Heterogeneous Effects of Consolidation on Premiums in Medicare Part D*

Nicholas Hill

Bates White Economic Consulting

Mathis Wagner

Bates White Economic Consulting

This version: January 2020

Abstract

We show that the benefits of the private provision of public health insurance coverage can be undermined if excess consolidation among private insurers is permitted. Using plausibly exogenous variation induced by the merger between CVS and Universal American, we find that rising concentration for Medicare Part D plans resulted, on average, in higher premiums. Importantly, consistent with the assumptions behind standard antitrust practice, we show that the effects of consolidation are heterogeneous: consolidation resulted in large premium increases in newly concentrated markets, while other markets experienced small and marginally significant decreases in premiums.

JEL: I11, I13, G22, H51

Keywords: Medicare; Part D, Health Insurance; Merger; Concentration; Premiums; Heterogeneity

* This paper is not purported to represent the views of the Department of Justice, Bates White Economic Consulting, or anyone other than the authors. Nicholas Hill was retained by the DOJ to testify on its behalf in a Tunney Act proceeding concerning the CVS-Aetna merger. Mathis Wagner worked with Nicholas Hill on the same matter. We would like to thank Bridgette Degnan and Brian Leibowitz for excellent research assistance and Cory Capps, Francesco Decarolis, Laura Kmitch, Malika Krishna, Margaret Loudermilk, Gloria Sheu, Chad Syverson, and Scott Thompson for insightful feedback. All remaining errors are our own.

1 Introduction

In the United States there has been a dramatic expansion of programs that use private markets to provide publicly-subsidized health insurance coverage. The goal of these programs is to harness competition to deliver high-quality health insurance at low premiums. While privatizing the delivery of health insurance can have benefits, it can also pose challenges.[1] In particular, the privatization of the U.S. health insurance industry has been accompanied by significant consolidation.[2] Such consolidation, if it creates market power, could negate or reverse the efficiency gains that the privatization of health insurance could otherwise deliver.

In this paper, we tackle this issue by analyzing how health insurance consolidation has affected the prices of Medicare Part D plans, which provide prescription drug coverage to seniors covered by the Medicare program.[3] The existing evidence suggests that Part D plans have been successful in negotiating lower prices for branded drugs and that this has helped contain costs (Duggan and Scott Morton 2010, 2011). Nevertheless premiums have increased over time,[4] and recent research has identified a number of challenges to the efficient working of the Medicare Part D program.[5] Among these is the steady trend of insurer consolidation.[6]

We add to this literature by using the 2011 merger between CVS and Universal American to estimate the effect of increases in Part D plan insurer concentration on premiums. In addition to providing novel evidence for the Medicare Part D market, our paper extends the previous literature in a few important

---

[1] See Gaynor, Ho and Town (2015) and Gruber (2017) for recent surveys.
[2] Dafny (2010) shows that firms with higher profits pay higher health insurance premiums, concluding that health care insurers are exercising market power. Cabral, Geruso and Mahoney (2018) find evidence of extensive market power in Medicare Advantage, based on incomplete pass-through of government subsidies. Crouzet and Eberly (2018) argue that the healthcare sector is characterized by stable productivity and growing markups, evidence of rising market power. Gaynor (2018) provides an overview.
[3] These drug plans are offered by private insurers but are heavily regulated by the government. Duggan, Healy and Scott Morton (2011) and Kirchhoff (2018) provide extensive descriptions of the Medicare Part D program. Seniors covered by original Medicare can obtain coverage by enrolling in a stand-alone Part D plan. Seniors covered by Medicare Advantage plans also have access to drug coverage, but cannot purchase stand-alone Part D plans but rather must purchase Medicare Advantage plans that include drug benefits.
[4] In the period 2009–2019 the mean enrollment weighted premium paid for standalone PDP plans increased from around $34 to around $40 per month.
[5] See Ericson (2014) on consumer inertia in plan choice; Ho, Hogan and Scott Morton (2017) on the role of consumer inattention in insurer pricing; Starc and Town (2016) study the role of plan design on prescription drug spending; and Decarolis, Polyakova and Ryan (2019) study the efficiency of the subsidy design for PDP plans, and conclude that the current mechanism acts much like a voucher and obtains a level of welfare close to the optimal voucher.
[6] Decarolis (2015) provides evidence for an interesting mechanism relating rising concentration to premium growth based on the manipulability of low-income subsidies for PDP plans. Chorniy, Miller and Tang (2018) provide a discussion of the M&A activity in PDP markets in the early years of the program.

ways. First, we allow for the effect of concentration on premiums to vary with the level of concentration of a market. Structural models suggest heterogeneous treatment effects,[7] and a central premise of U.S. competition policy is that mergers are likely to be problematic primarily in relatively concentrated markets.[8] Despite the centrality of concentration thresholds in U.S. (and international) prospective merger analysis, there is a dearth of (reduced-form) empirical evidence that would justify their significance.[9] Second, we are able to identify the impact of concentration on both within plan changes in premiums and average premiums in a market, which helps address the concern in Dafny, Duggan and Ramanarayanan (2012) that unobserved changes in plan quality may explain their results.[10] Third, the data allows us to analyze non-price responses to an exogenous change in concentration, including the entry and exit of plan sponsors and plans.

The raw correlation between concentration and insurance premiums is unlikely to be causal. For example, if low-cost plan sponsors offer low-premium plans and consequently win a large share of the market, then high concentration may be correlated with low premiums. However, that relationship is not causal but rather driven by (unobserved) heterogeneity in firms' region-specific cost structure. Similarly, if costly (and desirable) quality improvements are not completely captured by covariates, high-priced, high-quality plans may displace low-priced, low-quality plans, leading to a correlation between high prices and high concentration. Our identification strategy addresses these endogeneity concerns by relying on the local variation in concentration induced by a major national merger—CVS's acquisition of Universal American's Part D business on April 29, 2011—in the 34 prescription drug plan (PDP) regional markets.[11]

The IV estimates show that on average, assuming a homogenous treatment effect, the CVS-Universal American merger increased PDP plan premiums by 1.7 percent across the regional PDP markets (and 1.3

[7] Previous work has examined heterogeneous marginal effects from mergers. Nevo and Whinston (2010, p. 73) argue that on account of likely within-industry heterogeneity in the impact of concentration, "simply looking at the average effect of all previously consummated mergers is unlikely to provide a very useful prediction." Conlon and Mortimer (2019), when estimating diversion ratios, find substantial differences in the marginal treatment effect (at pre-merger prices) and the average treatment effect. Miller, Remer, Ryan and Sheu (2017) provide evidence from Monte Carlo experiments on heterogeneity in the predicted price effects of mergers.

[8] Department of Justice (DOJ) and Federal Trade Commission (FTC), *Horizontal Merger Guidelines*, Aug. 19, 2010, § 5.3.

