from \$78 billion in 2007 to over \$200 billion in 2017. Federal spending on Medicare Advantage now accounts for roughly one percent of the U.S. gross domestic product (Centers for Medicare and Medicaid Services 2017; Congressional Budget Office 2017).

Rather than paying directly for beneficiaries' care as in FFS Medicare, the federal government pays Medicare Advantage plans a prospective amount for covering the standard Medicare Part A and Part B benefit for each beneficiary they enroll. Those payments depend on the relationship between a federally published county-level "benchmark" rate and a plan's asking price for insuring a beneficiary—a "bid"—in the counties where that plan operates. If a plan bids below the benchmark, it receives a portion of the difference—called a "rebate"—which it must use to provide enrollees with additional benefits or lower cost-sharing. If a plan bids above a benchmark, they are required to charge an additional premium. Plan payments are further adjusted based on "risk scores" that reflect variation in plans' spending due to differences in enrollees' health. This bidding system is intended to foster competition between plans, which compete to provide enrollees with low premiums and better benefits.

The method for determining county-level benchmark payment rates has changed over time and remains a key policy lever in the Medicare Advantage program. The bidding system

and a new method for updating benchmark payments were both implemented by the Medicare Modernization Act (MMA) of 2003. Under the MMA, benchmark payment rates for each county were updated annually via the maximum of several possible paths, including a minimum update of 2 percent. As a result, payments increased more quickly after the MMA than before, inducing plan entry (McGuire, Newhouse, Sinaiko 2011). High benchmarks, combined with the new bidding mechanism, also changed how insurers allocated resources between enrollee benefits and premiums. Because benchmarks were high, few insurers charged additional premiums beyond the standard Medicare premium paid by all beneficiaries, and instead competed by providing additional covered benefits and reduced cost sharing. As of 2012, virtually all beneficiaries were in zero-premium plans; that is, they were in plans that bid at or below the benchmark and charged no premium for the standard Medicare benefit (Gold et al. 2011).¹

In the ensuing years, growth in plan entry, enrollment, and risk scores, particularly in areas with higher benchmarks, led to concerns that Medicare Advantage plans were overpaid. Estimates from 2009 suggested that, on average, per beneficiary spending in Medicare Advantage was 14 percent, or over \$1,100 annually, higher than in traditional FFS Medicare (Biles, Pozen, Guterman 2009; Medicare Payment Advisory Commission 2009). In 2008, Congress enacted the Medicare Improvements for Payers and Providers Act (MIPPA), which froze benchmarks in 2011 at 2010 levels.

In 2010, the Affordable Care Act (ACA) further changed the way that benchmarks were determined, with the goal of reducing the difference between per-beneficiary payments to Medicare Advantage plans and FFS per capita spending (further described below). Although those payment cuts were projected to decrease Medicare Advantage enrollment, enrollment rose

¹ Premiums in this context refers to the basic premium charged to beneficiaries to cover the standard Medicare benefit. In many plans, beneficiaries have the option of purchasing optional supplemental benefits, such as dental or vision services, at an additional premium that is not reflected in plan bids.

from 25 percent of all Medicare beneficiaries in 2010 to a third of beneficiaries in 2017 (Jacobson et al. 2017). To date, the impact of benchmark reductions after the ACA on plan behavior and pass-through to beneficiaries remains unknown.

We investigate the effects of declining federal payments to Medicare Advantage on plans and beneficiaries after the ACA and compare these effects with those of the increases in federal payments before the ACA, using a standard ordinary least squares approach that relates changes in plan behavior (e.g. bidding, rebates) to changes in federal payments (e.g. benchmark). According to economic theory, if markets are perfectly competitive, the zero profit condition would predict that plans submit bids equal to their average costs. Thus, changes in the federal subsidy (benchmark) would have no impact on plan bids. Rebates would move with the benchmark and thus, there would be complete pass through of the federal subsidies—the predominant share going to beneficiaries through changes in rebates and the remaining share being retained by the Medicare program. Conversely, if insurers in Medicare Advantage have market power, then insurers may raise bids in response to an increase in the subsidy, thus extracting a portion of the subsidy as rents. Analogously, insurers may lower bids in response to a decline in subsidies, thus blunting the pass-through of subsidy cuts to enrollees in order to retain enrollment.

We exploit county-level variation in benchmark updates from 2006 through 2015 and find that for each dollar increase in the benchmark pre-ACA, plans raised their bids by 60 cents and passed through 27 cents to beneficiaries (with the residual returned to the government). For each dollar decrease in the benchmark post-ACA, plans reduced their bids by virtually the same amount -- 56 cents on average -- while passing through an average cut of 27 cents to beneficiaries in rebates. Within the change in rebates, plans reduced cost-sharing and covered

benefits by about twice as much on the margin after the ACA as they had increased those buy-downs and coverage before the ACA – perhaps suggesting that insurers allocate cuts towards plan characteristics that are less salient to beneficiaries. However, plans changed premiums by roughly similar amounts before and after the ACA. Moreover, plans in more competitive markets were less responsive to benchmark changes than plans in less competitive markets, suggesting that plans in more competitive markets were bidding closer to their costs.

Our findings add to the literature on incidence and pass through in Medicare Advantage, while offering several new insights. First, we find that on the margin, plans did not significantly alter their bid response post-ACA. This symmetry in plan bids in response to increasing and decreasing federal payments is notable and a key contribution of this study. It has not been tested in the literature (Cabral, Geruso, and Mahoney 2014; Duggan, Starc, and Vabson 2016; Song, Landrum, and Chernew 2013). We interpret this to mean that, just as plans keep a portion of growing subsidies as potential rents, plans similarly protect beneficiaries from facing the full brunt of cuts when subsidies are reduced. Second, plans responded to reductions in subsidies by cutting less salient components of rebates (coverage of additional services and reductions in cost-sharing) to a larger degree than more salient components of rebates (premiums). Third, plans in more competitive markets were likely bidding closer to their costs, given that the changes in their bids were closer to zero. Fourth, plans' reductions in bids, combined with additional payments due to quality bonuses and growth in risk scores after the ACA, helped lessen the decrease in rebates, which likely helps explain the continued growth in enrollment after the ACA.

This work builds on a literature that examines the incidence of increasing subsidies in Medicare Advantage, which generally shows an incomplete pass through with contributions from market power and selection (Cabral, Geruso, and Mahoney, 2014; Duggan, Starc, and Vabson

2016; Song, Landrum, and Chernew 2013, 2012). It also contributes to prior research showing insurers have market power in Medicare Advantage (Curto et al. 2015; Dunn 2010; Pelech 2018a; Town and Liu 2003), that payments to private plan foster greater plan entry and enrollment (Afendulis, Landrum, and Chernew 2012; Atherly, Dowd, and Feldman 2004; Cawley, Chernew, and McLaughlin 2005; Chernew, DiCicca, and Town 2008; Dowd, Feldman, and Coulam 2003; Maruyama 2011; Pizer and Frakt 2002), and that Medicare Advantage plans tend to compete by adjusting benefits rather than premiums (Pelech 2018a; Cabral, Geruso, and Mahoney 2014; Stockley et al. 2014).

In addition, our work is related to a broader theoretical and empirical literature on pass through of subsidies and taxes in health insurance, with implications for payment design given heterogeneity in competition between markets and demand among beneficiaries (Dague 2014; Einav and Finkelstein 2011; Geruso and Layton 2017; Glazer and McGuire 2011; Glazer and McGuire 2017, 2013; Hackmann, Kolstad, and Kowalski 2015; Weyl and Fabinger 2013).

The remainder of the paper is organized as follows. Section 2 provides an overview of the Medicare Advantage payment and bidding system, including payment changes introduced by the ACA. Section 3 presents a framework for the economics of bidding and pass-through. Section 4 describes our data and empirical strategy. Section 5 presents the results of plan bid response and pass-through, as well as heterogeneity, salience, and sensitivity analyses. Section 6 concludes.

II. Payments in Medicare Advantage

A. COMPETITIVE BIDDING FRAMEWORK

Over the past three decades, the Medicare Advantage program (previously referred to as Medicare+Choice or Medicare Part C) has offered Medicare beneficiaries the option to enroll in private coverage that is potentially more comprehensive than traditional FFS Medicare. Most plans receive a per-beneficiary capitation payment that is risk-adjusted to reflect variation in enrollees' health. Plans are required to cover Medicare's Part A (hospital care) and B (physician) benefits at an actuarially equivalent level of cost-sharing as traditional FFS Medicare, but also have discretion to modify premiums and benefits within allowed bounds. Before the ACA, Medicare payment policies for these private plans tended to encourage plan entry and expand beneficiary choice (McGuire, Newhouse, and Sinaiko 2011).

The MMA introduced a competitive bidding system that can be summarized visually in 4 stages (**Figure 1**). First, each year the Centers for Medicare and Medicaid Services (CMS) publishes a county-specific benchmark payment rate that represents the maximum allowed federal payment to Medicare Advantage plans for insuring the average-risk beneficiary. The benchmark includes the expected costs of Medicare Part A and Part B benefits for a Medicare beneficiary of average health risk (Medicare Payment Advisory Commission 2014).

Second, plans submit their bids to CMS along with their projected enrollment in the counties in which they choose to operate. The bid represents a plan's uniform asking price (i.e. projected cost plus allowed profit and administrative costs) for insuring an average risk beneficiary across all of the counties it chooses to operate in.

Third, CMS calculates a plan-specific benchmark as the weighted average of published benchmarks and projected enrollment across the plan's counties. This plan-specific benchmark is then compared to the bid to determine the final plan payment and pass-through to beneficiaries. If the bid exceeds the benchmark, CMS pays the plan the benchmark, and the plan must collect

the difference through an additional premium to beneficiaries. If the bid is below the benchmark, CMS pays the plan its bid plus a share of the difference—the rebate—which the plan must return to beneficiaries in the form of lower cost-sharing, supplemental coverage (e.g., vision, dental, or hearing), or lower premiums. (Plans can reduce the Part B premium or the Medicare Part D premium for plans that offer Part D benefits). Prior to the ACA, the rebate was 75 percent of the difference between the bid and the benchmark. After the ACA, this share varied depending on the plan’s quality rating, as described below.

Finally, beneficiaries shop among plans in their county of residence, comparing attributes such as premiums and rebates. Beneficiaries may enroll in a Medicare Advantage plan or enroll in FFS Medicare. Over the past decade, a greater proportion of beneficiaries have opted to enroll in Medicare Advantage. Numerous potential factors underlie this growth, one of which is that plans use their rebates to offer supplemental benefits, additional coverage for Medicare Parts A and B cost-sharing, and Part D benefits at lower cost than most stand-alone Part D plans.

