

The Impact of Horizontal Mergers on Plan Premiums and Drug Formularies in Medicare Part D

Anna Chorniy
Daniel P. Miller
Tilan Tang

Clemson University *

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Abstract

In this paper, we examine the impact of horizontal mergers amongst insurers on competition in the Medicare Part D prescription drug market. Theory predictions about the effect of mergers on price and product quality are confounded by three competing forces: market power, increased cost efficiency, and bargaining power with upstream suppliers. Applying a differences-in-differences identification strategy to panel data for the full set of plans offered by Part D insurers between 2006-2012, we document the effects that merger activity has on plan pricing and drug coverage characteristics. We find that plans affected by a merger experience higher premiums as a result of increased market power. However, for merging insurers that restructure their plan offerings, price falls to offset the market power effect. The results on drug formulary measures show that merging on its own has no effect on the generosity of drug coverage. Yet for restructured plans, there are sizable merger effects on coverage in the form of reduced out-of-pocket drug cost and increased scope in the set of covered drugs. The lowered prices and improved drug coverage for restructured plans suggest cost efficiencies and bargaining power with drug suppliers are a major source of gains stemming from mergers.

1 Introduction

The landscape of competition in the health insurance industry has experienced many changes in the past several years, starting with the introduction of Managed Care plans in the 1980s, privatized Medicare plans, expanded prescription drug coverage, and most recently the reforms in the 2010 Patient Protection and Affordable Care Act. Throughout this period

*Author correspondence: achorni@clemson.edu, dmille7@clemson.edu, and ttang@clemson.edu

there have been waves of M&A activity as insurers adapt to the evolving marketplace (Town and Park, 2011).

In this paper, we examine the effect that horizontal M&A activity amongst health insurers has on prices and plan quality in the Medicare Part D prescription drug market. Part D is a recently created program that established a regulated and subsidized insurance exchange for senior citizens to purchase prescription drug coverage from competing private insurers. The program lifetime overlapped with a dozen large scale horizontal M&A deals involving the parent companies of insurers offering Part D plans. Each year, an average of 17% of all insurance plans is directly affected by an M&A deal.

Theory suggests that there are three competing merger effects. First, in healthcare and in many other industries, horizontal mergers may have beneficial effects in the form of increased productive efficiency or enhanced quality of product offerings. In particular, in health insurance markets the efficiency benefit is thought to be achieved through scale economies that appear as administrative and marketing costs become consolidated. Examples of plan quality improvements include reduced copay/coinsurance rates, expanded networks of healthcare providers, increases in the number and variety of covered prescription drugs, and better claims processing.

Horizontal mergers can also have an effect on the market with upstream suppliers as the combined firm gains monopsony or bargaining power over suppliers. For health insurers the upstream suppliers are the providers of healthcare goods and services (doctors, hospitals, drug manufacturers, and pharmacies). With greater bargaining power, an insurer may be able to negotiate lower reimbursement fees with healthcare providers and/or increase the number of providers or drugs available to the enrollees in its plans. This aspect is of particular importance in the context of Part D. The program designers relied heavily on the ability of private insurers to bargain for better drug prices and coverage and explicitly prohibited the government from participating in negotiations. As such, mergers amongst Part D insurers could have a positive effect if the improved bargaining position allows plans to increase the scope of covered drugs or obtain a reduction in drug acquisition prices which in turn can be passed to enrollees' either directly or through lower premiums.

But there are also anti-trust concerns with mergers stemming from the market becoming more concentrated. Reduced competition can lead to higher prices for customers and/or lower product quality if firms compete on quality dimensions. Medicare Part D is a fairly young market, but it has followed the general trend in healthcare industries: rapid growth in prices. Since 2006, Part D prescription drug insurance premiums increased by more than 26% in real terms and the number of plan offerings has fallen by 31%. We examine to what extent mergers contributed to the observed increase in premiums.

In our application to Medicare Part D, we analyze the effect that horizontal mergers have on market outcomes with respect to the three channels through which M&A activity affects plans: cost efficiencies, market power, and bargaining with upstream suppliers. We use panel data on all plan offerings between 2006 and 2012 (over 9,000 plans) and consider two types of outcome variables: monthly premiums and plan coverage quality, specifically the number of drugs covered on insurers' formularies and drug copay/coinsurance rates. To identify the treatment effect that M&A deals have on plans we use differences-in-differences approach. We examine how plans affected by a merger change in the year following a merger as compared to the control group of plans unaffected by mergers. Difference-in-difference design is feasible in our setting for two reasons. First, the observed M&A activity is likely the result of broad changes in health insurance, most importantly the 2010 reform. Almost all merger deals in our sample are between extremely diversified health insurance providers for which Medicare Part D is only a fraction of all operations. This fact satisfies the assumption of mergers exogeneity and enables application of difference-in-difference design. Second, in contrast to earlier research, we are able to include a rich set of controls related to coverage characteristics of the plans and we can exploit the panel data structure to control for market, year, and insurer specific factors.

We are able to distinguish between market power effects and cost-efficiency by looking at the status of plans in the "after" period. Post merger, some insurers restructure their plan offerings while others make no changes. Insurers restructure by consolidating two or more plans offered in the previous year into a joint plan for the following year. By consolidating plans, companies combine their assets, administrative functions, marketing activities, and business contracts (such as those with drug manufacturers). We view the consolidation of plans as evidence that these firms realize cost efficiencies. In contrast, when the merged companies take no action by simply renewing their same plans offered before the merger, we hypothesize that the plans are not realizing efficiency gains and as such the only effect from the merger comes from their ability to coordinate pricing decisions. The comparison of merged insurers that consolidate plans to mergers with no consolidation allows us to separately identify market power effect from the other two channels. In the data, we often observe the same insurer consolidating plans in some markets, while not consolidating in others. This within insurer variation provides especially robust evidence on the consolidation effect.

Our results show that all three channels are at play. When insurers merge, they may raise the monthly premiums by as much as 8% on average over and above what the prices would have been absent of the merger. We attribute the rise to increased market power. Yet, for the plans of merged insurers that consolidated their plans, the net effect on premiums

is an average decrease of 9%. We attribute the overall potential gains of 8.6% drop to efficiency gains and increased bargaining power with suppliers. Further breaking down the effect, 8.6% of the price decrease comes from intra-firm gains from plan consolidation that even non-merged firms realize, and the additional 4.9% comes from the combined effect of insurers merging and consolidating plans.

The results on the other set of outcomes, coverage characteristics, are consistent with the results on plan premiums. Merging, without consolidating plans, has a nearly zero effect on drug coverage. This supports our hypothesis that merging and making no changes to plans does not allow insurers to capture bargaining or efficiency gains. But, merging and consolidating plans leads to very large improvements in drug coverage: these plans add about 5% more top100 drugs and about 14% more NDCs, as well as provide about 4% savings in drug costs for their enrollees. The overall effect of plans that merge and realize cost efficiencies is positive and significantly different from zero for the number of drugs listed on formulary, but the combined effect for the price of top100 basket of medications is indistinguishable from zero.