[9] See Kwoka (2013) for an overview.

[10] Dafny, Duggan and Ramanarayanan (2012) highlight that "quality remains an important omitted factor in our analysis." (p. 1180)

[11] Conceptually, we use the same instrument as Dafny, Duggan and Ramanarayanan (2012). That paper emphasizes that only large, non-local mergers are candidates for this analysis, and that one must use a pre-period and post-period of significant length. The Part D merger that we use is the only merger in this industry we are aware of that fits these criteria.

percent within plans).[12] This finding adds to a growing literature using plausibly exogenous merger-induced differences in competition to identify an average treatment effect,[13] and is consistent with an emerging consensus that health insurer consolidation degrades the benefits of privatization when concentration reaches high levels.[14] Importantly, we find that the impact is long-lasting (more than five years) and consolidation does not result in subsequent entry of plans or competitors in a regional market.

Our estimated average price effects mask considerable heterogeneity in marginal price effects. We find large and statistically significant *increases* in premiums in markets that became considerably more concentrated due to the merger (or were already relatively more concentrated) and small and marginally significant *decreases* in premiums in other markets. Allowing for heterogeneous treatment effects, we find that the merger increased premiums in moderately concentrated PDP markets by 3 percent but not at all in unconcentrated markets (and possibly resulted in small decreases in premiums). Our results provide clear evidence of heterogeneity in the impact of concentration on premiums and provide support for the use of concentration thresholds in prospective merger analysis by antitrust agencies.

To illustrate the importance of accounting for non-linearities in the impact of concentration on premiums, we analyze the implied price effect from the recent merger between CVS and Aetna had the U.S. the DOJ not imposed any remedy. Our homogenous treatment effects model predicts that the CVS-Aetna merger, absent divestitures, would have led to Part D plan premiums increases of 4.2 percent. Our heterogeneous treatment effect model predicts an even larger premium increase of 5.2 percent. Of course, the DOJ did impose a remedy on CVS and Aetna: it required that the merged firm divest Aetna's Part D lives and additional Part D assets to Wellcare.[15] Our homogenous treatment effects model predicts that with the divestiture—which can be thought of as a merger between the Part D lives of Aetna and Wellcare—the merger will lead to a price increase of only 0.9 percent. The heterogeneous treatment model suggests that the divestiture will be even more effective: it predicts no significant premium increase on average.

---

[12] Our reduced-form estimates of the merger effect implies a very similar impact, suggesting that most of the impact of the merger is picked up by the change in concentration.

[13] See, for example, Hastings (2004, retail gasoline markets), Dafny, Duggan and Ramanarayanan (2012, large group health insurance); Ashenfelter, Hosken and Weinberg (2013, the Maytag-Whirlpool merger); Allen, Clark and Houde (2014, mortgage industry); Ashenfelter, Hosken and Weinberg (2015, breweries); and Lewis and Pflum (2017, hospitals). Angrist, Graddy and Imbens (2000) discuss the interpretation of IV in a simultaneous equations setting.

[14] For studies of the impact of concentration on premiums in health insurance see Dafny, Duggan and Ramanarayanan (2012); Guardado, Emmons and Kane (2013); Trish and Herring (2015); Dafny, Gruber and Ody (2015); and Ho and Lee (2017).

[15] See the Asset Preservation Stipulation and Order in the matter of *United States of America et al. v CVS Health Corporation and Aetna Inc*., Case 1:18-cv-02340 (Department of Justice, October 10, 2018) and the associated Q&A at https://www.justice.gov/opa/pr/justice-department-requires-cvs-and-aetna-divest-aetna-s-medicare-individual-part-d.

The remainder of the paper proceeds as follows. Section 2 describes the data and the institutional setting. Section 3 provides OLS, reduced-form and IV estimates of the impact of the merger and increased concentration on premiums. Section 4 discusses evidence of heterogeneity in the treatment effect due to differences in market structure, and Section 5 simulates the predicted effects of the CVS-Aetna merger with and without divestitures. Section 6 concludes.

2 Background and data

Medicare Part D is available to all Medicare enrollees and it can be accessed in a number of ways.[16] The two most common ways are through stand-alone Part D plans (which are available to traditional Medicare enrollees) and Medicare Advantage plans that include Part D benefits.[17] In this paper we follow the literature in focusing on stand-alone individual Part D plans, which seniors covered by original Medicare can opt to purchase.[18]

There are two main types of stand-alone individual Part D plans: basic and enhanced. A basic plan must provide coverage that is actuarially equivalent to a set of benefits prescribed by the Centers for Medicare & Medicaid Services (CMS), but basic plans can differ in exactly what benefits they provide. Insurers may also offer enhanced plans whose coverage can exceed the value of defined standard coverage.

There are 34 Part D regions. An insurer (also known as a plan sponsor) may offer only one basic plan benefit design in a region and no more than two enhanced alternative plans.[19] An enrollee in a stand-alone Part D plan may only select a plan that is offered in the region in which he or she resides (and all eligible individuals in a region are offered the same plans).[20] There is strong evidence that the Part D plans offered in a region constitute an antitrust market.[21] Hence, in what follows, we will analyze the relationship between concentration, concentration changes, and premiums in the 34 Part D plan regions, or markets.

---

[16] Congress created Part D in the Medicare Prescription Drug, Improvement, and Modernization Act of 2003, effective January 1, 2006.

[17] In July of 2018, 44.2 million Medicare beneficiaries were enrolled in Part D plans (nearly three-quarter of all Medicare beneficiaries). Of that total, 25.5 million traditional Medicare enrollees were enrolled in stand-alone Part D plan, 18 million Medicare Advantage enrollees were in a Medicare Advantage plan that included Part D benefits, and 690,000 Medicare enrollees were enrolled in other types of Part D plans.

[18] There are also PDP group plans, which are not a close substitute for individual plans because they typically include enrollment criteria that individuals do not and cannot met (e.g., having been an employee of a particular firm).

[19] The exception is that post-merger a plan sponsor has two years within which to consolidate plans, and so may have up to six plans (three from each of the merging parties) for 2 years.

[20] Kirchhoff (2018), p. 2.

[21] The relevant market depends on demand and supply-side characteristics, both geographic (sponsors offer region-specific plans and insured patients cannot opt for a plan offered outside of the region they are resident in) and product-related (consumers can freely choose between PDP plans, but rarely switch to other types of drug insurance

We use premium and enrollment data from the CMS covering the period from 2009 to 2019.[22] A unit of observation in our data is a plan year. The data include information on each plan's premium and a large number of covariates related to plan quality and insurer characteristics. [23]Table 1 provides summary statistics for key variables for stand-alone plans for the years 2009 and 2019. The table shows that unweighted, mean plan premiums ($47 in 2019) have been fairly stable over time,[24] but there is considerable variation in the premiums that different plans charge (a standard deviation of $27 in 2019). The average deductible offered by plans has increased from $111 to $270, with considerable variation across plans.[25] The average number of drugs on a plan's formulary is over 3,000 with only modest variation across plans (a standard deviation of around 600). The number of pharmacies within network has increased over time from around 55,000 to around 65,000, but there is a considerable decrease in heterogeneity across plans with the standard deviation in 2009 equal to nearly 20,000 and that in 2019 below 5,500. The fraction of plans categorized as enhanced increased from 54 to 61 percent. On average sponsors offer more than one basic plan and more than two enhanced plans in a market.[26] The size of market, as measured by PDP enrollment, varies considerably and has been growing over time.