Growth in benchmarks over the 2003-2010 period were likely another key driver of growth in Medicare Advantage enrollment. Specifically, benchmarks were set to be at least as high as FFS costs in an area and were updated annually such that they could never decrease.² As a result, by 2009, average benchmarks were estimated to be 18 percent higher than the cost of covering a Medicare FFS beneficiary of average health in an area, and average payments were 14 percent higher than the cost of covering the average FFS beneficiary. (Medicare Payment Advisory Commission 2010)

² The benchmark in each year was updated based on: (1) a minimum update that equaled the maximum of 2 percent or the national FFS Medicare growth rate, (2) a FFS update that equaled 100 percent of risk-adjusted FFS Medicare costs in a county, and (3) a floor update that equaled an urban or rural floor payment, or 4) a blend of those payment rates.

Congress responded to growing concerns that Medicare Advantage plans were overpaid by adding a provision in MIPPA which froze 2011 benchmarks at 2010 levels. This provision temporarily slowed the growth of benchmarks, although payments to Medicare Advantage plans continued to exceed the amount that Medicare would pay for a similar beneficiary in FFS.

B. CHANGES IN THE AFFORDABLE CARE ACT

The ACA introduced two key changes to the payment system set forth by the MMA. First, the ACA changed the formula for calculating the benchmark. Beginning in 2012, the benchmark in a county was adjusted to be a fixed percentage of local FFS Medicare spending in the county. This percentage was based on the quartile of per capita FFS Medicare spending in the county relative to other counties in the U.S. Specifically, counties in the lowest quartile of FFS Medicare spending were given a benchmark (B_{kt}) that equaled 115 percent of the county's traditional Medicare spending (TM_{kt}), followed by 107.5 percent for counties in the second lowest quartile, 100 percent for those in the third lowest quartile, and 95 percent for those in the highest quartile of FFS Medicare spending, as below. This change was phased in between 2012 and 2017 over 2, 4, or 6 years depending on the estimated impact of these ACA changes in the county. During the transition period, the benchmark was calculated as a blended rate of the pre-ACA and post-ACA payment systems (Medicare Payment Advisory Commission 2011; Medicare Payment Advisory Commission 2016).

$$B_{kt} = \begin{cases} 1.15 * FFS_{kt} & \text{if } FFS_{kt} \text{ in the lowest quartile} \\ 1.075 * FFS_{kt} & \text{if } FFS_{kt} \text{ in the 2nd quartile} \\ 1.00 * FFS_{kt} & \text{if } FFS_{kt} \text{ in the 3rd quartile} \\ 0.95 * FFS_{kt} & \text{if } FFS_{kt} \text{ in the highest quartile} \end{cases}$$

This revised benchmark methodology was expected to reduce average benchmark rates nationwide, as counties in the highest quartile of FFS spending accounted for the largest share of the population. Initial projections were that Medicare Advantage spending would slow, average plan generosity would decrease, and enrollment would decline (Congressional Budget Office 2010; Office of the Actuary 2010).

The second change brought forth by the ACA was the introduction of plan quality scores, which affected both the calculation of the rebate and plan benchmarks. Plans are assigned quality “stars” based on their performance on a range of consumer satisfaction, clinical process, and patient outcome measures. Composite star measures range between 1 for the lowest quality plans up to 5 for the highest quality plans. Instead of setting rebates (r_{jt}) at 75 percent of the difference between the bid (b_{jt}) and the plan-specific benchmark (B_{jt}), the ACA allowed rebates to vary with plan quality, ranging from 50 percent of the difference for low-quality plans (less than 3.5 stars), to 65 percent for middle-quality plans (3.5 up to just below 4.5 stars), and 70 percent for highest-quality plans (4.5 stars and above).³

$$r_{jt} = \begin{cases} 0.50(B_{jt} - b_{jt}) & | B_{jt} > b_{jt} & \text{if } < 3.5 \text{ stars} \\ 0.65(B_{jt} - b_{jt}) & | B_{jt} > b_{jt} & \text{if } 3.5 \text{ to } 4.49 \text{ stars} \\ 0.70(B_{jt} - b_{jt}) & | B_{jt} > b_{jt} & \text{if } \geq 4.5 \text{ stars} \end{cases}$$

In addition, the ACA added bonus payments to plan-specific benchmarks based on plan quality. The initial legislation awarded bonuses to 4-star or higher plans. Subsequently, a Quality

³ For the purposes of calculating the rebate, new plans or plans with low enrollment were treated the same as 3.0 or 3.5-star plans, depending on the year. Minor adjustments in the rebate share by year, as well as the phase-in of these rebate shares from February 12, 2013, are detailed by CMS in their annual Advance Notice, which can be found at <https://www.cms.gov/Medicare/Health-Plans/MedicareAdvtgSpecRateStats/Announcements-and-Documents.html>.

Bonus Payment (QBP) demonstration project extended bonuses to plans with 3 stars or better and increased the magnitude of bonuses for all awarded plans, including new plans; moreover, it doubled quality bonuses for certain counties with lower than average FFS Medicare spending and greater than 25 percent Medicare Advantage penetration (Layton and Ryan 2015; L&M Policy Research 2016).

The combination of quality bonuses, quality-adjusted rebates, QBP demonstration bonuses, and any increases in the intensity with which plans code diagnoses helped offset the reduction in benchmarks described above.⁴ To the extent that benchmarks were still reduced beyond these offsetting effects, the heterogeneous application of these bonuses across counties provides useful identifying variation for studying bid response and pass-through.

III. Economics of Bidding and Pass-through

A. BIDDING AND INSURER COMPETITION

The bid is a mechanism by which plans set price. Plan bidding behavior provides insights into the nature of competition in the Medicare Advantage market, which directly affect the pass-through of subsidies to beneficiaries. Under perfect competition, plans would set prices equal to marginal cost, thus meeting the zero-profit condition. Exogenous changes in benchmarks would not be predicted to change the bid and instead would be passed through entirely to beneficiaries. Under a perfect insurer monopoly, however, prices are not equal to marginal cost, and thus plans

⁴ Plan payments are adjusted based on risk scores, which are higher if more diagnoses are recorded for each beneficiary. Medicare Advantage plans generally record more diagnoses for a beneficiary than are recorded for a similar beneficiary in FFS. Recent studies show that this difference in “coding intensity” between Medicare Advantage and FFS beneficiaries has increased in recent years (Kronick and Welch, 2014, Hayford and Burns, 2017).

could potentially capture all of the rents of increasing subsidies.⁵ Between these two extremes, imperfect competition among insurers would lead to a less than 1-for-1 relationship between changes in the benchmark and changes in bids—with the elasticity of bids with respect to the benchmark closer to 0 in more competitive markets and closer to 1 in less competitive markets. Imperfect competition would result in partial pass through of changes in the federal subsidy to beneficiaries.

Prior literature has largely supported this latter scenario. Cabral and colleagues (2014) performed a difference-in-differences analysis which exploited variation in the 2000 Benefits Improvement and Protection Act. They found that for every dollar increase in plan payments, about 53 cents were passed through to enrollees, of which 45 cents were devoted to premium reductions and 9 cents to additional benefits. Pass-through was 74 cents in the most competitive markets and 13 cents in the least competitive markets. The authors argue that this evidence suggests that market power is a larger factor than advantageous risk selection contributing to imperfect pass-through (Cabral, Geruso, and Mahoney 2014).

Song and colleagues (2013) examined plan bidding behavior directly over the first five years of the bidding system established by the MMA. Using variation in benchmark updates, including 2 “rebasing” years (during which benchmark updates were more likely exogenous), they found that every dollar increase in the benchmark led to an approximately 53-cent increase in the bid (Song, Landrum, and Chernew 2013), implying a 35-cent pass-through in enrollee benefits when accounting for the 25 percent of the difference between the bid and benchmark that was recouped by Medicare (Song, Landrum, and Chernew 2012). The number of insurers

⁵ To the extent that providers have greater market power over insurers, providers may also capture a share of these rents through their negotiations with insurers.

was independently associated with smaller changes in bids, holding constant the change in benchmark, consistent with the prediction of competition pushing bids closer to costs.

Using a similar specification within a structural approach, Curto and colleagues find a qualitatively similar pass-through of about 40 to 60 percent, consistent with plans having fairly significant market power (Curto et al. 2014). In contrast, Duggan and colleagues (2016) exploit policy-induced variation in benchmarks updates among select counties close to the urban floor threshold in 2007-2011 and find a lower pass-through of about one-eighth on average.

Nevertheless, they also found that pass-through was larger in more competitive counties, specifically concentrated among plans of one particular large insurer (Duggan, Starc, and Vabson 2016).

Taken together, these studies are consistent with imperfect competition among plans and a meaningful role for insurer market power in setting bids, resulting in incomplete pass-through. However, they all examined a period during which plan payments were growing. Whether plans pass through *decreases* in the benchmark in a similar manner—that is, whether there is a mirror image in plans' response when subsidies decline—remains an open question.

There are several reasons why plans' bids may respond differently pre- and post-ACA. First, bid responses need not be symmetric; if premiums or benefits exhibit downward stickiness, then insurers may increase benefits and decrease premiums in response to benchmark increases more than they decrease those benefits or raise premiums in response to benchmark cuts. Second, the nature of plan competition may be different in the post-ACA years. For example, private fee-for-service (PFFS) plans in Medicare Advantage, which surged in enrollment after 2006, exited in large numbers after policy changes enacted in MIPPA (Biles, Adrion, Guterman 2008; Pelech 2017). Second, provider consolidation has increased significantly over the last decade (Baker,

Bundorf, and Kessler 2014; Neprash et al. 2015). Providers may extract incomplete pass-through from insurers through their price negotiations,⁶ and thus, consolidation in the provider market could impact whether plans can pass through benchmark changes by reducing premiums or increasing benefits. Third, many insurers in Medicare Advantage also sell plans on the ACA marketplace. Thus, in the years after 2014, underlying insurer costs may change in such a way that alters their bidding strategy in Medicare Advantage. Finally, insurers may respond to payment cuts differently than to payment gains in a manner suggested by prospect theory (Kahneman and Tversky 1979). If insurers valued losses more than equal-sized gains, as individuals do, then we would expect to see a dissimilar pass-through when the benchmark is cut, holding all other factors constant.

Given these factors, it is an empirical question whether plan bidding behavior and pass-through during benchmark cuts will mirror those during benchmark increases. Exploiting variation in benchmark cuts after the ACA, we characterize the nature of these plan responses after the ACA and compare them to those before the ACA.

B. SALIENCE OF PASS-THROUGH CHANNELS

In Medicare Advantage, plans have multiple dimensions along which they can pass through the rebate to beneficiaries, including through premiums, additional benefits, and cost-sharing reductions. Some are salient, such as the plan's Part C (Medicare Advantage) premium,

⁶ If an insurer in Medicare Advantage also contracts with providers for the commercially-insured (e.g. employer-sponsored insured) population, then providers may theoretically extract rents away from the insurer by raising prices either in Medicare Advantage, in the commercially-insured market, or both. However, recent evidence suggests that insurers in Medicare Advantage are able to require providers to largely accept FFS Medicare prices, in part due to a provision that constrains out-of-network prices to be the same as FFS Medicare prices (see Berenson et al. 2015; Baker et al. 2016; Trish et al. 2017; Pelech 2018b; Maeda and Nelson 2018). However, whether all insurers can do this and whether this constraint holds for services besides physician and hospital services is less well understood.

deductible, or out-of-pocket maximum. Others are arguably less salient, such as additional benefits (e.g., vision, dental, or hearing coverage).