The remainder of the paper is organized as follows. In section 2 we discuss related work in both the health economics and finance literature. In section 3 we provide the background for our application to Medicare Part D. In section 4 we discuss the data. In section 5 we present the econometric techniques, and section 6, results. Section 7 concludes.

2 Related Literature

Our work contributes to the literature on the price and quality effects of horizontal consolidation in the healthcare industry. Economists have long been concerned with whether healthcare markets are competitive and if so, whether competition ensures the first best. Ellis (2012) voices the concern that high levels of market concentration indicate that the current state of competition does not work. Mergers further increase the degree of concentration.

In the context of healthcare, the literature identifies two potential effects of M&A deals. First, mergers may increase market power - the ability of firms to raise prices, reduce quantity, and price discriminate across buyers. Second, mergers may bring about efficiency gains. Following earlier research, we think of the increased efficiency coming through two main channels: economies of scale and increased monopsony or bargaining power with upstream suppliers. From a policy perspective and for the purposes of antitrust enforcement it is important to determine which effect dominates.

Gaynor and Haas-Wilson (1999) describe trends in three healthcare markets: health insurance, hospitals, and physician services. One of the notable changes that affected all of

these markets is horizontal consolidation. In health insurance markets, the authors review the scarce and rather mixed evidence on the competitive conduct of HMOs, their bargaining power in negotiations with healthcare providers, and the quality of care provided under managed care plans. Much of this literature suggests market power concerns in HMO mergers are minimal because HMO enrollees are highly price-sensitive. Instead, the literature points to the selective contracting practices used with providers as the mechanism through which mergers could stimulate cost efficiencies, without compromising quality.

Gaynor (2011) provides a recent update on the studies on consolidation in healthcare markets. Most empirical evidence to date is on the impact of consolidation of hospitals. The results suggest that the market power effect dominates with little or no evidence of hospitals gaining cost efficiencies or quality improvements.

Much less is known about the effects of M&A deals in health insurance markets. Two of the most comprehensive studies are Dafny (2010) and Dafny, Duggan, and Ramanarayanan (2012). Dafny (2010) uses a large panel of insurers offering plans in the employer sponsored health insurance market to investigate whether health insurers have market power. The author finds evidence of a nontrivial market power exercised by the insurers. They are able to price discriminate by charging larger premiums to more profitable firms, especially so in highly concentrated geographical markets. A similar conclusion is reached by Bates et al (2012). They find that health plans exercise market power by looking at the number of individuals covered by insurance.

Dafny et al. (2012) employs the same data set as Dafny (2010) to look at the effect of concentration on premiums and payments to physicians and nurses. They focus on the 1999 merger of Aetna and Prudential, the two largest insurers in their sample. The deal between them resulted in a sharp change in the Herfindahl-Hirschman concentration Index (HHI) with a differential effect across markets allowing for identification. Their instrumental variable estimates show that the average market-level changes in HHI between 1998 and 2006 caused a 7 percentage points increase in premiums. They also find evidence of increased bargaining power with health care providers. They estimate that payments to physicians and nurses decreased by 2% to 3% over the same time period.

In this paper, we conduct an industry-wide analysis of the effects of mergers on premiums and plan quality in Medicare Part D. We overcome one of the main drawbacks experienced by the earlier research by obtaining a highly detailed data set. We are also aided by the institutional details of the Medicare prescription drug program. The program structure allows us to escape such typical challenges as market and product determination. Part D product markets are unambiguously defined by the legislator and the information on all Part D plans for all of them is available to us. We look at the relevant merger activity between

2006 and 2012. In contrast to Dafny et al. (2012) that examined just 1 merger, we were able to select 11 qualified deals - M&As that involved Part D plan providers. They translate into about 17% of plan-year pairs being affected by a merger. The high churn rate of mergers provides us with a large sample of both treated (merged plans) and a control group of plans (unmerged plans) to identify merger treatment effects.

We contribute to the existing research by testing the entire set of competing theories. We identify the impact of mergers on output prices (market power effect), input prices (monopsony power effect) and realized cost efficiencies. Our results corroborate the findings in Dafny et al. (2012) in that mergers amongst insurers have a market power effect on prices. But when cost efficiencies are realized, we find that this effect is offset.

In addition, we bring to light some evidence on the changes in plan quality in the aftermath of a merger. As Gaynor and Haas-Wilson (1999) point out, the analysis of the healthcare industry from the anticompetitive perspective should include the effects on both price and quality as they are being jointly set by the providers. We develop a number of quantitative measures to evaluate plan quality. They are the number of drugs covered by the plan formulary and number of restrictions placed on the insured by the plan - both are the essential features of a drug plan.

The effect of mergers on market performance is also an important topic in the finance literature. While we address the question employing product-level data, most papers in finance use event studies on a set of multiple M&A deals. For example, Fee and Thomas (2004) look at the impact of horizontal M&As on firm efficiency and monopsonistic buying power. They use a large across-industry sample of deals from 1980 to 1997 to disentangle these two sources of potential gains from the market power effect. They find evidence supporting the presence of increased buying power after a merger but little evidence supporting an increase in market power. Importantly, the uncovered effects are found to be most apparent in the first year after the deal. The authors suggest that it might be a consequence of the other firms' taking strategic actions in response to a merger. We follow them in this assumption and look at the effects of a merger within a year period.

3 Medicare Part D Background

Medicare Part D is a program that expanded existing health insurance coverage for the elderly. It was authorized under the 2003 the "Medicare Prescription Drug, Improvement, and Modernization" Act (MMA) and enacted in 2006. The MMA sets a coverage mandate requiring beneficiaries to obtain prescription drug coverage when they become first eligible or face a penalty if they sign up later than their initial eligibility period. Apart from long-

standing means of obtaining coverage (e.g. through an employer or retiree benefits) the act established a regulated and subsidized health insurance exchange where beneficiaries can choose amongst plans offered by competing private insurers. The prescription drug plans (PDPs) offered in this exchange are the focus of our study.

The program was designed to rely on free market principles to provide competitive drug plans. The benefit is offered by private insurers who may freely enter and exit the market, choose the number of plans to offer, and set monthly premiums. They are also largely responsible for benefit design: the number and type of drugs to cover and the conditions of such coverage. This program provision has been seen as controversial since the MMA prohibits price negotiations between government and the pharmaceutical industry (Frank and Newhouse, 2008). The main premise in favor of the provision is that plan providers possess bargaining power over drug prices and they are able to negotiate successfully with drug manufacturers, wholesalers, and pharmacies on behalf of the insured. Per regulation, the negotiated prices must be passed on to enrollees.

Plans have a large toolbox of “formulary management” techniques that they can use as bargaining levers with drug suppliers and as a means to steer enrollees’ usage of drugs. With the exception of six therapeutic classes, they are allowed to selectively choose which drugs to include on their formularies, place drugs on pricing tiers such as “preferred”, “non-preferred” and “specialty,” as well as impose usage restrictions in the form of quantity limits, step therapy routines, and prior authorization requirements. These techniques are thought to be important tools for negotiating favorable drugs prices, which will ultimately be reflected in the generosity of plans coverage and premiums (Duggan and Scott-Morton, 2010). In response to the concerns expressed in the literature (Frank and Newhouse, 2008), we shed some light on drug prices, formulary comprehensiveness, pricing tiers, and usage restrictions resulting from changes in bargaining power.