The concentration of Part D plans, as measured using the Herfindahl-Hirschman Index (or HHI), has varied considerably across markets and over time; see Table 1.[27] Concentration has increased substantially over time, from a mean HHI of 1685 in 2009 to 2070 in 2019.[28] At the same time the variation in concentration across regions has decreased: in 2009 the standard deviation was 545 and by

plans). See the Complaint in the matter of *United States of America et al. v CVS Health Corporation and Aetna Inc*., Case 1:18-cv-02340 (Department of Justice, October 10, 2018). The Department of Justice investigation, for example, found that "only about two percent of individual PDP members convert to Medicare Advantage plans each year during open enrollment, and an even smaller percentage of individuals convert from Medicare Advantage plans to individual PDPs;" and concluded that "individual PDPs satisfy the well-accepted "hypothetical monopolist" test set forth in the U.S. Department of Justice and Federal Trade Commission's *2010 Horizontal Merger Guidelines*." (p. 8) *See also* Koma, Cubanski, Jacobsen, Damico and Neuman (2019). In our empirical specifications, below, controlling for Medicare Advantage enrollment in a PDP market does not significantly affect our estimates.

[22] Within-year enrollment in Medicare Part D plans does not vary substantially, and the results in this paper do not depend on the choice of month. We assign all lives to the state in which the policy was issued.

[23] See Table 1 for a list of the variables used in the empirical analyses.

[24] In contrast, enrollment-weighted premiums have increased substantially. Reported premiums are not deflated.

[25] In 2009 around 47 percent of enrollees were in plans with no deductible and 49 percent had a deductible of $295, while in 2019 less than 39 percent of enrollees were in plans with no deductible and 45 percent had a deductible of $415.

[26] This is possible despite the restriction described above due to considerable merger activity among plan sponsors: when plan sponsors merge, for two years the merged firm may exceed limits on the number of plans per market to give it the ability to smoothly transition its enrollees to its new, reduced set of plans.

[27] The HHI is calculated as the sum of the squared market shares of all firms in a market. Measuring concentration in a market using the HHI is standard practice in the reduced-form empirical literature, and in the merger analysis of the DOJ and FTC.

[28] For context, the DOJ and FTC would consider the average PDP market moderately concentrated (an HHI between 1500 and 2500) and mergers that increase the HHI by over 200 points are "presumed to be likely to enhance market power;" see DOJ and FTC (2010).

2019 it had fallen to 271. This suggests that consolidation has occurred particularly rapidly in previously less concentrated markets.

3 Market concentration and premiums

3.1 OLS estimates of the relationship between market structure and premiums

To explore the relationship between plan premiums (for plan *i* offered by plan sponsor *j* in region *r* and year *t*) and concentration in a market more formally we begin by estimating the following general model:

$$ln\, premium_{ijrt} = \beta_0 + \beta_1 HHI_{rt} + X_{ijrt} + X_{jrt} + X_{rt} + \delta_r + \delta_t + \delta_j \times \delta_t + \delta_i + \epsilon_{ijrt}, \quad (1)$$

In addition to the HHI, the observable covariates X_{ijrt} capture differences in plan quality, plan sponsor characteristics X_{jrt}, and market-level factors X_{rt} other than concentration.[29] The model includes market fixed effects δ_r and year fixed effects δ_t. The inclusion of these fixed effects means that the effects of changes in concentration on premiums are identified by both within-region variability over time and within-year variability across regions. Unobserved time-varying differences between insurers, such as their cost structure, are captured by the sponsor by year fixed effects $\delta_j \times \delta_t$. Finally, in the last column Table 2, the model includes plan fixed effects δ_i to control for unobserved time-invariant heterogeneity in plan offerings.[30] When it does, the effect of concentration on premiums is identified by changes within existing plans rather than the entry and exit of plans.[31]

Table 2 presents results from 2009 to 2019 for: (1) basic plans, and (2) all plans (i.e., both basic and enhanced plans). There is no significant correlation between the HHI in a market and the log of plan premiums: in all specifications, the estimated correlation is economically and statistically insignificant, and confidence intervals are fairly small.[32] The lack of correlation between premiums and concentration is consistent with Dafny, Duggan and Ramanarayanan (2012) for health premiums of large employer-

[29] A direct theoretical connection between HHIs and pricing depends on particular model assumptions, see e.g. the discussion in Syverson (2019).
[30] Note that since plans are region specific, plan fixed effects make the inclusion of region fixed effects redundant.
[31] Instead of including plan fixed effects we could take the first differences of plan premiums, like Dafny, Duggan and Ramanarayanan (2012), and only explore the relationship between premium growth and market concentration. The reason that we prefer the specification in levels is that market concentration may be related to average premiums in a market due to differences in prices for existing plans and price differentials caused by the entry and exit of plans, and it is more straightforward to explore both these mechanisms in a levels specification.
[32] The interquartile range in HHIs across markets (defined as a region-year) is around 500 points, the point estimates imply associated premium differences ranging from -0.13% to 1.05%.

sponsored health plans, while Dafny, Gruber and Ody (2015) find a positive association between concentration and premiums in the ACA's health insurance marketplaces.

Table 2 also reports coefficients for our other main additional variables (for the full sample of basic and enhanced plans), and these coefficients typically have the expected sign. For example, premiums are higher for plans with: (1) a lower deductible, (2) additional coverage, (3) a larger formulary (i.e., number of covered drugs), and (4) a larger (preferred) pharmacy network. We also find, as did Ericson (2014), that new plans are priced significantly lower than existing plans. Our market-level controls are only significant when insurer by year and plan fixed effects are excluded.