Literature on salience and incentives suggest that individuals are more responsive to salient incentives relative to less salient incentives (Chetty, Looney, Kroft 2009; Finkelstein 2009). In the Medicare Advantage context, we would predict that during periods of subsidy increases, plans might pass through benefits in a more salient manner, such as through premium reductions rather than extra coverage. Several papers suggest that this is the case. Cabral, Geruso, and Mahoney (2014) showed that plans passed through payment increases overwhelmingly via premium reductions in the early 2000s. In later years, Stockley, et al. (2014) showed that Medicare Advantage plans rarely reduced the Medicare Part B premium, because premium reductions were not transparently displayed when beneficiaries chose plans and reductions in Part B premiums were applied directly to beneficiaries' social security checks (rather than being paid directly to the beneficiary). This lack of transparency, combined with high benchmarks, led to the majority of plans charging \$0.) Pelech (2018a) showed that plans are more likely to adjust benefits than premiums, particularly when their Medicare Advantage premium is \$0. We expand on this analysis by examining the differential pass-through between premiums and other rebate channels during benchmark declines post-ACA and compare it to differential pass-through pre-ACA.

IV. Data and Methods

A. DATA

We analyzed publicly-available Medicare Advantage benchmark, bid, and rebate data from CMS from 2006 through 2015. The benchmark, published at the county level for each year, is the monthly capitation rate for a beneficiary of average risk—or a beneficiary who has a risk score of 1.0—using the CMS-Hierarchical Condition Category (HCC) risk score model.⁷ Beginning in 2012, the benchmark incorporated star ratings of plan quality, as discussed above. Bidding data are submitted by Medicare Advantage plans to CMS.⁸ Those data also include a plan’s Medicare Advantage risk score, which is the weighted average of the risk scores of its membership across counties, and a plan’s rebates.

To measure the degree of competition, we calculated the number of unique insurers (“parent organizations” in the data) that operated in each county. We used insurers rather than plans because a single insurer can offer multiple plans in a county and bidding decisions are made by insurers. We treat counties as markets because the Medicare Advantage plan types included in our sample (health maintenance organizations (HMO), local preferred provider organizations (PPO), and PFFS plans) make county-level decisions about where to operate (Layton and Ryan 2015; Pelech 2017). We also calculated a measure of competition among insurers in a county using the Herfindahl-Hirschman Index (HHI). HHI is arguably a more robust measure of competition than the number of insurers or plans, because it reflects both the number of insurers and the distribution of shares among those insurers. We hypothesized that more insurer concentration would, all else held equal, push changes in bids towards zero.

For our analysis, we used risk-standardized benchmarks, bids, and rebates. We accounted for the effects of the quality bonus program on plan payments in the post-ACA period by

⁷ Available at: <https://www.cms.gov/Medicare/Health-Plans/MedicareAdvtgSpecRateStats/Ratebooks-and-Supporting-Data.html?DLSort=0&DLEntries=10&DLPage=1&DLSortDir=descending>

⁸ See the Centers for Medicare and Medicaid Services website on Bid Forms & Instructions, available at: <https://www.cms.gov/Medicare/Health-Plans/MedicareAdvtgSpecRateStats/Bid-Forms-Instructions.html>.

calculating the quality-adjusted benchmark for each plan in each county and then calculating an enrollment-weighted average of those benchmarks at the county level. As plans exercise some control over their quality and thus, a quality-adjusted benchmark might be endogenous, we also performed robustness checks that used a benchmark calculated as though the quality bonus program was not in place.

In all regressions, we included logged county-level FFS Medicare risk scores, and logged Medicare Advantage risk scores, averaged across all plans in the county. Given evidence that shows risk-adjustment in Medicare Advantage is imperfect (Newhouse et al. 2015), we expected risk scores to be related to changes in bids in the analysis. (If risk-adjustment were perfect, the plan risk score would have no impact on bids.) Plan payment is the product of the risk-standardized (in other words, average risk) plan-specific benchmark multiplied by the plan risk score. Therefore, we hypothesized that an increase in the plan risk score would be independently associated with a smaller bid response. In other words, to the extent that the risk score overstates true risk, the higher the plan risk score, the lower the bid needed to meet the same revenue. Analogously, we expected the plan risk score to be positively associated with rebates. Risk scores were logged so that changes in those variables could be interpreted in percentage terms.

We add several other controls to all regressions to absorb additional variation that may affect bids. Namely, we control for county-level FFS per capita spending to absorb any time-varying county-level variation in utilization that might affect plans' bids. We also control for variation in local economic conditions using the county-level unemployment rate from the Bureau of Labor Statistics and county-level per capita income from the Bureau of Economic Analysis. These controls are important, as other studies have shown that they may be linked to growth in Medicare Advantage (Johnson et al. 2016).

Our sample included HMOs, local PPOs, and PFFS plans in our analysis. Special needs plans (SNPs), which largely enroll dual-eligible beneficiaries, were not included in our analysis because many dual-eligible beneficiaries have their benefits and premiums covered by the Medicaid program and hence, insurers offering SNPs are not necessarily competing by lowering premiums or increasing benefits. We excluded employer group waiver plans because they do not compete for enrollees and thus face different incentives, regional PPO plans because they face different benchmarks, and several other plan types including cost plans and Programs of All-Inclusive Care for the Elderly (PACE) plans, which do not participate in the bidding process. All dollar figures were adjusted to year 2015 using the consumer price index.

To decompose changes in the rebate into changes in different categories of benefits, we use Medicare's expected out-of-pocket cost data. The out-of-pocket cost data are constructed by CMS using data on FFS beneficiaries' spending and are used on Medicare's plan finder website to assist beneficiaries in selecting a plan. They have been used frequently to measure benefit generosity and have been found to correlate with beneficiary plan choice (Dunn 2010; Cabral, Geruso, Mahoney 2014; Stockly et al. 2014). The data reflect expected spending for a representative beneficiary in each plan in Medicare Advantage, given the plan's premiums, copays, deductibles, spending limits, and covered benefits. Spending in each plan is simulated using FFS beneficiaries consumption patterns, and thus, measures of benefit generosity are unaffected by beneficiary response to plan generosity (moral hazard) or adverse selection across plans.

We extract several measures of premiums and benefit generosity from the out-of-pocket cost data. For premiums, we examine the total premium, which includes: a plan's Medicare Advantage premium, charged when a plan bids above the benchmark; a Medicare Part D

premium, which is charged when a plan offers Part D benefits, but can be reduced by the plan using rebate dollars the standard Medicare Part B premium; and any amount by which the plan reduces the beneficiary's Part B premium (Part B buy-down). Each of these premium components is also examined separately.

To measure the generosity of plans' cost-sharing and covered benefits, we examine beneficiaries' total expected out-of-pocket spending in each plan (excluding premiums), spending on pharmaceuticals, and spending on optional, supplemental benefits. Total expected out-of-pocket costs capture what a beneficiary would spend on Medicare Parts A and B benefits (including hospital, physician, diagnostic and lab spending), pharmaceuticals, and other categories not covered under the Medicare FFS benefit, including vision, dental, and hearing care. Spending on pharmaceuticals reflects what a beneficiary would spend on Part D drugs in each plan. Optional, supplemental benefits capture spending on vision, preventative dental, and hearing care, after accounting for a plan's coverage of such categories of care. Higher expected spending reflects lower plan generosity in each category.⁹

B. EMPIRICAL STRATEGY

We examined the impact of changes in the benchmark on bids by exploiting variation in benchmark updates. Our identification strategy is rooted in comparing changes in the dependent variables among counties that saw large changes in their benchmark to counties that saw small changes in their benchmark, pre- and post-ACA. We used the following longitudinal reduced form model,

⁹ Changes in this out-of-pocket cost measure may understate changes in generosity, because this measure is calculated assuming that all care is provided in-network. If plans respond to benchmark reductions by narrowing their networks, this dimension of generosity will not be captured by this measure.

$$Y_{kt} = \beta_1 * B_{kt} + \beta_2(B_{kt} * post_t) + X_{kt}\delta + \gamma_k + \gamma_t + \varepsilon_{kt}$$

where B_{kt} is the county benchmark in county k at time t , the vector of covariates, X_{kt} , denotes time-varying characteristics of a county, including contemporaneous FFS Medicare spending, FFS Medicare risk score, the average Medicare Advantage risk score weighted across plans in the county, and number of insurers or HHI in county k . The indicator $post_t$ denotes years 2012 or later, after the ACA benchmark cuts began to be phased in;¹⁰ γ_k and γ_t are county and year fixed effects, respectively, and ε_{kt} is the error term. When the outcome Y_{kt} is the bid, the coefficient β_1 captures the average pre-ACA bid response for each dollar change in the benchmark, while β_2 captures the average difference on the margin in bid response after the ACA relative to before. ($\beta_1 + \beta_2$ represents the mean bid response for every dollar change in the benchmark post-ACA.) Although $post_t$ is common to all observations in a year, β_2 is identified by heterogeneity across counties in benchmark changes in the post-period. The model was weighted by county-level Medicare Advantage enrollment averaged across the years in the data, and standard errors are clustered on the county level to account for correlation in bids within county over time.

Given that ACA payment cuts were phased in over time and benchmarks varied over time due to the quality bonus program, we also estimated year-specific coefficients as below, where β_t are the coefficients of interest. In sensitivity analyses, we examined the robustness of our results under alterations in the model and covariates. We examine whether coefficients meaningfully vary across years rather than testing whether plans responded differently to benchmark increases

¹⁰ Results that treat the “post” period as beginning in 2010, after the ACA was passed but before the cuts were effective, are discussed in a section on sensitivity analysis.

or decreases because – in some years, virtually all plans experienced benchmark increases whereas in other, virtually all plans experienced benchmark decreases.

$$Y_{kt} = \sum_{t \in (2006, 2015)} \beta_t * B_{kt} + X_{kt} \delta + \gamma_k + \gamma_t + \varepsilon_{kt}$$

To examine bid response and pass-through under different market conditions directly, we explored heterogeneity of effects between counties with high and low levels of competition. In one set of specifications, we defined counties as being high competition if they had more than 2 insurers operating in them in 2012, and in the other, they were defined as being high-competition if insurer HHI was below the median in 2012 (HHI=5,473). Counties were omitted from this regression if no insurer operated in them in 2012. Given that the majority of Medicare Advantage beneficiaries reside in urban counties and those counties are disproportionately in the highest spending quartile of FFS Medicare, which received the largest benchmark cuts under the ACA, we also examined urban and rural counties separately.