The regulations establish a number of coverage standards. All providers are required to offer at least one basic plan that meets (or is actuarially equivalent to) a minimum coverage level with respect to the deductible, coinsurance and copay rates, and the scope of drugs covered on the formulary. In addition to a basic plan, the companies may offer enhanced plans that have more generous coverage through a combination of lower deductibles, lower copay/coinsurance rates, and drug coverage for a larger set of medical condition.

All major health insurance companies entered the Part D market in the first two years of the program. Geographically, the market is separated into 39 regions drawn around state boundaries by legislation. Insurers offer and price plans individually for each market. In the typical market, enrollees can choose from over 40 plans offered by 20 insurers.

4 Data

4.1 Plan-Level Data

We utilize detailed longitudinal data on plans that includes an average of 1,500 stand-alone, Part D plans (PDPs) per year. The data span 7 years from 2006 when Medicare Part D was introduced to the most recently available data in 2012 and covers all 39 geographical markets. The sample is constructed using both publicly available and restricted use data collected by The Centers for Medicare and Medicaid Services (CMS). These files fully characterize each prescription drug plan. Plan name, insurer, benefit type, and renewal status are reported.

The CMS data represent about 16.6 million enrollees each year. On average, there are 11,347 enrollees in a plan across all years. However, the plans differ significantly on this margin. There are plans that have fewer than 10 insured, while others insure more than 300,000 individuals. Table 1 presents information on plan trends. In the first year of the program, there were only 1,446 plan offerings, which rose to 1,908 in the second year. But following 2007, the number of plan offerings has steadily decreased down to 995 in 2012. Much of this decrease can be attributed to merger activity.

Table 1: Trends in Medicare Part D market, 2006-2012.

	2006	2007	2008	2009	2010	2011	2012
Monthly premium	42.55 (14.60)	40.63 (16.70)	42.99 (21.35)	49.03 (22.15)	48.61 (20.14)	54.73 (25.79)	53.41 (26.72)
Plan market share	0.009 (0.018)	0.007 (0.016)	0.007 (0.015)	0.008 (0.015)	0.008 (0.016)	0.012 (0.024)	0.013 (0.023)
N plans offered	37.08 (13.82)	48.92 (16.47)	45.54 (14.54)	41.69 (13.10)	38.28 (12.29)	26.51 (8.65)	25.51 (8.74)
Plan enrollment	10,730 (25,159)	8,473 (23,066)	8,573 (21,155)	9,415 (21,912)	10,594 (24,187)	16,201 (37,194)	17,297 (36,155)
LIS enrollment	5,588 (13,368)	4,196 (13,820)	4,051 (11,104)	4,377 (12,387)	5,042 (14,401)	7,699 (20,340)	8,069 (20,431)
Eligible population, in '000	1,275 (951)	1,279 (963)	1,305 (986)	1,329 (1,010)	1,364 (1,029)	1,396 (1,049)	1,480 (1,104)
Insurer regional presence	26.33 (12.04)	31.14 (9.25)	29.76 (11.15)	31.30 (7.96)	30.10 (10.68)	31.23 (8.99)	28.85 (12.12)
N plans affected by merger	293	4	541	173	129	272	245
N plans offered	1,446	1,908	1,778	1,626	1,493	1,034	995

Notes: All plans: renewed, consolidated, new and terminated in the next calendar year are included. Premiums are given in 2012 dollars. Number of plans offered and eligible population are calculated per Part D region. Standard deviations are in parentheses.

During the sample period the premium increased by 26% in real terms (by 43% in nominal

terms) and the average plan market share went up by about 37%. Another way to look at it, average plan enrollment of all and in particular subsidized (LIS) beneficiaries increased. The number of plans offered in each region plummeted. The program enrollment grew by 16% over 7 years.

We collect information on each plan’s premium, deductible, gap coverage, and formulary. Part D plan *premium* is set up once a year, when private insurance companies submit their bids for contract with Medicare. The deadline for the plan sponsors to submit their bid is the first Monday in June each year. Premiums are paid monthly by the insured. Qualified individuals are provided with the “Extra Help”, or low-income subsidy (LIS) by Medicare. This program covers in full or partially the monthly premium amount, yearly deductible, copayments and coinsurance, as well as eliminates the coverage gaps.

Deductible, followed by the initial coverage zone, is the amount the insured must pay out-of-pocket before the drug plan cost-sharing kicks in. Yearly deductible for what Medicare determines as the standard Part D benefit was set to \$250 in 2006. Updated using annual percentage increase, it was raised to \$320 by 2012.

The gap in coverage or “*donut hole*” begins when the insured reaches the limit on the expenses covered by the initial coverage zone. Any incurred prescription medicines costs beyond the limit and below the “catastrophic” level are covered by the insured out-of-pocket. Some plans, mostly enhanced PDPs provide full or partial coverage in the donut hole.

Formulary is a comprehensive list of the medicines covered by the plan, identified by the National Drug Code (NDC).¹ It contains data on the drug’s tier, usage restrictions, and copay/coinsurance provisions that determine the cost to a beneficiary. The formulary file is complemented with the yearly drug pricing data, first published in 2009. They contain information on the average drug prices for every drug and plan. Specifically, the reported price is the average transaction price, net of all rebates for a 30-day supply filled at the plan’s preferred pharmacies in the third fiscal quarter of each year.

Part D formularies typically have three *pricing tiers* that separate preferred drugs with relatively more favorable coverage from non-preferred ones. Lower tiers indicate better coverage. For example, a three-tier plan that has 1/3 of its drugs on tier 1, 1/3 on tier 2, 1/3 on tier 3 has an average pricing tier of 2. Since the plans differ in the number of tiers, for the purposes of comparison we normalize a 2 on a scale of 1 to 3, to 0.5 on a 0 to 1 scale. The formularies also might have up to three types of *restrictions* placed on drug consumption. Constraints that can be imposed on the insureds, are step therapy, prior authorization and quantity limits. We sum up the restrictions and calculate the average level of formulary

¹NDC is an 11-digit classification issued by the Food and Drug Administration (FDA) for all the approved drugs. Under this system, different package and dosage sizes of the same drug molecule have separate NDCs.

consumption limitation.

We use drug prices to construct an index of the out-of-pocket expenditures across plans. It is a more refined measure of the generosity of plan coverage than those that simply count the number of drugs or average pricing tiers. It is constructed by using actual copay/coinsurance rates and pharmacy prices to calculate the out-of-pocket price enrollees pay for a basket of the top 100 drugs by the prescription filled. These hundred drug prices are combined into a price index, where each drug is weighted equally. If a drug is not covered by a particular plan, we assume that patients will have to pay the full drug price out-of-pocket. Three sources of variation affect the copay price index: number of covered drugs, drug pricing tiers, and a plan's negotiated price with the pharmacy and drug manufacturer. More comprehensive formularies, lower pricing tiers, and lower pharmacy prices all contribute to a lower value of the copay price index.