3.2 The causal impact of consolidation on PDP premiums

In this section, we provide instrumental variables estimates of the causal relationship between concentration and premiums. As discussed above, the correlation between market concentration and premiums is unlikely to be causal. To address endogeneity concerns, our research design exploits the variation in concentration induced by a 2011 national merger between CVS and Universal American.[33]

3.2.1 Actual and simulated changes in concentration

In 2011, prior to the merger, CVS had 8 percent of PDP lives and Universal American (UA) 11 percent, but they had quite different regional distributions. For every market we calculate the predicted change in HHI due to the merger, i.e., the change that would have occurred absent any other changes. To maintain consistency with the literature and avoid confusion, we call this quantity the simulated delta HHI and calculate it as follows:

$$\Delta HHI_r^{simulated} = \left(share_{2011}^{CVS} + share_{2011}^{UA}\right)^2 - \left({share_{2011}^{CVS}}^2 + {share_{2011}^{UA}}^2\right)$$
$$= 2 * share_{2011}^{CVS} * share_{2011}^{UA}. \qquad (2)$$

Figure 1 shows the substantial variation in predicted HHI changes across local markets, which results in different shocks to predicted post-merger concentration across PDP markets. The average simulated delta HHI is 147, with a low of 10 and a high of 636. The distribution is right-skewed, with a median simulated delta HHI of 88.

[33] The rationale for the merger emphasized its national aspect, rather than any region considerations; see for example: https://cvshealth.com/newsroom/press-releases/cvs-caremark-purchase-universal-americans-medicare-part-d-business, https://www.reuters.com/article/us-cvs-antitrust/cvs-gets-go-ahead-to-buy-universal-american-unit-idUSTRE72055Z20110301, and https://www.prnewswire.com/news-releases/cvs-caremark-to-complete-acquisition-of-universal-americans-medicare-part-d-business-120857239.html.

To investigate the degree to which the simulated change in HHI actually predicted the level of concentration in a regional market we estimate the following equation:[34]

$$HHI_{rt} = \beta_0 + \beta_1 \Delta HHI_r^{simulated} \times post_t + \delta_r + \delta_t + \epsilon_{rt}, \qquad (3)$$

The "post" variable takes the value of one in every year after 2011 and zero otherwise. We estimate the equation separately for each year in the sample and always include 2011 as the baseline year.

Table 3 shows that for every post-merger year, the simulated delta HHI in a region is a highly significant predictor of the HHI in that region. The coefficient on the simulated delta HHI variable (β_1) is consistently above one and relatively stable. This implies that the simulated delta HHI, based on the pre-merger shares of CVS and United American, is an excellent predictor of the post-merger changes in concentration in a market. Conversely, the pre-merger delta HHI is uncorrelated with market concentration in the period before the merger (i.e., 2009 and 2010). This implies that the simulated delta HHI is not simply picking up a pre-merger trend in concentration, and reinforces that it is a suitable proxy for the merger's effect on concentration.

3.2.2 IV estimates of the causal impact of market concentration on premiums

To address the question of whether increases in market concentration result in increases in premiums in the PDP market, we use the simulated delta HHI due to the CVS-Universal American merger as an instrument for post-merger concentration in each Part D region. As discussed above, the simulated delta HHI is an excellent predictor of subsequent concentration in regional PDP market. Moreover, the CVS-Universal American merger was driven by national considerations and not the conditions in any particular regional market—as such, it is unlikely that changes in premiums affect the simulated delta HHI. Empirically, we test our assumption that the simulated delta HHI is exogenous using the same specification as in equation (1) above, for the full sample of plans. We find that changes in log premiums do not vary systematically with the simulated delta HHI.[35]

We estimate the following model in which we regress log premiums on the HHI, instrumenting for the HHI with the simulated delta HHI:

$$\ln premium_{ijrt} = \beta_0 + \beta_1 HHI_r \times post_t + X_{ijrt} + X_{jrt} + X_{rt} + \delta_r + \delta_t + \delta_j \times \delta_t + \delta_i + \epsilon_{ijrt}. \qquad (4)$$

[34] To maintain comparability with the first stage of the IV estimator below, this regression is weighted by the number of plans in each market-year. Recall the *r* stands for region and *t* for time (i.e., year).

[35] Specifically, in a specification without plan fixed effects the coefficient is 0.109 and the standard error 0.108. Once plan fixed effects are included there is not sufficient variation to identify the correlation between premiums and delta HHI (it is perfectly collinear with the plan fixed effects).

Table 4 reports our (abbreviated) first and second stage estimates of this model. It uses data from 2009 to 2016, and shows results for: (1) basic plans only (Panel I), and (2) all plans (i.e., basic and enhanced; Panel II). Column 1 shows results for a parsimonious specification including only market and year fixed effects; subsequent columns add additional covariates. In the first stage, we find that the simulated delta HHI is positively and statistically significantly related to post-merger concentration. The first-stage estimates are consistently above one, between 1.3 and 1.4 (though the estimates are not statistically significantly different from one), implying that the increase in concentration due to the merger was somewhat larger than the pre-merger simulated delta HHI would suggest.[36]

In the second stage, we find that increased concentration in a Part D region results in increased premiums. Comparing the estimates in columns 1 and 2, we note that the inclusion of our rich set of covariates reduces the standard errors of the estimates substantially and they become statistically significant.[37] Our preferred specification of the model (column 4) implies that the merger resulted in a 1.5 percent increase in premiums for all existing plans and a 2 percent increase in premiums for basic plans.[38] Further, comparing the results in columns 3 and 4 suggests that while most of the increases in premiums came from increases in the prices of existing plans, the exit and entry of plans also likely contributed to higher average premiums.

The results are robust to varying the sample period. Once the sample is extended to 2013 and beyond the point estimates are remarkably stable.[39] Increased concentration in a regional PDP market, due to the merger, resulted in long-lasting increases in premiums in that market.[40]

---

[36] Dafny, Duggan and Ramanarayanan (2012) use the lagged HHI as their instrument. We find that using the lagged HHI yields very similar results to those reported based on the contemporaneous HHI, likely because outside of large mergers HHIs change only slowly year-to-year. While it is true that the price of plans is set before consumer purchase decisions, as in most industries we have studied, we note that these decisions are made in the same year (sponsors have to submit plans to CMS by the first Monday in June and open enrollment starts on October 15; see Kirchoff, 2018). For example, Ericson (2014) on PDP pricing decision analyzes plan premiums and shares in the same time period, and Dafny, Gruber and Ody (2015), in a very similar setting, use the contemporaneous HHI in their work on ACA's health insurance marketplaces, and so as our default we retain the usual practice of estimating equilibrium relationships based on prices and quantities in the same period.

[37] For all estimates reported in this paper standard errors are clustered by market.

[38] On average across regional PDP markets concentration increased by 235 points in the five post-merger years (and our estimates suggest most of that was due to the CVS – Universal American merger). Reduced-form estimates of the impact of the merger, regressing log premiums on the simulated delta HHI, imply very similar premium increases: 1.7 percent for all plans and 2.2 percent among basic plans (the mean simulated delta HHI across the 34 regional PDP markets is 147).

[39] The estimates are significantly smaller in 2012. Recall though that the merger was only completed in late April 2011, and plan sponsors must submit their bids for the following plan year to CMS by June. Given that preparing bids is an extremely complex process, it would not be surprising if there was not enough time for insurers to account for the merger in constructing their plans and pricing for 2012.