To understand how plans passed through changes in rebates to beneficiaries, we assessed different categories of spending that were affected by rebates, including the Part B premium, Part D premium, plan premium (plans that bid above the benchmark), out-of-pocket costs, drug spending, and additional benefits.

Our analysis has several caveats. First, our primary analysis explores whether plans responded differently to payment increases and cuts using an indicator for years post-ACA, interacted with benchmarks. Identification of the coefficient on this interaction and on benchmark changes pre-ACA relies on variation across counties and years in the size of benchmark increases and decreases. Although we are interested in identifying how plans respond

differently to benchmark increases and decreases, we cannot easily test this hypothesis using indicators for whether benchmarks increased or decreased relative to the prior year. Although benchmarks have both increased and decreased over the years, the timing of policy changes are such that there are years in which virtually all counties (or plans) experienced benchmark increases and other years where virtually all counties experienced decreases. Thus, indicators for whether plans responded differently to increases or decreases would be collinear with year fixed effects.

Additionally, our measure of plan benefit generosity has shortcomings. Namely, we use a measure of benefit generosity that captures changes in the expected out of pocket cost for a representative beneficiary. This variable captures the direction in which plans adjust benefits and allows for comparison across counties that faced different levels of benchmarks. However, it does not capture exactly what a plan spends on enrollees' cost sharing and covered benefits and thus, the magnitude of changes in benefits do not sum to the marginal change in rebates.

V. Results

A. SUMMARY STATISTICS

Characteristics of Medicare Advantage plans and the markets they operate in are shown in **Table 1**, where we divided observations into years in which benchmarks were growing in both real and nominal terms (2006 through 2009) and years in which they decline in both real and nominal terms (2012 through 2015). (Benchmarks were frozen in 2010 and 2011, and so plans experienced real declines and no change in nominal terms.) In real terms, average plan-level

benchmarks nationwide decreased from \$948 per member per month (PMPM) before the ACA changes to the benchmark formula became effective in 2012 to \$874 PMPM after the changes. Similarly, average bids and rebates were lower after 2012, although total risk-adjusted payments to plans declined by slightly less than bids or benchmarks because risk-adjustment scores were higher in the post-ACA years. **Figure 2, Panel A** illustrates these mean benchmarks and bids in Medicare Advantage during the entire study period. In real terms, the average benchmark grew by \$35 pre-ACA (2006 and 2009) and declined by an average of \$81 after the ACA payment cuts (2012-2015); the slope of this decline increased after 2014, consistent with the conclusion of the QBP demonstration program. Of note, steeper cuts in the benchmark would have occurred in the absence of the QBP demonstration program. Additionally, trends in bids and benchmarks were largely parallel across counties divided by quartiles of FFS spending (**Figure 2, Panel B**).

Meanwhile, benefits, as measured by projected out-of-pocket costs, were less generous and premiums were higher after 2012 relative to before (**Table 1**). Competition, as measured by the average number of insurers offering plans, declined slightly from 5.36 in the years before 2012 and 5.01 after, although insurer HHI was relatively unchanged between the two periods. Average beneficiary risk in Medicare Advantage relative to average beneficiary risk in FFS Medicare increased slightly, from 0.96 prior to 2012 and 0.99 after. Changes in the ratio of risk between the Medicare programs might reflect declines in selection of healthier beneficiaries into Medicare Advantage (Cabral, Geruso, Mahoney 2014; Newhouse et al. 2012) or it might reflect increases in the intensity with which diagnoses are coded in the Medicare Advantage program (Geruso and Layton 2015, Kronick and Welch 2014, Hayford and Burns 2018).

Figure 3 shows a time series of beneficiary rebates in real terms and total enrollment in Medicare Advantage, illustrating continued growth in enrollment despite a relative decrease in

rebates over the years. Of note, the actual rebates were greater than initial projected rebates, which were projected to decline substantially beginning in 2010 due to the ACA-related changes in the benchmark formula (Centers for Medicare and Medicaid Services 2010). This difference between the actual and projected rebates was likely driven by quality bonuses, which boosted the benchmark, and the plan bid response, which we examine in this paper.

B. PLAN BID RESPONSE AND REBATE RESPONSE

Our main estimates of the bid and rebate response are shown in **Table 2** and **Figure 4**. From 2006 to 2012, a period of growth in the benchmark before the ACA, plans raised their bids by an average of 60 cents for every dollar increase in the benchmark. After the ACA-related benchmark formula changes (and start of quality-based bonuses), plans lowered their bids by an average of 56 cents for every dollar reduction in the benchmark. Plans' responses to changes in benchmarks post-ACA were statistically different than their responses pre-ACA, although the magnitudes were very similar.

As a result, plans passed through an average of 27 cents in rebates for every dollar increase in the benchmark before the ACA (the remainder going to the Medicare Trust Fund in the form of shared savings for the federal government). After the ACA, plans lowered the rebate by almost the same amount as they had increased them pre-ACA.¹¹ On balance, our main estimates illustrate fairly similar average magnitudes of the bid and rebate responses to changes in the benchmark during a period of benchmark growth and a period of benchmark declines. In

¹¹ One way in which the bid regression and the rebate regression differ is that rebates are adjusted for risk scores, as they are measured and reported by CMS as actual dollars given to Medicare Advantage plans. Meanwhile, bids and benchmarks are not adjusted for risk as they are reported for the average risk (1.0 risk) beneficiary (i.e. they are risk-standardized). We thus risk-standardized county-level rebates using plan-level risk scores, which may not perfectly capture all the risk of plans in the county.

fact, bid responses are remarkably stable over the study period, ranging from 0.66 (in 2007) to 0.50 (in 2015) (see **Figure 4**). The stability of those coefficients suggests that the overall estimate of bid responsiveness accurately reflects plan behavior, rather than being a spurious result.

C. HETEROGENEITY OF BID RESPONSE AND REBATE RESPONSE

Plans' response to benchmark changes varied based on the extent of competition in the Medicare Advantage market (**Table 3, A**). Plans in more competitive counties were less responsive to benchmark changes than plans facing less competition. Plans in more competitive counties adjusted bids by approximately 58 cents for every dollar change in benchmark, whereas plans in less competitive counties adjusted bids by 69 cents for every dollar change in the benchmark.¹² We found similar heterogeneity when defining competition using insurer HHI. In addition, we found that the bid response was closer to \$1 (\$0.82) in rural counties, whereas it was closer to \$0.56 in urban counties. This is consistent with the fact that 68 percent of rural counties were classified as non-competitive, using the definition above, whereas only 36 of urban counties were non-competitive.

Analogous heterogeneity was observed in the rebate response (**Table 3, B**). Following from the changes in bids, plans in more competitive markets passed through a larger share of each dollar change in the benchmark to beneficiaries than plans in less competitive markets. Namely, plans in more competitive counties passed through 29 cents in rebates for every dollar

¹² Counties were classified as more competitive if they had more than 2 insurers operating in them 2012, and less competitive if they had two or fewer insurers operating in them. Counties were classified based on 2012 levels of competition so that changes in competitiveness would not confound results – and plans with no insurers in 2012, comprising 3% of county-year observations, were omitted from analysis.

change in the benchmark versus 16 cents in less competitive counties. Plans in urban counties passed through about 31 cents of every dollar, whereas plans in rural counties passed through nearly none of those benchmark changes.

D. DECOMPOSITION OF CHANGES IN THE REBATE

We examine how insurers allocated changes in rebates to by testing for changes in measures of benefits and premiums. **Table 4** and **Figure 5** show marginal changes in the total premium, the three components of the total premium (Medicare Advantage plan premium, Part D premium for plans that offer Part D coverage, and Part B premium), cost-sharing, and covered benefits offered by the plan as a function of a dollar change in the benchmark. Changes in cost-sharing and covered benefits are measured by changes in total out-of-pocket spending for a representative beneficiary, drug spending for a representative beneficiary, and spending on supplemental benefits (vision, hearing, and dental services). Out-of-pocket cost data are not available for 2006, so Column 1 of Table 4 replicates the regression of benchmarks on rebates with 2006 omitted. All other regressions in this portion of analysis also omit 2006.

During the period of benchmark increases before the ACA, each dollar increase in the benchmark was associated with a 6.7-cent reduction in total premiums that was passed through to beneficiaries in the form of lower Medicare Advantage premiums (-4.6 cents) and lower Part B premiums via plan buy-downs (-2.3 cents), but no significant changes in the Part D premium. Reductions in Part B premiums are likely less salient to consumers than reductions in Medicare Advantage plan premiums, because the former are added directly to beneficiaries' social security checks and the latter are paid directly by the beneficiary (Stockley et al. 2014).

During the period of benchmark decreases after the ACA, plans increased premiums by 8.3 cents for each dollar decrease in the benchmark. This marginal increase in premiums post-ACA was significantly larger than marginal decreases pre-ACA, but none of the coefficients on premium components were significantly different pre- or post-ACA—perhaps because all marginal changes were rather small.

Insurers also increased plan benefits in response to increased benchmarks and decreased plan benefits when benchmarks decreased; unlike premiums, all components of benefits that we examined decreased by more post-ACA than they increased pre-ACA. Pre-ACA, total out-of-pocket costs for the representative beneficiary fell by 9 cents for every dollar increase in benchmarks. Changes in drug spending comprised 5 cents of the total change in out-of-pocket costs, and changes in spending on extra benefits accounted for a 1-cent change in out-of-pocket costs. Post-ACA, out-of-pocket costs increased (benefits became less generous) with each dollar reduction in the benchmark. Specifically, total out-of-pocket costs for beneficiaries increased by 21 cents, total out-of-pocket drug spending increased by 13 cents, and total out-of-pocket spending on extra benefits increased by 2 cents.

Thus, after the ACA, plans reduced the generosity of cost-sharing and covered benefits by about twice as much on the margin as they had increased the generosity of these dimensions before the ACA (see **Figure 5**). In contrast, plans changed premiums—which are plausibly more salient to consumers—by roughly similar amounts pre- and post-ACA in response to benchmark changes.

E. INSTRUMENTING FOR MEDICARE BENCHMARKS

One concern with regressing changes in benchmarks on plan bids is that those two variables could be endogenously related. For instance, favorable selection into Medicare Advantage could leave FFS Medicare with higher per capita spending -- which would increase benchmarks -- and lower average spending among Medicare Advantage beneficiaries, which could reduce plan bids. Although all regressions control for FFS spending, Medicare Advantage plans cover more than the basic FFS benefit, and thus, unobserved selection could reduce their bids, biasing coefficients downward. Alternately, several papers provide evidence of a spillover effect -- or that greater Medicare Advantage penetration reduces spending in FFS (Baicker and Robbins 2015). Reductions in FFS spending due to spillovers could reduce benchmarks, and simultaneously, areas with more Medicare Advantage penetration might have more insurers and more competition, which would likely lower bids. Thus, benchmarks and bids might be related in ways other than through plans' direct response to benchmark changes.