Table A.1 reports summary statistics on the plan-level data for 2006-2012. In the CMS data each plan is uniquely identified by the combination of a contract ID number and plan ID number and is offered in one region only. Over time both the premium and out-of-pocket drug cost increased significantly. The latter is likely to be a result of a declining number of drugs on the formulary and the overall increase in drug prices.

We look at two sets of outcomes. The effect of mergers on pricing is measured by the insurance premium. Over the sample period the premiums increased by 26% in real terms. We study the question of whether the mergers contributed to the upward trend.

The other set of outcomes measures plan coverage quality. It has three dimensions. To evaluate the comprehensiveness of coverage, we count the number of drugs listed on the plan's formulary, first, for the number of top100 most popular medications by prescriptions filled and then, for all NDCs. Plans with more drugs are considered more comprehensive. Finally, we evaluate the cost of the basket of top100 drugs by prescriptions filled under each plan. As described earlier, for each plan we calculate how much an individual would pay for a 30-day supply of each of the top100 drugs in the initial coverage zone. The more generous is the coverage or the better are the drug prices negotiated by the plan, the smaller is the drug price index.

The other measures of plan design are distinguishing characteristics of basic and enhanced plans. Recall basic plans meet or are actuarially equivalent to minimum coverage standards set by the Part D regulations, enhanced plans offer some form of additional coverage. Slightly more than half of the plans are basic. Benchmark plans are a subset of basic plans. Their status is determined yearly based on the average bid. Benchmark plans qualify as low income subsidy (LIS) eligible plans. Under the low income subsidy program, basic plans priced below a threshold receive Medicare/Medicaid dual eligible enrollees through a random assignment

process. The dual eligible enrollees receive full premium assistance from Medicare. A plan that is LIS eligible can be thought of as a more desirable plan because it receives these extra enrollees. The theoretical foundations for this interpretation are explained in a companion work by Miller and Yeo (2012b).

We include these other plan characteristics as control variables to ensure that our regression results attribute price changes to merger effects, and not pricing responses to changes in coverage characteristics.

4.2 Data on M&A Deals

We collected data on M&A activity from the Securities Data Company (SDC) merger and acquisition module which contains detailed information on all deals involving public and private companies. In the time frame suitable for our analysis, from 2006 to 2011 we identified a total of 11 completed horizontal M&A deals amongst companies that offer Medicare Part D policies.

Table 2: M&A Deals' Details

N	Acquiror	Target	Value	Date	Form
1	United HealthCare Services	PacifiCare Health Systems	7,511	12.21.05	M
2	MemberHealth	AmeriHealth Ins Co-Medicare	N/A	11.16.06	AA
3	Medical Mutual of Ohio	Carolina Care Plan	N/A	05.18.07	AA
4	Universal Holding Corp	MemberHealth	780	09.21.07	AA
5	UnitedHealth Group	Sierra Health Services	2,425	02.25.08	M
6	CVS Caremark Corp	Longs Drug Stores Corp	2,637	10.30.08	M
7	CVS Caremark Corp	Universal American Corp	N/A	12.31.08	DJV
8	United HealthCare Services	Health Net-US Northeast	630	12.11.09	AA
9	HealthSpring	Bravo Health	545	11.30.10	M
10	Munich Health North America	Windsor Health Group	131	01.04.11	M
11	CVS Caremark Corp	Universal American Corp	1,059	04.29.11	M

Notes: We list the acquiror and target names as they are recorded in the SDC data. For example, in deal #6 the acquiror is UnitedHealth Group Inc. It is a parent of the United HealthCare Services Inc, a company that was the acquiror in deals #1 and #8. Merger value is given in millions of dollars. The date is merger completion date. "AA" stands for acquisition of assets; "M" for merger; "DJV" for dissolution of joint venture. AA is the purchase of a company by acquisition of its assets rather than its stock.

Table 2 lists the details on each of the selected deals. All of the deals (with one exception) involve major Part D insurers that offer plans across the entire nation. Note that some of the major plan providers were involved in multiple mergers in the sample period.

We restrict attention to horizontal mergers and acquisitions of assets where either participants or their immediate subsidiary offered a PDP at least in the year prior to the merger completion date. We exclude all the deals where one or both companies belong to a non-Part

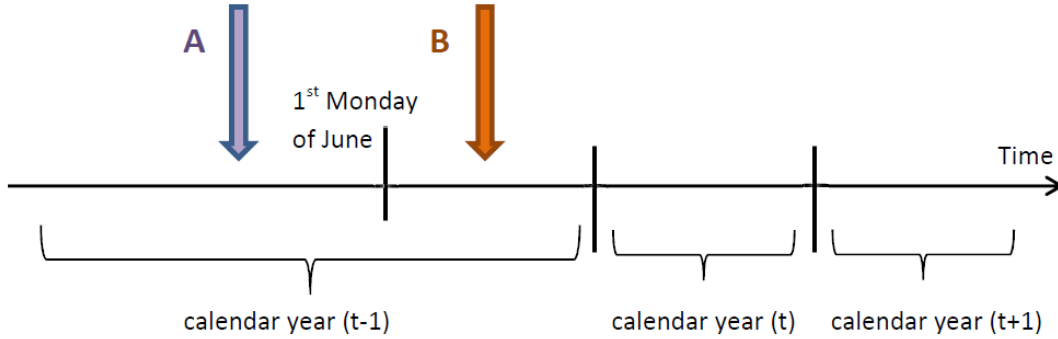


Figure 1: M&A deals timing with respect to the bid deadline date

D line of insurance (such as life insurance), joint ventures of Part D insurers into related lines of business (such as pharmacy management) and vertical mergers with pharmacies. It is worth noting that we exclude a few large deals that took place in the second half of 2011 and in 2012 due to our assumption on the relative timing of the deal and its effects. The bids for each successive calendar year are submitted before the first Monday in June of the previous calendar year. Thus, for the deals completed prior to the deadline we measure the “before” period as the current calendar year and “after” as the following calendar year assuming that their bid will reflect the effects of merger. For example, case A in Figure 1 demonstrates a merger that was completed prior to first Monday in June of year $(t-1)$. In this case, year $(t-1)$ will represent the “before” period and year (t) - the “after” period. The merger from case B was completed after the bid date. It means that its “before” period is year (t) and “after” period is year $(t+1)$. We also go through the news and companies’ press releases for each of the 11 deals to obtain factual support to our assumption. The mergers that were completed after June 2011 when all the bids for 2012 calendar year had been submitted would require data from 2013. The latest CMS data available at the time of study are for 2012. Including these later deals, 22 of the top 25 Part D insurers have been involved in an M&A deal with the notable exception being the number 2 insurer, Humana.

We match the SDC data on deals to the plan-level data by company name, or contract ID number. There are about 100 unique parent companies whose subsidiaries offer Part D plans yearly during the sample period. Some parents control more than one insurance company. As multi-product firms, insurers offer between one and three plans per region. At least one of the plans offered must be a basic plan as determined by the MMA.