[40] This evidence is consistent with the conclusion of Dafny, Duggan and Ramanarayanan (2012) for large group health insurance. Chorniy, Miller and Tang (2018) investigate related issues relying on within market variation of

3.3 Non-price effects of consolidation

Thus far, we have examined the impact of market structure on premiums. Our data also allows us to analyze provider responses on other margins, including the quality of plans and the entry and exit of plans and providers.[41] Using the same identification strategy as in Equation 4, above, we find that increases in concentration lead existing plans to increase deductibles. The impact of this change is uncertain for basic plans, since the benefit design of a basic plan must be actuarially equivalent to a CMS-mandated benefit design. For enhanced plans, however, it may represent a diminution of quality.

Our results suggest that changes in concentration do not affect additional coverage, the number of drugs in the formulary, the number of in-network pharmacies, or the number of preferred in-network pharmacies. Finally, we also find that a change in concentration has no statistically significant effect on stand-alone Part D plans' share of all Part D plans, i.e., it does not appear to drive enrollees to switch to Medicare Advantage plans that offer Part D coverage.

As concerns the permanency of effects of consolidation, one might expect markets that experienced larger increases in concentration (and larger associated premium increases) to subsequently attract additional competitors and/or existing competitors adding new plans. In practice, our estimates suggest that the merger-induced change in concentration had no impact on the number of plans offered in a region.[42] Interestingly, increases in concentration seem to have a negative impact on the subsequent number of competitors in a market. The point estimates (though only significant at the 10 percent significance level) suggest that a market with the mean increase in concentration in the five years after the merger experienced an additional decline of about 0.25 competitors.

The pattern of results summarized above are inconsistent with the two alternative explanations posited by Dafny, Duggan and Ramanarayanan (2012) for the finding that consolidation resulted in an increase in premiums. First, the hypothesis that this might be explained by "mistakes" in CVS's post-merger pricing strategy is inconsistent with our finding that the impact of the merger resulted in long-lasting increases in premiums. Presumably, mistakes would not persist for seven years after the completion of the merger. In addition, when we split the sample into merging and non-merging parties, we (like Dafny, Duggan and Ramanarayanan, 2012) find that insurers which were not involved in the merger responded to the merger-

pricing by merging and non-merging for identification. The paper also tries to distinguish between the impact of insurer consolidation (a merger) and plan consolidation. We do not attempt to do so since regulation leads to a mechanical relationship between a merger and plan consolidation: each insurer is allowed at most three plans and so will inevitably have to consolidate plans after a merger.

[41] Decarlois and Guglielmo (2017) provide evidence on non-price responses in the PDP market.

[42] Note that since pre-merger CVS and Universal American were present in all 34 markets the number of plans and competitors changed mechanically in all markets, the estimated effects are relative to that national baseline.

induced change in concentration by raising their premiums. A fact pattern which supports the market-power explanation for our findings. Second, an explanation based on unobserved increases in the post-merger quality of plans (and therefore price) is inconsistent with our finding that the large majority of observed plan characteristics were unaffected by the merger, exception for the size of deductibles that suggested a decrease (not increase) in post-merger plan quality. Moreover, to the extent that large year-on-year quality changes would likely be the result of the exit and entry of plans,[43] the fact that we find within-plan premium increases also lends support to a market power explanation of our findings.

4 Heterogeneous impacts of market concentration on premiums

A central premise of U.S. competition policy is that mergers are likely to be problematic primarily in relatively concentrated markets in which the merger has a substantial impact on concentration. This presumption has been accepted by the courts, but the premise underlying it—that mergers likely have differential effects based upon the post-merger level of concentration and the change in concentration caused by the merger—has not been rigorously studied. Nor do the reduced-form studies we are aware of explicitly allow for heterogeneous treatment effects.

In this section we help to remedy this oversight. In our main specification, we modify our model to allow the effect of changes in concentration to vary based upon the current level of concentration. In particular, we allow for different treatment effects for moderately concentrated markets (i.e., the post-merger simulated HHI is greater than or equal to 1500) Part D markets that experienced a significant (more than 100 points) increase in concentration due to the CVS-Universal American merger (the treated markets) and all other markets. 14 of the 34 Part D regional markets qualify as being moderately concentrated and experienced significant increases in concentration.[44]

In our secondary specification we allow the treatment effect to vary based on the merging parties' pre-merger sum of shares in each region. The antitrust literature posits various thresholds above which the

[43] See the discussion in Kirchhoff (2018).
[44] Using the "highly concentrated markets" stratification is not feasible since not a single regional market meets those criteria (a post-merger simulated HHI greater than 2500 and a simulated delta HHI greater than 200). Similarly, distinguishing between the "small change in concentration" (a simulated delta HHI less than 100) and the "unconcentrated markets" (a simulated post-merger HHI of less than 1500) is unfeasible since only one regional market had a simulated delta HHI of greater than 100 but a simulated HHI of less than 1500.

merged firm's simulated share is too high, but there is no clear guidance on the ideal cutoff to use. Accordingly, we calculate the median across regions, 17 percent, and use it as our threshold.[45]

We estimate the following basic model to test for heterogeneous treatment effects, where a market (i.e., a region) is defined as concentrated based on one of the two criteria discussed above:

$$ln\, premium_{ijrt} = \beta_0 + \beta_1 HHI_{rt} + \beta_2 HHI_{rt} \times \mathbb{1}(conc.mkt)_r + X_{ijrt} + X_{jrt} + X_{rt}$$
$$+\delta_r + \delta_t + \delta_j \times \delta_t + \delta_i + \epsilon_{ijrt}, \qquad (5)$$

To construct the instrument we use, as above, the simulated delta HHI from the CVS-Universal American merger. We interact that instrument with the indicator for whether the market is concentrated to test for heterogeneous treatment effects. We also estimate reduced-form merger effect results using the specification in equation (4) with the difference that we also interact the $\Delta\mathrm{HHI}_{\mathrm{r}}^{\mathrm{simulated}}$ with the indicator for whether the market is concentrated.

Table 5 reports reduced-form (panel A) and IV (panel B) estimation results using our baseline sample of 2009 to 2016 for (1) basic plans only, and (2) all plans (i.e., basic and enhanced). For convenience, columns 1 and 2 repeat the IV estimates for our model without allowing for heterogeneity in treatment effect. Columns 3 and 4 report the results allowing for a heterogeneous treatment effect in "moderately concentrated markets," while columns 5 and 6 report results allowing for a heterogeneous treatment effect in markets where the merged firm's simulated share is above 17 percent. For each specification, we calculate the implied impact on premiums on average and separately by stratification.[46]

Our results point to a marked heterogeneity in treatment effects. In markets with low predicted concentration we find that premiums declined slightly in response to the merger, though these results are not typically statistically significant. This holds true for both of our definitions of low predicted concentration and in the reduced-form and IV estimates. These findings are consistent with the conventional wisdom, reflected in the Horizontal Merger Guidelines, that increases in concentration in unconcentrated markets are unlikely to lead to higher prices.