To test for potential endogeneity, we instrument for benchmarks using the percentage of FFS beneficiaries who are enrolled in Medicare Part A only. The percentage of "A-only" beneficiaries affects Medicare Advantage benchmarks because CMS calculates benchmarks by summing Part A per capita spending and Part B per capita spending. Beneficiaries who are only enrolled in Medicare Part A are included in the calculation of Part A per capita spending, even though their average risk-adjusted spending on Part A services is lower than beneficiaries who are enrolled in both Parts A and B. (Many of these beneficiaries spend less because they still have employer-sponsored insurance and, thus, Medicare is the secondary payer.) The Medicare Payment Advisory Commission has found that including Part A-only beneficiaries in the benchmark calculation reduces benchmarks by about 1 percent nationally, and this effect is much

larger in counties with more A-only enrollment (Medicare Payment Advisory Commission 2017).

The percentage of FFS beneficiaries who are A-only plausibly meets the exclusion criteria if, conditional on choosing FFS, a beneficiary's choice of enrolling in Medicare Part B changes plan bids by changing the benchmark. This assumption is more plausible under specific conditions. First, we construct our instrument using the percentage of the aged (beneficiaries over 65) who are enrolled in Part A only, rather than the percentage of A-only beneficiaries among both the aged and disabled. Beneficiaries over 65 are more likely to be A-only because they still have employer-sponsored coverage. As the decision to retire is unlikely to be related to Medicare Advantage plans' bids, the decisions to be A-only is more plausibly unrelated to the Medicare Advantage market among the aged. In contrast, the disabled may be more likely to become A-only because they cannot afford the Part B premium. Those beneficiaries might be making joint decisions about enrolling in Medicare Advantage or FFS based on their options for secondary coverage, and therefore their decision might be influenced by benchmarks and bids.

Second, the probability that beneficiaries over 65 choose to stay working and continue their ESI coverage is likely related to local, time-varying economic conditions, which might also influence plan bids. We address this by controlling for the unemployment rate and county-level per capita income in all regressions. Additionally, the percentage of beneficiaries that choose to be Part-A-only and forgo Part B coverage is likely related to underlying population health. That is, beneficiaries may be more likely to stay employed and insured if they are in better health. Controlling for per capita FFS costs partially addresses this concern; additionally, time-invariant differences in population health are absorbed by county fixed effects.

Finally, we specifically focus on the percentage of FFS beneficiaries who are enrolled in Part-A only – rather than the percentage of all Medicare beneficiaries -- to avoid reverse causality. Reverse causality might arise because beneficiaries enrolled in Medicare Advantage must be enrolled in Part A and Part B, and hence, the percentage of all Medicare beneficiaries (not just those in FFS) who are enrolled in Part A and Part B is affected directly by Medicare Advantage plans' bids. We avoid this issue by focusing only on the percentage of FFS beneficiaries who are A-only, where our identification hinges on those beneficiaries deciding to forgo Part B once they have enrolled in Medicare FFS.

We construct the percentage of the FFS enrollment in the county that is Part A-only using the publicly-available files on FFS per capita spending among the aged. Specifically, we subtract Part B enrollment from Part A enrollment and divide by Part A enrollment. That statistic is a reasonable proxy for Part-A only enrollment because—although there are some beneficiaries who are enrolled in Part B only—estimates suggest that those numbers are quite small (Medicare Payment Advisory Commission 2017). For less than 1 percent of observations where A-only enrollment is negative when calculated this way, we replace those values with 0. (Results were unaffected when these values were allowed to be negative.) We then regressed benchmarks on the percentage of A-onlies in a county as a first stage. This regression uses all the same controls used in main results, except we do not control for number of insurers, to avoid reverse causality in our first stage.

Column 1 Table 5 shows that, in the first stage of this regression, the benchmark is reduced by \$4.06 dollars for each additional percentage point of FFS beneficiaries in a county who are A-only. In the average county in 2015, 8 percent of FFS beneficiaries were A-only, so this estimate implies that benchmarks in the average county were roughly \$32 lower than they

would be if all FFS beneficiaries were enrolled in Medicare Parts A and B. The F-statistic on this regression is 1,618, which suggests that the instrument strongly meets the relevance criterion.

Column 2 shows our baseline regression of bids on benchmarks, replicated here without controlling for the number of insurers in the county and without the interaction in the post period, to allow for comparison with IV results. Column 3 shows the effect of instrumenting for the benchmark using the percentage of FFS beneficiaries who are A-only. Coefficients are similar in the two regressions. Without instrumenting, the coefficients on benchmarks suggest that plans reduce their bids by 62 cents for each additional dollar of benchmark payments. After instrumenting, it appears that plans reduce their bids by 71 cents. Based on this analysis, we conclude that endogeneity is not strongly affecting our estimates.

F. SENSITIVITY ANALYSES

Table 6 tests the robustness of our main estimates to alterations in the model or variables. Omitting key controls, including county-level FFS risk, county-level Medicare Advantage risk, and the number of insurers operating in a county, had minimal effects on the coefficients of interest (Columns 2-4). Across specifications, estimates of plans' pre-ACA bid response are between 59 and 62 cents on the margin, while estimates of plans' post-ACA bid response are between 55 and 58 cents on the margin.

Calculating the benchmark without accounting for benchmark increases due to quality bonuses also had minimal effects (Column 5). We performed this specification check because plans can influence their quality scores—either directly by engaging in quality improvements or indirectly by cancelling and consolidating lower-quality plans. Thus, benchmarks that include

quality bonuses could be endogenously related to plans' choice of bid. However, coefficients on benchmarks that exclude quality payments are 62 cents, pre-ACA, and 57 cents, post-ACA. Those estimates are similar to estimates of 60 and 56 cents in a regression that uses benchmarks that account for plans' quality scores.

Redefining the post period to include years 2010 or later, rather than years 2012 and later, changes coefficients on benchmarks by less than 6 cents. Specifically, the coefficient on benchmarks pre-2010 suggests that plans passed through 65 cents of every dollar, and the coefficient on benchmarks 2010 and later suggests they passed through 60 cents. The gap between the pre- and post-period effects is larger in this specification than in other specifications, but the magnitudes of coefficients are similar to those in other regressions.

We also analyzed insurers' bid response using plan-years as the unit of analysis, instead of county-years. Analyzing data on the plan level necessitated several changes in our approach. Namely, we used CMS's published plan-level data on plan bids (instead of county-level data), and we controlled for FFS risk and the number of insurers operating in a plan's markets by averaging those measures across all counties in which a plan operated, weighting by a plan's enrollment in each county. Regressions were weighted by plan-level enrollment (instead of county-level Medicare Advantage enrollment), averaged across all years for which a plan operated under a given identification number, and included plan fixed effects instead of county fixed effects. All regressions included year fixed effects.¹³

Despite changes in key variables and approach, coefficients in the plan-level analysis were remarkably similar to those in the county-level analysis. Specifically, plans appeared to increase their bids by between 62 and 65 cents for each additional dollar of benchmarks, pre-

¹³ Those changes likely had small effects on the set of included plans. Specifically, CMS's published plan-county level data excludes observations with fewer than 11 enrollees – so those observations were excluded from the plan-level analysis, but were likely included in the published county-level data on bids.

ACA, and they decreased them by 53 to 60 cents, post ACA. (Estimates are similar for HMOs and PPOs because analysis includes plan-level fixed effects.) Changes in rebates were also similar across most specifications. One difference of note was that estimates of pass through were lower when we consider the benchmark calculated without stars, which is consistent with the hypothesis that the quality bonus program helped shield beneficiaries from benchmark cuts.

VI. Conclusion

In the years following passage of the ACA, benchmark payments to Medicare Advantage plans decreased, leading to three main effects—a decrease in plan bids, an associated decrease in beneficiary rebates, and a shift by plans in their allocation of pass-through across categories that appear to differ in salience. To our knowledge, this is the first analysis of competitive bidding and pass-through in Medicare Advantage after the ACA. This analysis also provides an explanation for why enrollment in Medicare Advantage has continued to grow, defying experts' projections.

On average, a \$1 decrease in the benchmark led to about a 60-cent decrease in plan bids. This suggests that plans have been bidding above their true costs, possibly using their margin to absorb decreases in benchmarks without needing to exit the market. Before the ACA, the size of this bid response was similar, though in the positive direction, as benchmarks grew, consistent with prior evidence (Cabral, Geruso, Mahoney 2014; Curto et al. 2015; Duggan, Starc, and Vabson 2016; Song, Landrum, Chernew 2013 and 2012). Relative to a scenario with no bid response (for example, perfect competition), this symmetrical bid response after the ACA lessened the potential decline in enrollee benefits. Moreover, declines in final plan payments and

enrollee benefits were further offset by new bonuses from quality incentives and higher beneficiary risk scores.

After the ACA, the 56-cent increase in plan bids led to about a 27-cent decrease in the pass through of rebates to beneficiaries. This implied that beneficiaries received a smaller share of the benchmark cuts than plans did. (The government keeps the residual of the difference between the benchmark and the bid when the bid is below the benchmark, depending on the plan quality star level.) This also suggests that insurers protected or kept beneficiaries from facing the full cost of decreasing subsidies, possibly to keep their Medicare Advantage plans attractive to beneficiaries and remain competitive in the market. Our results suggest that plans in less competitive markets (those with market power), were more able to protect beneficiaries from facing the brunt of the benchmark cuts, given their ability to generate a larger bid response.

Not only did insurers change the magnitude of pass-through to beneficiaries as subsidies declined after the ACA, they also allocated cuts more towards cost sharing and additional benefits than they did before the ACA, when pass-through was increasing. This is consistent with premiums being potentially more important to consumers than cost-sharing or additional benefits. This may be because premiums are more salient or guaranteed, whereas extra benefits in coverage are less salient or may only be realized if the need for medical care arises.

Our results are consistent with imperfect competition in Medicare Advantage. If Medicare Advantage markets were perfectly competitive, changes in the benchmark would not affect plan bids, as competition would ensure that plans push each other's bid down to their marginal costs of delivering services. However, our finding that bids do respond to changes in the benchmark—independent of risk—suggests otherwise. Our results suggest that decreases in the benchmark likely resulted in lower insurer or provider profits. When benchmarks declined,

plans cannot lower their bids indefinitely and remain financially viable. They may respond in other ways: narrowing their networks, paring back on their product line, or exiting parts of their service area. In addition, they may exit the Medicare Advantage market altogether.

That the magnitude of plan response was similar during periods of benchmark increases and cuts has two meaningful implications. First, it suggests that insurer competition in the Medicare Advantage market is imperfect. Second, declining subsidies were shared between plans and beneficiaries. That enrollment in Medicare Advantage nationwide continued to grow despite decreased benchmarks is consistent with our finding that plans shielded rebate dollars from the brunt of the cuts, which allowed them to continue offering rebates to beneficiaries. Our results are also relevant for federal spending. Policies that affect the benchmark will likely have a larger budgetary impact beyond the direct effects on estimated benchmark spending because variation in benchmarks has been found to induce plan entry or exit (Layton and Ryan 2015; Maruyama 2011). Insurers' ability to alter their bids should also be taken into account.