We look at the short-term merger effects by comparing plans prices and quality before and after the deal was completed. From year-to-year, plans can evolve in one of four ways as depicted in Figure 2. Plans can be renewed, terminated, consolidated, or new plans can be introduced. To determine each plan’s transition status we use the CMS “crosswalk” file

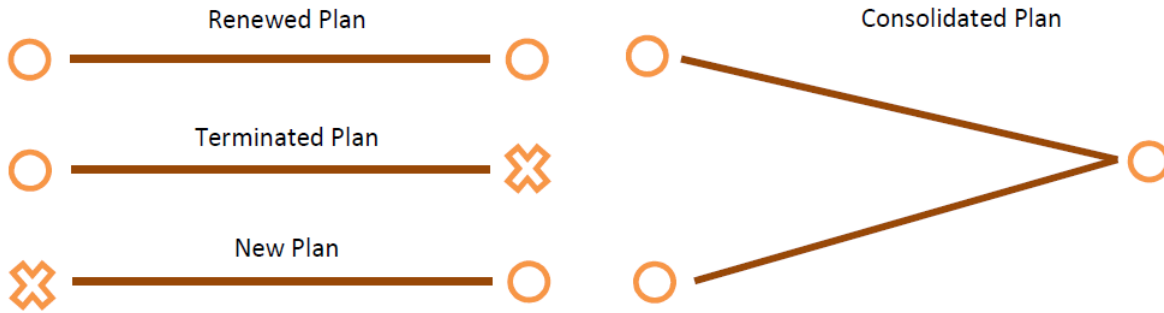


Figure 2: Plan transitions from year-to-year

that links plans across years. Renewed plans carry-over enrollees from the previous year and typically maintain the same product segment: basic or enhanced status. However, plan characteristics such as the monthly premium, formulary list, and copay/coinsurance tiers can change across years. Terminated plans simply stop being offered starting new calendar year, and previously enrolled individuals have to actively select another plan. New plans are introduced to the market for the first time and they have no enrollees from the previous calendar year.

Consolidated plans combine two or more plans from the previous year into one plan. Enrollees from the previous year's plans carry over into the new plan. Like renewed plans, the product characteristics can differ from the previous year's plan characteristics. Most consolidations combine two or more basic plans or two or more enhanced plans, but there are examples of cross segment, basic-enhanced, consolidation. Consolidation of plans is undertaken by merging firms as well as by firms that did not participate in a deal. We posit that the main reason behind plan consolidation is efficiency gains. A similar idea is presented by Maksimovic et al. (2011). They find evidence of extensive restructuring in a short period following an M&A deal. In the sample of U.S. manufacturing firms, acquirors were likely to sell or close down targets' plants. It resulted in a boost in productivity in the retained plants comparing to the industry. Health insurance is fundamentally different from manufacturing in that closing down plans is highly inefficient. It is more reasonable to change the plan's premium or benefit and retain at least a part of enrollees, which can be done through consolidation.

Table 1 shows the total number of plans offered during the sample period in each year, and number of plans directly affected by an M&A deal. In each year, an average of 17% of all plans are affected by a merger. In the first year of the program, 2006, there were only 1,446 plan offerings, which rose to 1,908 in the second year. But following 2007, the number of plan offerings has steadily decreased down to 995 in 2012. Much of this decrease can be

attributed to merger activity.

Table A.2 shows how all plans and M&A affected plans evolve. There is no systematic tendency for the plans of merged firms to evolve differently from non-merger affected plans. Most plans are renewed or consolidated, few plans exit or newly enter the market. The only difference between the two groups of plans is that firms that were not affected by a merger were more likely to create a new plan. For our analysis we restrict attention to renewed and consolidated plans because our empirical design requires a plan to be observed for at least two consecutive years. By definition, terminated and new plans do not meet this criteria and excluding them from the sample is unlikely to bias results because they compose such a small fraction of the market.

Table A.2 also reports comparative summary statistics for the control group, plans unaffected by merger, and comparison group, plans offered by companies involved in a merger deal. The pre-merger plan characteristics of merger affected plans are similar to all other plans. Although the plans differ in the initial state by some of the characteristics, in our empirical work we are able to control for most of them.

5 Discussion: Differences-in-Differences

Differences-in-differences (DD) is a popular method for identifying effects of policy “treatments”. It is most often applied to household-level data in labor, health, and development economics fields (Bertrand et al., 2004). DD and treatment effect approaches are used less often for studies of the firm and in particular, merger outcome studies. However, they have been finding applications — Hastings (2004) (retail gas stations) and Dafny et al. (2012) (health insurance). The detailed panel of product-level data and large sample of merger-“treated” plans make such a DD approach feasible and provide an attractive alternative to structural-based modeling and estimation of merger outcomes (Angrist and Pischke (2010)).

5.1 Merger Treatment Effects

We run several specifications of DD regressions to estimate the treatment effect of an M&A deal on plan outcomes. Specification (1) considers the effect of deals on our first outcome of interest — the monthly premium, p .

$$p_{it} - p_{it-1} = \alpha + \beta D_{it-1} + (\mathbf{X}_{it} - \mathbf{X}_{it-1})' \beta + \varphi_t + \varphi_{market} + \varphi_{insurer} + \epsilon_{it-1} \quad (1)$$

where i indexes the plan, and t the year. The deal treatment $D_{it-1} = 1$ if plan i was involved in an M&A deal that was completed in year $t - 1$, such that the effect of the deal could be

expected to appear in year t . Note that the dating of deals is determined by the time line in figure 1 and does not necessarily match the calendar year in which the deal was officially announced. The controls for plan characteristics \mathbf{X}_{it} include various measures of plan design and drug coverage. We also include fixed effects for years (φ_t), markets (φ_{market}), and also insurer fixed effects ($\varphi_{insurer}$) in our most heavily controlled specification. The term ϵ_{it-1} is a plan-year error term. To estimate the effect of mergers on plan characteristics, we apply DD approach to drug formulary counts, f , and the price index of the out-of-pocket drug cost, $copay$. The dependent variables in these regressions are the first differences in outcome measures, or $f_{it} - f_{it-1}$ and $copay_{it} - copay_{it-1}$ respectively.

To identify the merger effect, we take advantage of the two dimensions present in the data: time and merger status. First, we look at the across time variation in outcomes, i.e. plan premiums immediately before merger to premiums immediately after the deal. This comparison is possible if a plan is observed in the data for at least two consecutive years. For this reason, our sample includes renewed and consolidated renewal plans, excluding new and terminated plans (see figure 2). The unit of observation is indexed to year $t - 1$ in equation (1), which matters for consolidated plans. For example if plans A and B sold in year $t - 1$ are consolidated into plan C for year t , there are two observations in the data for plans A and B in year $t - 1$. Observations of A and B may have different p_{it-1} and X_{it-1} values in year $t - 1$, but will have the same p_{it} and X_{it} values in year t because of consolidation.

On the other dimension, we compare merger-affected plans to a control group of plans unaffected by an M&A. Combining both sources of variation in the DD estimator provides a very robust means of identifying average treatment effects.