In more concentrated markets we find the opposite: an increase in concentration is likely to lead to a significant increase in premiums. On average, in moderately concentrated markets, the IV estimates imply a 4.4 percent premium increase for basic plans and 3 percent increase for all plans. The average impact

[45] We cannot use higher values, such as 35 percent (which was used in an earlier version of the Merger Guidelines), because only one market meets that criteria.
[46] The simulated impact of the merger is based on the point estimates, the simulated delta HHI in a group of markets, the first-stage relationship between simulated delta HHI and the actual change in HHI (reported in Table []), and the fraction of regional PDP markets in the low and high tiers.

across all 34 PDP regions is similar across our various specifications, ranging between 1.5 and 1.7 percent for basic plans and 1.1 and 1.3 percent for all plans.

5 The CVS-Aetna merger

Our results can also be used to simulate the predicted impact of prospective mergers. The most prominent recent merger in this industry was between CVS and Aetna. The DOJ reviewed the merger and approved it conditional on the divestiture of Aetna's Part D lives and additional Part D assets to Wellcare.[47] Our homogenous treatment effects model predicts that the CVS-Aetna merger, absent divestitures, would have led to a Part D plan premium increase of 4.2 percent. It further predicts that the divestiture, which can be thought of as a merger between the Part D lives of Aetna and Wellcare, will still lead to a (relative) price increase, though the magnitude is far smaller—only 0.9 percent. Recall also that this estimate does not capture any efficiency gains at the national level arising from the merger.

Our heterogeneous treatment effect model, like our homogenous treatment effect model, predicts that the merger between CVS and Aetna would have led on average to a large premium increase of 5.2 percent. The heterogeneous treatment model's prediction for the effect of the divestiture, however, differs from the prediction of the homogenous treatment model: it predicts that the divestiture will not on average lead to a statistically or economically significant premium increase, with point estimates between 0.2 and 0.6 percent. The CVS-Aetna example highlights that allowing for heterogeneous merger effects can be important. Relative to the homogeneous model, our heterogeneous model predicts that the merger would have had larger anticompetitive effects absent intervention by DOJ and that the divestiture required will be more effective.

6 Conclusions

In this paper we show that, for Medicare Part D plans, the benefits of the private provision of public health insurance coverage can be undermined if excess consolidation among private insurers is permitted. We show that the effect of consolidation in Part D plan sponsors depends upon the pre-merger level of concentration in a region: consolidation resulted in large premium increases in newly concentrated markets, while other markets experienced small and marginally significant decreases in premiums. That the effects of a merger should be heterogeneous in this way is consistent with standard antitrust practice, but had not

[47] See the Asset Preservation Stipulation and Order in the matter of *United States of America et al. v CVS Health Corporation and Aetna Inc*., Case 1:18-cv-02340 (Department of Justice, October 10, 2018) and the associated Q&A at https://www.justice.gov/opa/pr/justice-department-requires-cvs-and-aetna-divest-aetna-s-medicare-individual-part-d and

previously been demonstrated for Part D plans or, to our knowledge, elsewhere in the reduced-form literature. Identifying the source of potential efficiency gains, to enable an understanding of the conditions under which these might offset the negative effects of increased concentration, is an important area for further research.

Figure 1: Distribution of simulated change in HHI resulting from CVS - Universal American merger

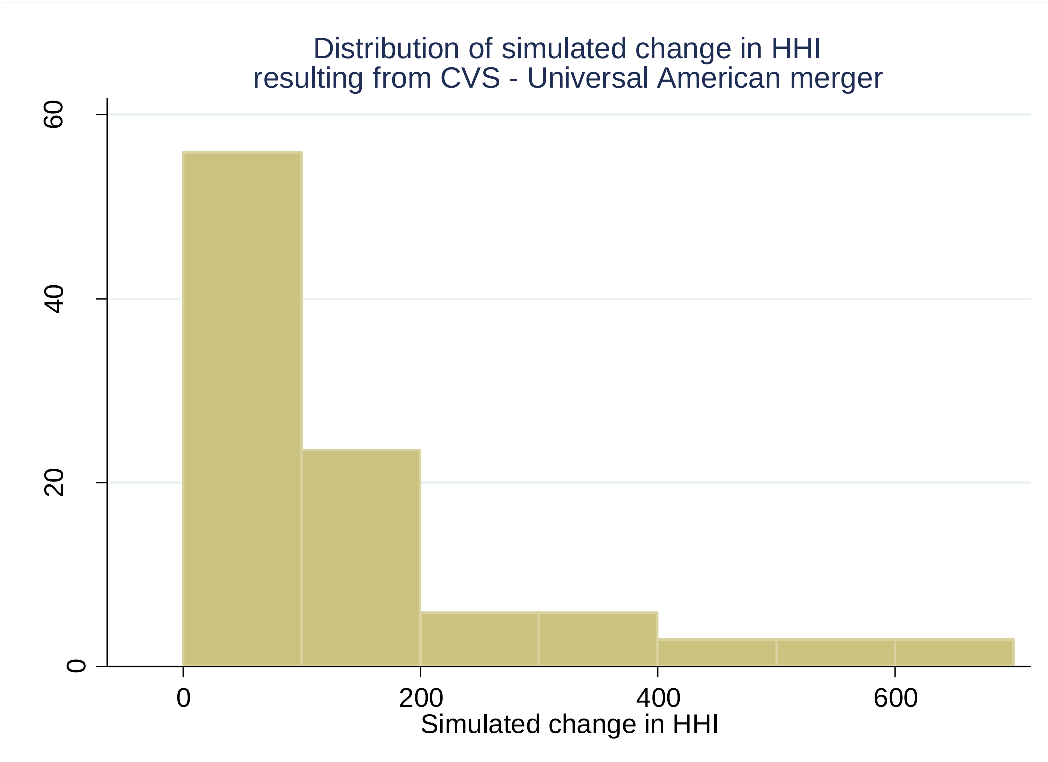

Table 1: Summary statistics

		2009	2019
		Herfindahl-Hirschman Index	
HHI	Mean	1685	2070
	Std dev	545	271
		Plan-level variables	
Premium ($)	Mean	45.31	47.16
	Std dev	20.59	26.50
Deductible ($)	Mean	111.06	269.51
	Std dev	135.39	185.56
No. drugs on formulary*	Mean	3,353	3,409
	Std dev	621	576
No. pharmacies in network*	Mean	55,463	64,480
	Std dev	19,961	5,415
Enhanced plans		54%	61%
		Sponsor-level variables	
No. basic plans	Mean	1.59	1.45
	Std dev	0.69	0.50
No. enhanced plans	Mean	2.10	2.68
	Std dev	1.10	1.29
Star rating (1–5)	Mean		3.05
	Std dev		0.56
Sanctioned plans		0%	0.2%
		Market-level variables	
Total PDP enrollment	Mean	490,732	620,907
	Std dev	343,892	431,041
Fraction Part D enrollees on Medicare Advantage	Mean	32%	42%
	Std dev	14%	14%