Our analysis has several limitations. First, we do not characterize plan entry or exit in response to benchmark changes, in part because plans' responses have been studied elsewhere (Layton and Ryan 2015; Maruyama 2011). Second, while our analysis expands on prior work by studying how plan benefits respond to changes in the benchmark, our measure of benefits may not adequately capture all margins that plans might adjust. For instance, the out-of-pocket cost measure is calculated under the assumption that all care is received in network. If plans respond to benchmark changes by changing network size or out-of-network cost sharing, this will not be captured in our analysis.

In addition, other research has documented that the intensity with which plans code beneficiaries' diagnoses has increased over the study period, resulting in higher reimbursement

for a given level of bid (Kronick and Welch 2014; Hayford and Burns 2018). Although changes in coding may have shielded plans from benchmark cuts, quantifying the relationship between diagnostic intensity and benchmark changes is better done using patient level data and is an area for future research. Finally, although we find that plan responses to benchmark cuts were limited, this result might not generalize to all benchmark cuts. Rather, there is likely some level of payment at which plans would not be able to cut their bids further and would be forced to raise premiums, decrease benefit generosity, or exit the market.

Finally, as discussed earlier, we cannot separately identify the effects of benchmark increases and decreases on bids and benefits, because virtually all plans experienced benchmark increases in some years and nearly all plans experienced decreases in others. Thus, indicators for when plans experienced benchmark increases would be largely collinear with year fixed effects. This limitation does not affect most of our conclusions, as we find that plans' pass through of bids was remarkably similar during times of both payment increases and cuts. However, in the case of benefits, where it appears that plans responded more strongly post-ACA than pre-ACA, we cannot completely rule out that the differences in insurers' responses were due to other factors affecting benefits during the post-ACA period. Nevertheless, it should be noted that many of the changes that affected benefits post-ACA – such as the institution of mandatory out-of-pocket limits for plans and a greater emphasis on quality metrics such as consumer satisfaction – should have induced plans to increase benefit generosity, rather than reduce it.

In summary, after growing before the ACA, benchmarks in Medicare Advantage decreased post-ACA. Plans responded to payment cuts by lowering their bids, and plans in less competitive markets lowered bids by more. This plan bid response, combined with additional payments from quality bonuses and growth in risk scores, helped plans lessen cuts in enrollee

benefits, which may explain the continued growth in Medicare Advantage enrollment. Reductions in federal payments have heretofore had a limited impact on enrollee benefits. However, if future benefit reductions are larger or passed on to beneficiaries through more salient channels, then payment reductions may slow growth in enrollment.

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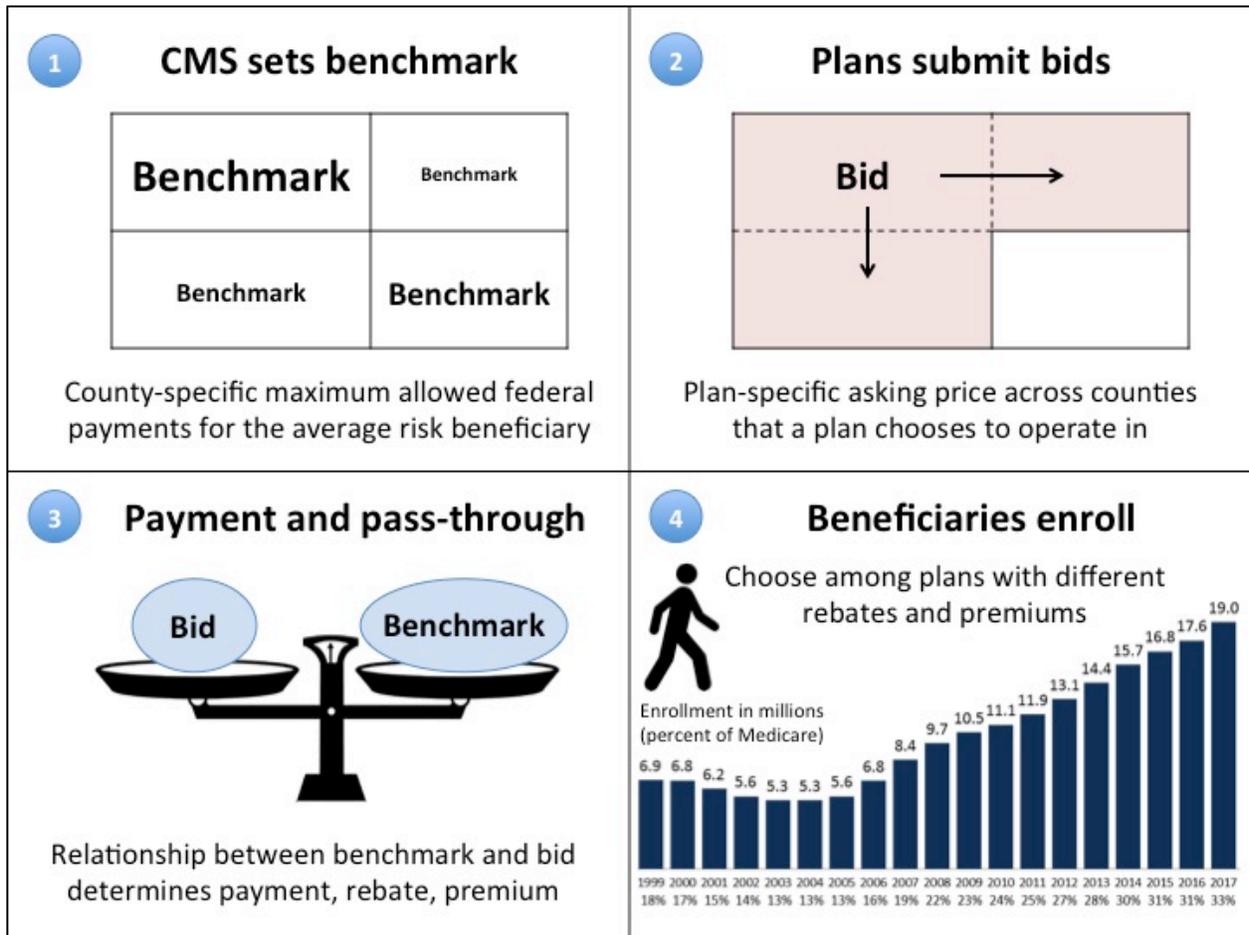
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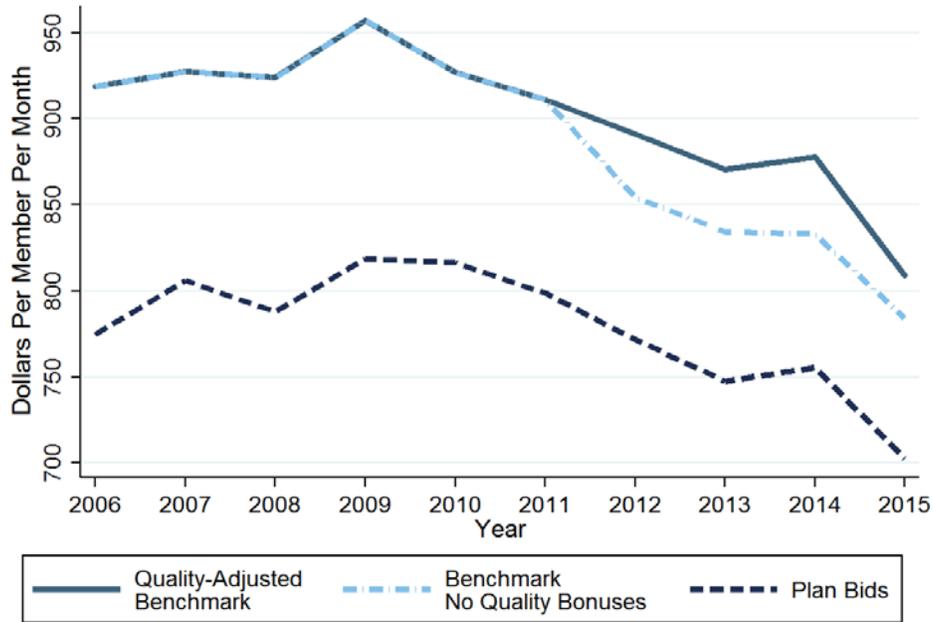
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Figure 1. Benchmarks, Bids, and Pass-through in Medicare Advantage

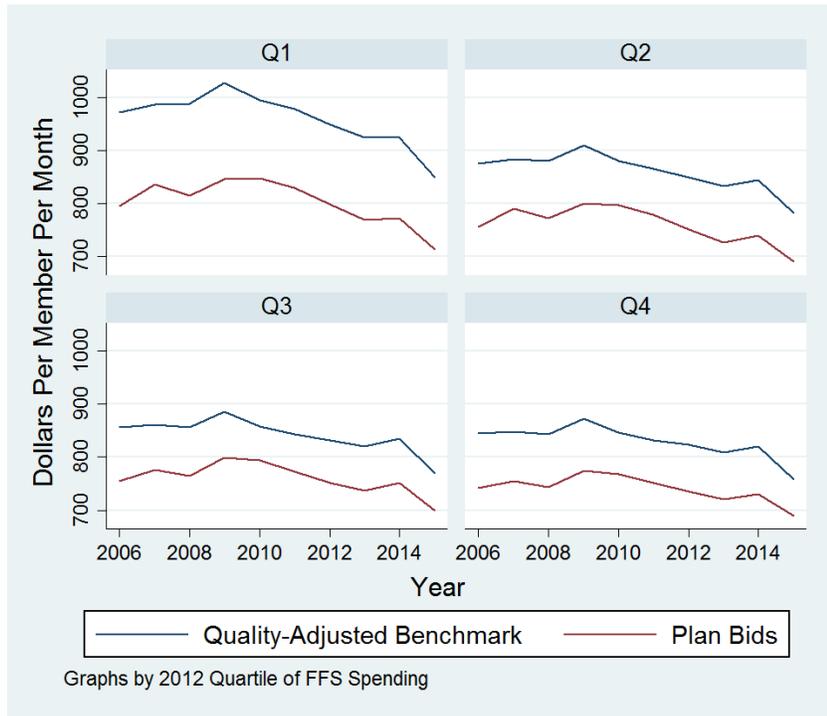


Note: This figure depicts the Medicare Advantage bidding system in 4 stages. First, the Centers for Medicare and Medicaid Services sets a county-specific maximum allowed payment rate for the average-risk beneficiary (benchmark). Second, plans consider the benchmark and submit a bid, which reflects their asking price for insuring the average risk beneficiary across all counties a plan chooses to operate in. Third, the relationship between the bid and the benchmark determines the final plan payment and pass-through (rebates or premium) offered to beneficiaries. Rebates include premium reductions and additional coverage such as vision, dental, and hearing. Finally, beneficiaries may enroll in Medicare Advantage by choosing among plans after considering the available options in terms of premiums or rebate offerings.