To understand the intuition behind the DD approach, it is useful to break down the components of the estimator. Applying only one of the differences could result in confounded estimates of the treatment effect. In the raw data, a before and after comparison across time of average premiums for merger-treated plan shows a $(44.81-40.27=)$ \$4.54 increase in premiums caused by a merger (see table A.2). A comparison of average premiums for a merger (treatment group) and non-merger (control group) plans shows a $(44.81-45.16=)$ \$0.36 decrease in premiums caused by a merger. However, neither of these results necessarily measures the causal treatment effect. The increase indicated by time differencing could simply reflect an increasing trend in premiums over time that affects all plans. Such a trend is plausible given plans not affected by a merger, experience average premium increases of $(45.16-42.54=)$ \$2.62. The decrease indicated by differencing the treated and untreated group could be attributed to differences in unobserved plan characteristics of the two groups of plans. The DD estimate of $(44.81-40.27)-(45.16-42.54=)$ \$1.92 controls for both confounding time trend effects and unobserved plan characteristics. The estimate of \$1.92 is the causal

average treatment effect if firms' decisions about merging are orthogonal to plan, market, and time period characteristics. To control for selection on observables, we include first differences in plan characteristics $\mathbf{X}_{it} - \mathbf{X}_{it-1}$. For example, if merger-affected plans are more likely to lower the deductible between years than non-merger plans, the \$1.92 could simply reflect the fact that lower deductible plans are more costly. The year and market fixed effects control for their respective correlation with mergers. Year fixed effects are needed because mergers do not all occur in the same year. From the data (table 1), mergers happened more intensively in the years following the 2010 health reform legislation, which itself may have altered trends in health insurance premiums. Market fixed effects control for market characteristics, such as the number of competing plans in the market and its size.

The DD estimate of the merger effect is the causal treatment effect if the decision to merge is exogenous or random, conditional on the control variables and fixed effects. Two features of the insurance industry during this time period support the plausibility of the merger exogeneity assumption. First, the mergers in our sample involve large diversified insurance companies. Part D is a relatively small component of the firms' business activities, which suggests merger decisions are likely exogenous to the Part D market. Second, nearly every major firm offering a Part D plan has been involved in a merger since 2006. Including recent mergers announced after our sample period, 21 of the top 25 Part D insurers have merged with another Part D insurer. This high intensity of merger activity suggests merger decisions are not a matter of "if" a firm will merge, but rather a question of "when" it will merge. Matters of "if" firms merge raise concerns about whether the DD estimator measures causal treatment effects; matters of "when" to merge are controlled for by the year fixed effects. These two justifications aside, we cannot rule out the possibility that there are other unobserved insurer characteristics correlated with the specific year, when a particular insurer merges. To purge such correlation our most heavily controlled specifications include insurer fixed effects. The DD estimator becomes a triple differences-in-differences-in-differences (DDD) with insurer fixed effects (Bertrand et al., 2004). Identification is a comparison of year-to-year differences in premiums within an insurer in the year(s) it merges compared to year-to-year differences in premiums in the year(s) it does not merge. Insurer fixed effects change the control group from being all other Part D plans that don't merge, to plans of the same insurer in years that the insurer does not merge. We should note that for these specifications it is necessary to compute insurer heteroskedasticity-robust standard errors, which given the limited variation in the data results in large standard errors. Nonetheless our results are economically significant and in many specifications statistically distinguishable from the null hypothesis of zero merger effect.

Interpreting the DD estimates requires care because of equilibrium effects and the pos-

sibility of multiple merger events occurring simultaneously in the same time period. In the product and upstream supplier market, equilibrium effects can cause a merger event to have an effect on all plans in a market, not just plans sold by the parties to the merger. In the product market, Bertrand pricing models of differentiated products predict that all firms will gain market power when a merger increases market concentration. Likewise, increased market concentration can increase monopsony power over the firm's upstream suppliers. The analysis in Dafny et al. (2012) estimates the market-wide effects of concentration induced by the Aetna-Prudential merger on product market pricing and payments to the upstream market for doctors and nurses. Lucarelli et al. (2011) estimate a structural discrete choice model of the Part D market under Bertrand pricing and simulates the effect on premiums from the 2006 merger of United Healthcare and Pacificare. The average premium increases 4.7% for the plans of the merged firms, and just 0.9% for all other plans. Our DD results measure the merger effect on a treated plan over and above the equilibrium effects of mergers on the untreated group. For example, if the data matched that in the simulated model in Lucarelli et al. (2011), the DD estimator on premium would show a $(4.7-0.9)=3.8\%$ increase in premiums. When there are multiple merger events occurring at the same time, the estimator measures the marginal effect of a merger on a particular plan, not the total effect of all simultaneously occurring mergers. Market and year fixed effects control for the intensity of merger activity in a given year and market. For example, there was a lot of merger activity in 2008 when prices increased by a very large amount of \$6 on average. The 2008 fixed effect would be higher than other years.

The last consideration for the DD estimator is sample selection. In Part D, plans are allowed to freely enter and exit the market. The DD estimator requires observation of a plan across two consecutive years. As such, new and terminated plans must be dropped from the sample. The DD estimator of the merger treatment effect is potentially biased by sample selection if factors that influence decisions to terminate or introduce a new plan are also related to merger decisions. The issue of plans selecting into or out of the market is analogous to the issue of program participation decisions in the typical DD estimator used for household studies. In our case, selection is not a major concern because there is very little churn in plans entering and exiting the market, and the little churn that exists does not appear to be related to merger decisions.² In particular, plans of merged firms are not more or less likely to introduce new plans or terminate plans than non-merging firms (see table A.2). There are good reasons to expect little churn in Part D. First, lock-in effects stemming from switching costs give strong incentives for plans to renew plans from year-to-

²The exceptions where a lot of entry is observed are 2006, when all plans were new plans by definition, and 2007 when the market was still in its nascency.

year and make it difficult for new plans to attract enrollees (Miller and Yeo, 2012b; Ericson, 2011). Second, subsidy amounts are calculated based on the previous year’s enrollment figures which discourages plan entry and exit (Miller and Yeo, 2012a). For these reasons new insurers that want to enter the Part D market do so by acquiring the existing plans, not by organically creating new plans. The leading example is the 2012 acquisition of Medco by Express Scripts.

5.2 Plan Consolidation Treatment Effects

The next set of DD specifications estimates the treatment effect of plan consolidation. In contrast to a merger that is a combination of two distinct insurance companies offering Part D plans into a joint company, plan consolidation is a combination of two or more plans offered by an insurance company into a single plan for the upcoming year. In this sense, our classification of a merger event can be thought of as an *inter*-firm combination, and plan consolidation is an *intra*-firm combination. Note that an insurer that does not merge with another firm can consolidate its own plans; in periods that an insurer merges it can consolidate its own plans and consolidate with plans offered by its merger partner; but, insurers cannot consolidate plans with a rival company.

We specify the following DD estimator for consolidation:

$$\begin{aligned}
 p_{it} - p_{it-1} = & \alpha + \beta_1 D_{it-1}^{merge} + \beta_2 D_{it-1}^{cons} + \beta_3 D_{it-1}^{cons} * D_{it-1}^{merge} + (\mathbf{X}_{it} - \mathbf{X}_{it-1})' \beta \\
 & + \varphi_t + \varphi_{market} + \varphi_{insurer} + \epsilon_{it-1}
 \end{aligned} \tag{2}$$

The treatment dummy for plan consolidation $D_{it-1}^{cons} = 1$ if plan i is consolidated with another plan between years $t - 1$ and t , and the M&A treatment dummy $D_{it-1}^{merge} = 1$ follow the same definition as that described in equation (1). The additional term $D_{it-1}^{cons} * D_{it-1}^{merge}$ measures the interaction effect of a plan being affected by both a merger and consolidation events. We also consider the treatment effect on formulary counts $f_{it} - f_{it-1}$ and the copay price index $copay_{it} - copay_{it-1}$.