* Variables are missing for 2009 and 2019, reported numbers are for 2010 and 2018. Note: The available plan-quality variables used in the empirical analysis are: the log plan annual deductible; plan benefit type (basic or enhanced); whether a plan is a consolidated renewal plan, an initial contract, a new plan, or a renewal plan; whether the plan offers additional drug coverage (for the coverage gap); drug coverage measures (log number of drugs on plan, log number of drugs with quantity limits, a dummy for no drugs with quantity limits, log number of drugs requiring prior authorization, log number drugs requiring step therapy, and a dummy if there are no such drugs); and pharmacy network variables (log number of pharmacies in plan, log number of local pharmacies in plan, log number of preferred pharmacies in plan, a dummy for no preferred pharmacies in plan, log number of local preferred pharmacies in plan, and a dummy for no preferred local pharmacies in plan). The plan sponsor-level variables are: the number of stars for the plan sponsor measuring the performance of the sponsor (as a categorical variable); a dummy variable whether the sponsor is currently sanctioned by CMS; the number of plans basic / enhanced (by sponsor and region) as a categorical variable interacted with whether the plan is basic and enhanced (to capture transitional effects that occur after mergers when sponsors have more than the standard number of plans). We construct two market-level variables: log PDP enrollment (a measure of the size of the market), and the fraction of Part D enrollees on Medicare Advantage. Note that not all variables are available in every year.

Table 2: OLS estimates of correlation between log premium and HHI

Dependent variable: log plan premium					
			Basic Plans Only		
HHI	0.0213	0.00300	0.00478	-0.0238	0.114
	(0.196)	(0.182)	(0.197)	(0.177)	(0.144)
			All Plans		
HHI	0.209	0.0204	-0.00623	-0.0260	0.0473
	(0.163)	(0.142)	(0.137)	(0.132)	(0.116)
Log deductible		-0.146***	-0.162***	-0.162***	0.0000127
		(0.0101)	(0.0105)	(0.0104)	(0.00826)
Additional coverage		0.200***	0.220***	0.220***	0.0976***
		(0.0126)	(0.0132)	(0.0132)	(0.0110)
New plan		-0.408***	-0.384***	-0.384***	-0.0858***
		(0.0122)	(0.0132)	(0.0133)	(0.0109)
Log no. drugs		0.731***	1.426***	1.426***	0.253***
		(0.0277)	(0.0582)	(0.0581)	(0.0696)
Log no. pharmacies		-0.00124	0.0179**	0.0180**	-0.0127
		(0.00436)	(0.00700)	(0.00699)	(0.00983)
Log no. preferred pharmacies		0.0198**	0.0745***	0.0745***	0.0466***
		(0.00903)	(0.00953)	(0.00951)	(0.00702)
Log total enrollment		0.293**	0.126	0.141	0.0182
		(0.115)	(0.0827)	(0.0863)	(0.0828)
Prop. in Medicare Advantage		0.555**	0.226	0.245	-0.0497
		(0.227)	(0.158)	(0.162)	(0.159)
Log no. competitors				-0.0547	
				(0.0678)	
Region and year fixed effects	Yes	Yes	Yes	Yes	Yes
Insurer by year fixed effects	No	No	Yes	Yes	Yes
Plan fixed effects	No	No	No	No	Yes
Additional covariates	No	Yes	Yes	Yes	Yes

Note: HHI has been rescaled (divided by 10,000) to lie between 0 and 1. Sample for 2009–2019 includes 5572 basic and 5972 enhanced plan observations. Additional covariates described in Section II. Standard errors clustered by market in parentheses * p<0.10, ** p<0.05, *** p<0.01.

Table 3: Estimated coefficient of regression of HHI on simulated change in HHI, by year

Dependent variable: HHI										
	Pre merger		**Post merger**							
Year	**2009**	**2010**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
Sim. Delta HHI	0.114	0.107	1.248***	1.645***	1.366***	1.380***	1.327***	1.150**	1.252**	1.247***
	(0.214)	(0.109)	(0.201)	(0.397)	(0.403)	(0.407)	(0.433)	(0.452)	(0.484)	(0.447)

Note: 2011 is included in all samples as the baseline year (for which the simulated delta HHI is zero). Standard errors clustered by market in parentheses * p<0.10, ** p<0.05, *** p<0.01.

Table 4: Impact of HHI on premiums, IV estimates, 2009–2016

	(1)	(2)	(3)	(4)
	I. Basic Plans Only: IV estimates, dep var = log premium			
HHI	0.606	0.765**	1.07***	0.850**
	(0.504)	(0.388)	(0.392)	(0.369)
	First stage: dep. var = HHI			
Sim. Delta HHI	1.306***	1.398***	1.415***	1.402***
	(0.346)	(0.291)	(0.301)	(0.280)
	II. All Plans: IV estimates, dep var = log premium			
HHI	0.793	0.799*	0.812**	0.632***
	(0.488)	(0.455)	(0.349)	(0.221)
	First stage: dep. var = HHI			
Sim. Delta HHI	1.299***	1.392***	1.411***	1.399***
	(0.350)	(0.297)	(0.301)	(0.280)
Region and year fixed effects	Yes	Yes	Yes	Yes
Covariates	No	Yes	Yes	Yes
Insurer by year fixed effects	No	No	Yes	Yes
Plan fixed effects	No	No	No	Yes

Note: HHI has been rescaled (divided by 10,000) to lie between 0 and 1. Sample for 2009–2016 includes 4506 basic and 4615 enhanced plan observations. Included covariates described in Section II. Standard errors clustered by market in parentheses * p<0.10, ** p<0.05, *** p<0.01.

Table 5: Heterogeneous impacts of concentration on premiums, IV estimates, 2009–2016

Dependent variable: log premium						
	(1)	(2)	(3)	(4)	(5)	(6)
	No heterogeneity				**Heterogeneity by:**	
			Moderately concentrated cutoff		**Simulated market share cutoff**	
	Basic	**All**	**Basic**	**All**	**Basic**	**All**
			IV estimates			
HHI	0.850**	0.632***	-0.579*	-0.0907	-0.904	-0.351
	(0.369)	(0.221)	(0.352)	(0.256)	(0.841)	(0.518)
HHI * Conc. Market			1.73***	0.867***		
			(0.489)	(0.315)		
HHI * High share					2.00**	1.11**
					(0.937)	(0.556)

Note: HHI has been rescaled (divided by 10,000) to lie between 0 and 1. Sample for 2009–2016 includes 4506 basic and 4615 enhanced plan observations. Included covariates described in Section II. Standard errors clustered by market in parentheses * p<0.10, ** p<0.05, *** p<0.01.