Figure 2. Benchmarks and Bids in Medicare Advantage
Panel A.

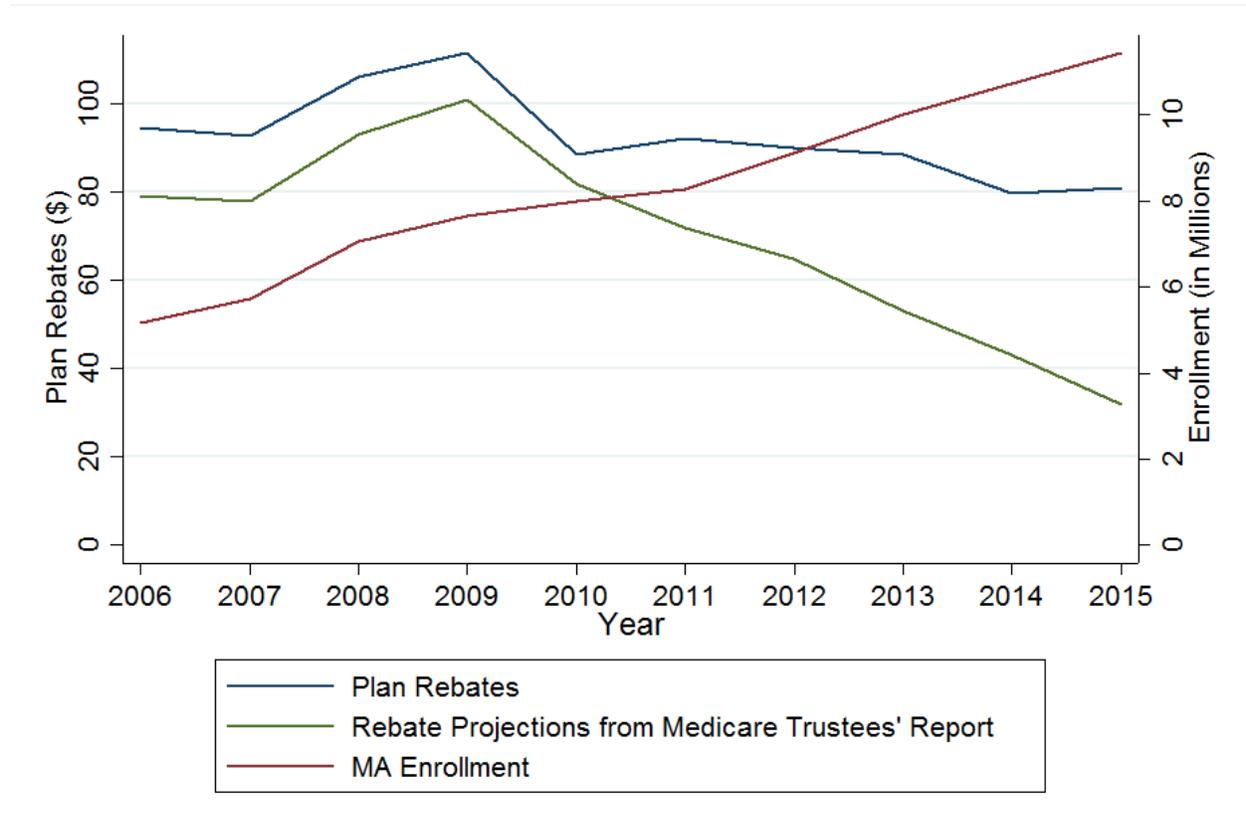


Panel B.



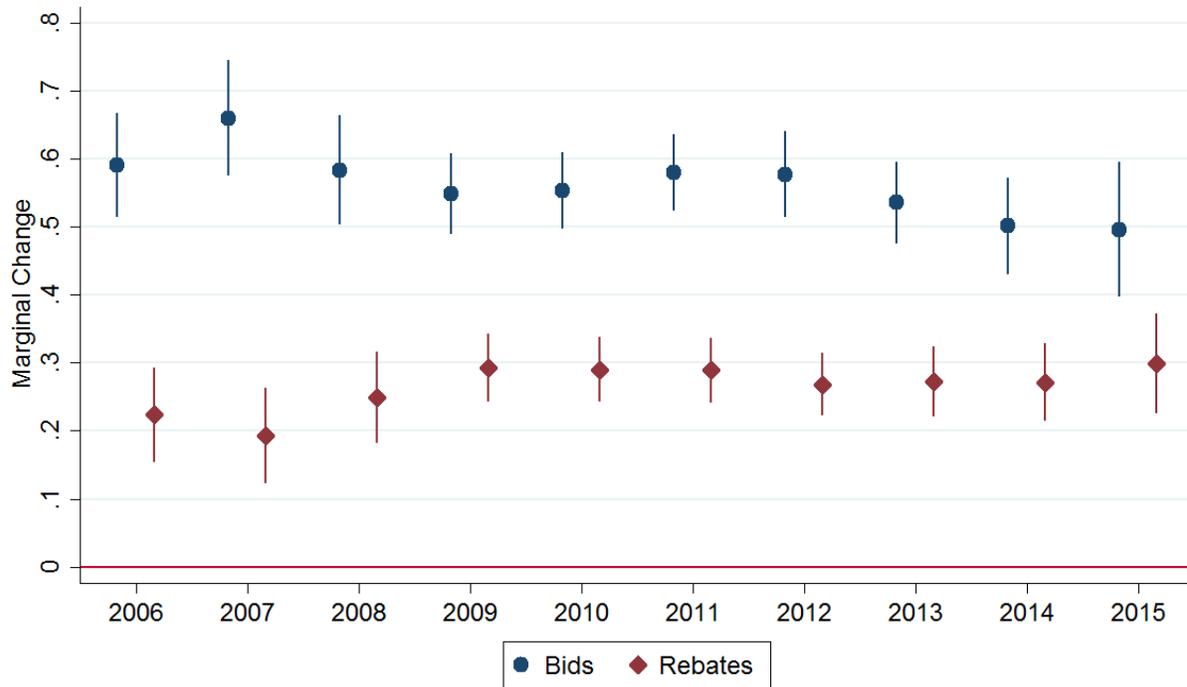
Note: Panel A shows national average levels of quality-adjusted benchmarks, benchmarks without quality adjustments, and bids in Medicare Advantage. Panel B shows quality-adjusted benchmarks and bids, divided by 2012 quartiles of Medicare FFS per capita spending. Both figures include all HMOs, local PPOs, and PFFS plans and are weighted by Medicare Advantage enrollment. Benchmarks that include quality adjustments are averages of the benchmarks faced by plans according to their quality rating. Both benchmarks and bids are adjusted for inflation using the consumer price index to year 2015.

Figure 3. Rebates and Enrollment in Medicare Advantage



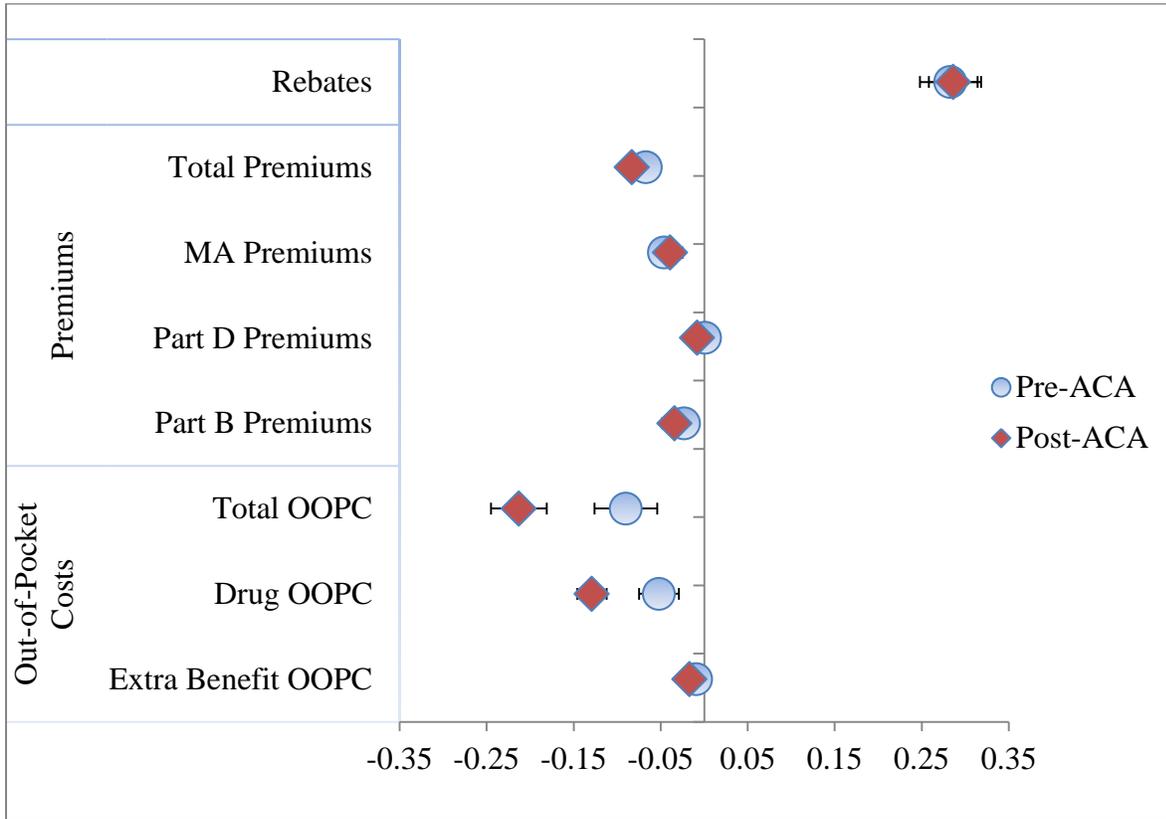
Note: This figure shows national average levels of actual plan rebates and projected rebates from the 2010 Medicare Trustees' Report (<https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/ReportsTrustFunds/downloads/tr2010.pdf>), showing that actual rebates declined less than projected post-ACA. The figure also includes total Medicare Advantage enrollment (in millions).

Figure 4. Marginal Change in Bid for Each Dollar Increase in Benchmark, by Year



Note: This graph plots marginal effects of changes in the benchmark on changes in plan bids, by year. The unit of observation is county-year, weighted by county-level enrollment averaged across the years. Standard errors are clustered at the county level.

Figure 5. Marginal changes from regressing rebates, premiums, and benefits on benchmarks, pre- and post-ACA



Note: This graph plots the marginal change in rebates, premiums, and benefits in response to a \$1 change in the benchmark, before and after the payment cuts passed under the Affordable Care Act (ACA) were implemented. Regressions of benchmarks on Part D and Drug spending only include plans that offer Part D. Out-of-pocket costs reflect beneficiary spending on covered services, given plans' cost sharing and covered benefits. Drug spending and spending on extra benefits reflect beneficiary spending after accounting for spending on pharmaceuticals and supplementary (vision, hearing, and preventative dental) benefits, respectively. Premiums and benefit data do not exist for 2006, so this year is omitted for all regressions in this figure.