The same issues in the above discussion about merger treatment effects apply to plan consolidation treatment effects. The exogeneity assumption is more tenuous for consolidation given that unobserved market-year specific shocks affecting Part D plan outcomes are more likely to be affecting consolidation decisions than they are to be affecting merger decisions. As a partial defense of exogeneity, the data indicate a similar fraction of plans are consolidated by merging firms as non-merging firms (see table A.2).

5.3 Testing the Three Theories of Mergers

Theory suggests that there are three competing effects of an M&A deal on market outcomes. Market power from the ability to coordinate pricing decisions predicts higher prices. Cost efficiencies from combining administrative functions and marketing activities, and monopsony power with upstream suppliers lowers costs to the insurer and hence consumer prices due to the Part D design. In Part D the primary upstream suppliers are drug manufacturers, wholesalers, pharmacies, and prescription benefit managers (PBMs).³ In total there is one channel causing higher prices, and two channels causing lower prices. The net effect on premiums, positive or negative, is theoretically ambiguous. The deal treatment effect in equation (1) measures the joint effect of all three.

The specification in equation (2) separates out merger deal treatment effects from plan consolidation effects. This way, we can distinguish amongst the three theoretical forces. In the insurance industry, as well as other industries, merging firms realize the cost savings channels (monopsony power and cost efficiencies) when they restructure their assets and renegotiate contracts. We interpret the act of consolidating plans as indicating that a firm restructures its assets and contracts, and the act of renewing a plan as indicating the firm does not restructure. For the insurance industry, marketing and administrative contracts and assets matter for cost efficiencies. Contracts with upstream suppliers matter for monopsony power. As a government regulated industry, the contractual terms with CMS also matter.

Our first assumption is that merging firms cannot realize cost savings if they do not consolidate. As such the only effect on price comes through the market power channel. The term β_1 on the merger dummy D_{it-1}^{merge} in specification (2) measures the pure market power effect. Identification comes from comparing price changes of merging firms that don't consolidate to non-merging firms that do not consolidate. Following theoretical predictions, we hypothesize $\beta_1 > 0$.

Secondly, we look at the firms that consolidate their plans. These insurers can economize on their administrative costs, marketing activities, and bidding process. This is a cost savings channel that would translate into lower premiums. The contractual arrangement with CMS further promotes cost efficiencies. A key stipulation in the contract between insurers and CMS is that enrollees are rolled over into the consolidated plan for the upcoming year. Although enrollees can opt out and choose another plan, high switching costs imply most will simply choose to stick with the consolidated plan. By pooling enrollees through consolidation, the insurer spreads the marketing and administrative costs across a larger

³PBMs act as a middleman between insurers and drug suppliers. Some Part D insurers have their own in-house PBM units and thus these insurers can be thought of as directly negotiating with drug suppliers. Other insurers contract with outside PBMs.

number of enrollees. The coefficient on the consolidate dummy D_{it-1}^{cons} , β_2 , measures cost efficiency. Note that both merging and non-merging firms can realize cost efficiencies from pooling enrollees into consolidated plans. We expect β_2 to be negative.

Finally, we look at the effect of the change in monopsony power with upstream suppliers of drugs (drug manufacturers, wholesalers, and pharmacies) or PBMs. When insurers merge and consolidate plans, the combined firm can renegotiate contracts with drug suppliers or PBMs from a position of greater bargaining power. When insurers merge and do not consolidate plans, we take this as evidence that the combined firm has not renegotiated its upstream contracts, and thus its monopsony power remains unchanged. In contrast, non-merging firms bargaining power with upstream suppliers remains the same regardless of whether it consolidates plans or not. We hypothesize that the coefficient β_3 on the interaction of the merger and consolidate dummy $D_{it-1}^{cons} * D_{it-1}^{merge}$ measures the monopsony power effect of mergers. Note that the contract with CMS requires an insurer to pass along lower drug acquisition costs to enrollees. Insurers cannot use their monopsony power to exercise market power over enrollees charging enrollees more than the negotiated drug prices. This contractual arrangement is convenient for our estimates, because market power is not confounded by monopsony power.

In summary, the merger deal dummy measures market power, the consolidate dummy measures cost efficiencies, and the interaction term measures monopsony power. We supplement the results on premiums with outcomes on formulary count and copay prices. These results provide direct evidence on how merging and consolidating affect monopsony power with drug suppliers; more generous formulary coverage indicates greater monopsony power.

6 Results

In this section we report four sets of results from estimating DD specifications (1) and (2). We show results on Part D plan premium outcomes, followed by our three measures of generosity of drug coverage, or plan quality. They are the number of drugs covered by plan formularies, overall and for the top100 most popular drugs ranked by prescriptions filled; and the out-of-pocket cost of a basket of top100 drugs.

6.1 Monthly Premiums

Table 3 reports results for the effect of mergers and plan consolidation on the monthly premium. The table has three panels, with two specifications each: with and without insurer fixed effects. Across all specifications the premium rises for plans affected by a merger, but it

drops if plans were consolidated. With insurer fixed effects, the merger effect is identified from within-insurer variation in premiums in the periods in which the firm merges, as compared to the periods in which it does not merge. We think that it is important to control for firm-specific factors with the fixed effects such as the size, financial characteristics, and firm-specific trends, which might otherwise confound estimates of the merger treatment effect. Specifications that include insurer fixed effects have larger standard errors than otherwise, but their signs are the same and magnitudes are close.

Panel A shows that when plans merge, the premium goes up by \$1.7 or \$3.6 on average on year, region and year, region, insurer level respectively. Given the average premium of \$45 across years, they correspond to 1.6% and 8% increase respectively. These estimates represent the market power effect. For all plans, consolidated or not, premiums rise if they belonged to a target or acquiring firm.

Panel B presents estimates of changes in plan premium for the plans that were renewed (control group) comparing to the plans that were renewed and consolidated (treatment group). As discussed above, we interpret plan consolidation as an evidence of firms realizing cost efficiencies. Regardless of the firm merger status, prices drop when plans are consolidated. They fall by \$4.2(9.3%) and \$3.9(8.7%) for the first and second specifications respectively. The result suggests that by consolidating, firms may be in fact realizing cost efficiencies, reflected in lower prices, through consolidation of administrative costs and/or marketing activities. Here we cannot separate the two theoretical effects that predict reduction in prices in the context of Medicare Part D: cost efficiencies and increased bargaining power. If insurers negotiate drug prices on the plan level rather than on the level of the firm, the obtained estimate is a combination of these two effects. Most likely, cost efficiencies come from the reduced administrative costs, for example from administrative burden of plan-level yearly bids submitted by each insurer to CMS.