References

Allen, Jason, Robert Clark, and Jean-François Houde. 2014. "The Effect of Mergers in Search Markets: Evidence from the Canadian Mortgage Industry." American Economic Review, 104 (10): 3365-96.

Ashenfelter, Orley C., Daniel S. Hosken, and Matthew C. Weinberg. 2013. "The Price Effects of a Large Merger of Manufacturers: A Case Study of Maytag-Whirlpool." American Economic Journal: Economic Policy, 5 (1): 239-61.

Ashenfelter, O. C., Hosken, D. S. and Weinberg, M. C. (2015), Efficiencies brewed: pricing and consolidation in the US beer industry. The RAND Journal of Economics, 46: 328-361.

Cabral, Marika, Michael Geruso, and Neale Mahoney. 2018. "Do Larger Health Insurance Subsidies Benefit Patients or Producers? Evidence from Medicare Advantage." American Economic Review, 108 (8): 2048-87.

Chorniy, Anna, Daniel Miller and Tilan Tang. “Mergers in Medicare Part D: Assessing Market Power, Cost Efficiencies, and Bargaining Power,” mimeo, April 2018.

Conlon, Christopher and Julie Mortimer, “Empirical Properties of Diversion Ratios,” mimeo, January 2019.

Crouzet, Nicolas, and Janice Eberly. 2018. "Intangibles, Investment, and Efficiency." AEA Papers and Proceedings, 108: 426-31.

Dafny, Leemore S. 2010. "Are Health Insurance Markets Competitive?" American Economic Review, 100 (4): 1399-1431.

Dafny, Leemore, Mark Duggan, and Subramaniam Ramanarayanan. 2012. "Paying a Premium on Your Premium? Consolidation in the US Health Insurance Industry." American Economic Review, 102 (2): 1161-85.

Dafny, Leemore, Jonathan Gruber, and Christopher Ody. “More Insurers Lower Premiums: Evidence from Initial Pricing in the Health Insurance Marketplaces,” American Journal of Health Economics 2015 1:1, 53-81.

Decarolis, Francesco. 2015. "Medicare Part D: Are Insurers Gaming the Low Income Subsidy Design?" American Economic Review, 105 (4): 1547-80.

Decarolis, Francesco and Andrea Guglielmo (2017). “Insurers Response to Selection Risk: Evidence from Medicare Enrollment Reforms.” Journal of Health Economics, 56: 383–396.

Decarolis, Francesco, Maria Polyakova, and Stephen Patrick Ryan, "Subsidy Design in Privately-Provided Social Insurance: Lessons from Medicare Part D," Journal of Political Economy, forthcoming.

Department of Justice and Federal Trade Commission, Horizontal Merger Guidelines, Aug. 19, 2010, § 5.3.

Duggan, Mark, Patrick Healy, and Fiona Scott Morton. 2008. "Providing Prescription Drug Coverage to the Elderly: America's Experiment with Medicare Part D." Journal of Economic Perspectives, 22 (4): 69-92.

Emmons, David, Kane, Carol, and Guardado, Jose. (2013). The Price Effects of a Large Merger of Health Insurers: A Case Study of UnitedHealth-Sierra. Health Management Policy Innovation, 1. 16-35.

Ericson, Keith M. Marzilli. "Consumer Inertia and Firm Pricing in the Medicare Part D Prescription Drug Insurance Exchange." American Economic Journal: Economic Policy 6, no. 1 (2014): 38-64.

Gaynor, Martin. "Examining the Impact of Health Care Consolidation," Statement before the Committee on Energy and Commerce Oversight and Investigations Subcommittee, U.S. House of Representatives, February 14, 2018.

Gaynor, Martin, Kate Ho, and Robert J. Town. "The Industrial Organization of Health-Care Markets." Journal of Economic Literature 53, no. 2 (2015): 235-84.

Gruber, Jonathan. 2017. "Delivering Public Health Insurance through Private Plan Choice in the United States." Journal of Economic Perspectives, 31 (4): 3-22.

Hastings, Justine, S. 2004. "Vertical Relationships and Competition in Retail Gasoline Markets: Empirical Evidence from Contract Changes in Southern California." American Economic Review, 94 (1): 317-328.

Ho, K., Hogan, J. and Scott Morton, F. (2017), "The impact of consumer inattention on insurer pricing in the Medicare Part D program." The RAND Journal of Economics, 48: 877-905.

Ho, K. and Lee, R. S. (2017), "Insurer Competition in Health Care Markets." Econometrica, 85: 379-417.

Imbens G, Angrist J, Graddy K. (2000). "The Interpretation of Instrumental Variables Estimators in Simultaneous Equations Models with an Application to the Demand for Fish." Review of Economic Studies. 67, July: 499-527.

Kirchhoff, Suzanne. "Medicare Part D Prescription Drug Benefit," Congressional Research Service Report R40611, August 13, 2018.

Koma, Wyatt, Juliette Cubanski, Gretchen Jacobson, Anthony Damico, and Tricia Neuman (2019). "No Itch to Switch: Few Medicare Beneficiaries Switch Plans During the Open Enrollment Period." Kaiser Family Foundation Data Note, available at: https://www.kff.org/medicare/issue-brief/no-itch-to-switch-few-medicare-beneficiaries-switch-plans-during-the-open-enrollment-period/.

Kwoka, John E. "Does Merger Control Work? A Retrospective on U.S. Enforcement Actions and Merger Outcomes."Antitrust Law Journal 78, no. 3 (2013): 619-50.

Lewis, M. S. and Pflum, K. E. (2017), Hospital systems and bargaining power: evidence from out-of-market acquisitions. The RAND Journal of Economics, 48: 579-610.

Miller, Nathan H. & Remer, Marc & Ryan, Conor & Sheu, Gloria, 2017. "Upward pricing pressure as a predictor of merger price effects," International Journal of Industrial Organization, vol. 52(C), pages 216-247.

Nevo, Aviv, and Michael D. Whinston. 2010. "Taking the Dogma out of Econometrics: Structural Modeling and Credible Inference." Journal of Economic Perspectives, 24 (2): 69-82.

Starc, Amanda and Robert J. Town, "Externalities and Benefit Design in Health Insurance," *mimeo*, April 2018.

Trish, Erin E. and Bradley J. Herring, “How do health insurer market concentration and bargaining power with hospitals affect health insurance premiums?,” Journal of Health Economics, Volume 42, 2015, Pages 104-114.

Syverson, Chad. 2019. "Macroeconomics and Market Power: Context, Implications, and Open Questions." Journal of Economic Perspectives, 33 (3): 23-43.