Table 1. Summary Statistics

	Pre 2012	Post 2012
Contract Characteristics		
Benchmark (\$)	947.95	874.02
Bid (\$)	802.02	748.53
Rebate (\$)	105.78	86.28
Estimated Payments to Plans (\$)*	893.20	839.01
Plan Characteristics		
Total Out-of-Pocket Costs**	171.11	220.46
Total Out-of-Pocket Drug Spending	66.19	98.75
Out-of-Pocket Spending on Extra Benefits	29.11	33.79
Plan Premiums	25.81	27.88
Part D Premiums	9.32	12.80
Part B Premium Buy Down	0.85	0.93
Market Characteristics		
Number of Insurers in a Plan's Market	5.36	5.01
Insurer HHI	4129	4077
MA risk relative to FFS risk	0.96	0.99
Whether contract is an HMO	75%	0.70%

Note: Characteristics are risk-standardized for a beneficiary of 1.0 risk and adjusted for inflation using the consumer price index to year 2015. The unit of analysis is the plan. Contract characteristics are weighted by plan enrollment, market-level characteristics are not.

* Estimated payments to plans are risk-adjusted bids plus rebates

**Estimated out of pocket cost paid by a representative beneficiary in a plan.

Table 2. Changes in Bids and Rebates in Response to Changes in the Benchmark

	Dependent variable (\$ PMPM)	
	(1) Bids	(2) Rebates
Medicare Benchmark	0.596 (0.036)	0.272 (0.033)
Post * Benchmark	-0.038 (0.016)	0.007 (0.012)
FFS per capita spending	-0.025 (0.013)	0.004 (0.012)
Log MA Risk	-0.730 (0.180)	0.339 (0.138)
Log FFS Risk	0.558 (0.306)	-0.350 (0.209)
Number of insurers	-2.198 (0.532)	2.089 (0.399)
Unemployment Rate	-1.634 (0.655)	0.600 (0.631)
Per Capita Income (\$1000s)	0.259 (0.282)	-0.086 (0.251)
County FE	Y	Y
Year FE	Y	Y
Observations	27,444	27,444
R-squared	0.927	0.919

Note: This table shows coefficients of interest for the plan bid and rebate response before and after the implementation of the ACA benchmark cuts in 2012. The unit of observation is county-year, weighted by county-level enrollment averaged across the years. Standard errors in parentheses are clustered at the county level. After 2012, most plans bidding below the benchmark received a rebate that was 65-75% of the difference between their bid and the benchmark.

Table 3. Heterogeneity of the Bid Response and Rebate Response

Panel A		Dependent variable: Bids (\$ PMPM)					
	(1) Main estimates	(2) Higher competition	(3) Lower competition	(4) Low HHI	(5) High HHI	(6) Urban counties	(6) Rural counties
Benchmark	0.596 (0.036)	0.578 (0.037)	0.686 (0.047)	0.570 (0.037)	0.719 (0.048)	0.555 (0.035)	0.820 (0.034)
Benchmark * Post	-0.038 (0.016)	-0.039 (0.017)	0.033 (0.046)	-0.035 (0.018)	-0.027 (0.029)	-0.031 (0.017)	-0.024 (0.027)
Controls	Y	Y	Y	Y	Y	Y	Y
County FE	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y
Observations	27,444	12,971	14,473	13,729	13,715	11,276	16,168
R-squared	0.927	0.937	0.849	0.934	0.903	0.933	0.861
Panel B		Dependent variable: Rebates (\$ PMPM)					
	(7) Main estimates	(8) Higher competition	(9) Lower competition	(10) Low HHI	(11) High HHI	(12) Urban counties	(13) Rural counties
Benchmark	0.272 (0.033)	0.289 (0.033)	0.163 (0.055)	0.303 (0.032)	0.116 (0.039)	0.309 (0.031)	0.009 (0.022)
Benchmark * Post	0.007 (0.012)	0.005 (0.013)	-0.030 (0.039)	0.003 (0.014)	0.024 (0.022)	-0.001 (0.013)	0.013 (0.019)
Controls	Y	Y	Y	Y	Y	Y	Y
County FE	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y
Observations	27,444	12,971	14,473	13,729	13,715	11,276	16,168
R-squared	0.919	0.928	0.822	0.930	0.819	0.929	0.691

Note: This table examines heterogeneity of the bid response and rebate response by insurer competition. For the purposes of this analysis, we explore competition in three ways. First, counties are defined as higher- and lower- competition counties based on the number of insurers operating in those counties in 2012 (2 or fewer or more than 2). Counties with no insurers in 2012 are excluded from those regressions. Second, we calculated a measure of insurer competition in a county using the Herfindahl-Hirschman Index (HHI), and divided counties into high or lower competition based on median HHI in 2012 (HHI=5,473). Third, we looked at urban vs. rural counties, defined based on urban-rural continuum codes from the 2016 area resource file. Panel A has bids as the dependent variable. Panel B has rebates as the dependent variable.

Table 4. Decomposition of Changes in the Rebate

Dependent variable: Components of Pass-through (\$ PMPM)								
	Rebates	Premiums				Out-of-Pocket Costs		
	(1) Rebates (main)	(2) Total Premiums	(3) MA Premiums	(4) Part D Premiums	(5) Part B Premiums	(6) Total Out-of- Pocket Costs	(7) Out-of-Pocket Drug Costs	(8) Out-of-Pocket Costs on Extra Benefits
Benchmark	0.283 (0.035)	-0.067 (0.012)	-0.046 (0.011)	0.001 (0.005)	-0.023 (0.007)	-0.090 (0.036)	-0.052 (0.023)	-0.009 (0.003)
Benchmark * Post	0.003 (0.011)	-0.016 (0.006)	0.007 (0.005)	-0.009 (0.005)	-0.011 (0.009)	-0.124 (0.020)	-0.077 (0.011)	-0.008 (0.002)
Controls	Y	Y	Y	Y	Y	Y	Y	Y
County FE	Y	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y	Y
Mean of dep var	\$84.31	\$144.15	\$25.28	\$14.65	\$106.96	\$202.65	\$79.25	\$30.40
Observations	24,870	24,870	24,870	24,416	24,870	24,870	24,416	24,870
R-squared	0.929	0.926	0.909	0.857	0.894	0.915	0.937	0.835

Note: Regressions of benchmarks on Part D and Drug spending only include plans that offer Part D. Benchmarks are interacted with indicators for years 2012 or later, where 2012 was the first year in which the ACA benchmark cuts were effective. Out-of-pocket costs reflect beneficiary spending on covered services, given plans' cost sharing and covered benefits. Drug spending and spending on extra benefits reflect beneficiary spending after accounting for spending on pharmaceuticals and supplementary benefits (vision, hearing, and preventative dental), respectively. Premiums and benefit data do not exist for 2006, so this year is omitted for all regressions in this table.

Table 5. Instrumenting for the Benchmark

	(1) Benchmarks First Stage	(2) Bids OLS	(3) Bids IV
A-only Percentage	-4.059 (1.310)		
Benchmark		0.616 (0.037)	0.710 (0.248)
Controls	Y	Y	Y
County FE	Y	Y	Y
Year FE	Y	Y	Y
Observations	27,444	27,444	27,444
R-squared	0.958	0.926	0.774
F-statistic	1,618	552	639

Note: Column 1 is the first-stage regression of Medicare Advantage benchmarks on the percent of aged FFS beneficiaries in a county who are enrolled in Medicare Part A only, using all controls used in prior regressions, except for the number of insurers enrolled in a county. Column 2 is the OLS regression of benchmarks on bids, replicated here with the same controls as in Column 1. Column 3 is a regression of benchmarks on bids, instrumenting for the benchmark using the percentage of beneficiaries who are A-only.

Table 6. Sensitivity Analyses

Panel A		Dependent variable: Bids (\$ PMPM)						
	(1) Main estimates	(2) Omit FFS risk	(3) Omit MA risk	(4) Omit Competition	(5) No star benchmark	(6) Post=2010 or later	(7) Plan level: HMO	(8) Plan level: LPPO
Benchmark	0.596 (0.036)	0.594 (0.036)	0.593 (0.038)	0.620 (0.037)	0.617 (0.038)	0.645 (0.042)	0.632 (0.047)	0.619 (0.141)
Benchmark * Post	-0.038 (0.016)	-0.037 (0.015)	-0.046 (0.017)	-0.046 (0.017)	-0.051 (0.022)	-0.051 (0.022)	-0.102 (0.030)	-0.050 (0.093)
Controls	Y	Y	Y	Y	Y	Y	N	N
County FE	Y	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y	Y
Plan FE	N	N	N	N	N	N	Y	Y
R-squared	0.927	0.927	0.926	0.926	0.924	0.927	0.903	0.858
Observations	27,444	27,444	27,444	27,444	27,444	27,444	11,146	4,137
Panel B		Dependent variable: Rebates (\$ PMPM)						
	(9) Main estimates	(10) Omit FFS risk	(11) Omit MA risk	(12) Omit Competition	(13) No star benchmark	(14) Post=2010 or later	(15) Plan level: HMO	(16) Plan level: LPPO
Benchmark	0.272 (0.033)	0.273 (0.033)	0.274 (0.033)	0.254 (0.033)	0.221 (0.043)	0.231 (0.034)	0.314 (0.035)	0.256 (0.121)
Benchmark * Post	0.007 (0.012)	0.006 (0.012)	0.011 (0.013)	0.017 (0.014)	0.003 (0.011)	0.054 (0.015)	0.036 (0.019)	-0.079 (0.072)
Controls	Y	Y	Y	Y	Y	Y	N	N
County FE	Y	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y	Y
Plan FE	N	N	N	N	N	N	Y	Y
R-squared	0.919	0.919	0.918	0.916	0.913	0.918	0.906	0.762
Observations	27,444	27,444	27,444	27,444	27,444	27,444	11,146	4,137

Note: This table shows sensitivity analyses of the bid and rebate response. Panel A uses bids as the dependent variable. Panel B uses rebates as the dependent variable. Columns (1) and (9) replicate the base estimates from Table 2. Columns (2-3) and (10-11) omit FFS and Medicare Advantage risk, respectively, from the county-level model. Columns (4) and (12) omit the control variables reflecting the number of insurers operating in the county. Column (5) and (13) use a benchmark that does not include the influence of quality bonuses, given that plans could endogenously choose their star level. Columns 6 and 14 alternately define the “post” period as years 2010 or later rather than 2012 or later, where 2012 was the first year that the ACA benchmark cuts were effective. Columns (7-8) and (15-16) estimate the bid and rebate response using regressions at the plan level, rather than the county level, by plan type (LPPO denotes local PPO plans). Plan-level regressions are weighted by average-plan level enrollment, average over all years for which the plan operates under the same plan ID.