Finally, Panel C shows estimates that include merger-consolidation interaction term. Importantly, the signs are the same and magnitudes are similar for both merger and consolidation treatment effects to those obtained in Panel A and Panel B respectively. What is different is the combined effect of consolidating and merging. When firms merge and consolidate their plans the price for these plans falls by \$2, or for the average plan by 4.4%.

We interpret the additional effect of consolidating and merging, over and above the price savings realized by firms that do not merge, but consolidate their plans, to a very strong cost-savings effect from two separate firms actively combining their assets. The effect could come from either cost efficiencies or bargaining gains with drug suppliers. Note that in this case, the assumption that the interaction term includes bargaining power effect is more plausible. Merging firms are not simply reshuffling their assets as non-merging firms, but in

fact, change the number of enrollees on the contract level and other, relevant for negotiations, plan characteristics.

The third panel allows us to calculate the combined effect from the three theory-suggested forces. It is \$3.9(8.6%) or \$1.7(3.7%), depending on the specification, decline in plan premiums for the mergers that take advantage of cost efficiencies. When insurer fixed effects are excluded and the estimates are less noisy, this effect passes F-test on significance. But note that the price increasing effect on the merger treatment variable still indicates that there is a market power effect of raising prices, that partially offsets the cost-savings effect of consolidating. If we assume that it is not possible for a firm to realize cost efficiencies or improve its bargaining position, then we are able to distinguish and quantify the market power effect as that on the merger treatment variable.

Table 3: Difference-in-Difference Estimates: Premiums.

	A		B		C	
	(1)	(2)	(1)	(2)	(1)	(2)
Merger-affected plan	1.703 (0.363)	3.607 (2.219)			2.241 (0.400)	3.840 (2.494)
Consolidated plan			-4.221 (0.320)	-3.861 (1.339)	-3.911 (0.343)	-3.422 (1.547)
Consolidated x Merger plan					-2.199 (0.827)	-2.105 (2.127)
Year & Region F.E.	Y	Y	Y	Y	Y	Y
Insurer F.E.		Y		Y		Y
N of year-pairs	8,839			F-test	29.7	0.6
N of M&A affected plans	1,375					
N of consolidated plans	1,994					
N of M&A consolidated plans	296					

Notes: Panel A shows estimates for the plans involved in a merger; this specification does not distinguish between mergers that consolidated plans and mergers that didn't. Panel B shows estimates for the plan consolidation effect on premiums. Panel C includes the merger-consolidated plan interaction term. The F-test null hypothesis is that the sum of the coefficients on merger dummy, consolidation dummy and their interaction term is zero. Standard errors are in parentheses, clustered by pre-merger insurer for specification with pre-merger insurer fixed effects. Coefficients on the suppressed controls are presented in Table A.4 of the Appendix.

6.2 Drug Coverage: Formularies

Our next set of results delves deeper into the question of how mergers amongst Part D insurers and “intra-firm” mergers (plan consolidation) affect drug coverage. First, we look at the composition of drug formularies, represented by the two outcomes of interest: the number

of NDCs covered and the number of drugs out of the top100 most popular medications listed on the plan formulary. These measures evaluate generosity of drug coverage offered by a plan. The more drugs are covered, the more generous is the plan, and the more likely it is perceived as a high quality plan by the insured.

Table 4 reports results for the effect of mergers and plan consolidation on the number of top100 drugs on the formulary, and table 5 presents results for the NDCs listed on the formulary. As it was for monthly premiums, the tables on plan quality measures each has three panels, with two specifications: with and without insurer fixed effects. The results on the formulary composition are less clear-cut across specifications than the estimates of effects on plan premiums. The effects for top100 drugs and NDCs covered by the formulary are very similar. As with premium effects, elimination of across-insurers variation results in large standard errors in specification (2). In most cases, the signs are the same.

In Panel A, the estimates show that the effect of merger on the number of drugs covered is very small and positive for both top100 drugs and all drugs, where insurer fixed effects are excluded. If insurers merge, they cover on average less than one additional drug out of top100 most popular medications, and about 44 additional NDCs. Since on average a plan lists about 90 out of top100 drugs and 2,700 NDCs, in percentage terms these changes are 0.4% and 1.6% respectively. These estimates represent the market power effect. For all plans, consolidated or not, there is little change in drug formulary if they belonged to a target or acquiring firm. Overall, mergers themselves do not appear to have a significant affect on drug coverage.

Panel B presents estimates of changes in the number of covered drugs for plans that were renewed (control group) comparing to the plans that were renewed and consolidated (treatment group). Across all specifications, for top100 drugs the effect is small, negative and insignificant, about 0.2%. For the entire formulary, the estimates are positive and insignificant. Confidence interval includes negative values as well. The magnitude varies from 0.6% to 1.1%, depending on the specification. These results suggest that “intra-firm” mergers have no effect on the relationship with drug suppliers. In other words, the formulary coverage is a function of the contracts insurers have with drug manufacturers on the firm level rather than on the plan level.

In contrast, the interaction effect of consolidating plans by merging firms shown in Panel C, has a relatively large positive effect on formulary coverage. These plans add over 4(4.9%) medications out of top100 drugs and 373(13.8%) or 553(20.5%) of NDCs, depending on the specification. Notably, both specifications with and without insurer fixed effects have the same sign and similar magnitude, although standard errors on the former are still larger.

These estimates show that merging insurers are able to offer better drug coverage through

consolidation. The reason might be the consolidation of contracts with drugs suppliers. The firms that merge but simply renew their plans cannot benefit from becoming bigger as much as the firms that combine their contracts to obtain better bargaining position. We also estimate the overall effect of firms merging and consolidating their plans. It is 3(3.3%) extra top100 drugs or 281(10.4%) additional NDCs covered for the specification without insurer fixed effects that passes F-test on being significantly different from zero. In sum, larger firms do not bring better coverage to the enrollees unless they consolidate their contracts to improve their bargain position, the insured realize significant gains.

Table 4: Difference-in-Difference Estimates: Formulary, Top 100 Drugs.

	A		B		C	
	(1)	(2)	(1)	(2)	(1)	(2)
Merger-affected plan	0.391 (0.172)	-0.146 (1.872)			-0.492 (0.189)	-1.081 (2.025)
Consolidated plan			-0.196 (0.155)	-0.176 (0.922)	-0.866 (0.165)	-0.880 (0.940)
Consolidated x Merger plan					4.357 (0.396)	4.459 (2.244)
Year & Region F.E.	Y	Y	Y	Y	Y	Y
Insurer F.E.		Y		Y		Y
N of year-pairs	8,839			F-test	77.4	1.48
N of M&A affected plans	1,375					
N of consolidated plans	1,994					
N of M&A consolidated plans	296					

Notes: Dependent variable is the change in the number of drugs ranked in top100 by prescriptions filled, in the formulary. Standard errors are in parentheses, clustered by insurer for specification with insurer fixed effects. Coefficients on the suppressed controls are presented in Table A.5 of the Appendix.

6.3 Drug Coverage: Out-of-pocket Drug Cost

Our final set of results on the generosity of coverage shows the effect of Part D insurers' M&As on the out-of-pocket drug cost for the insured in the initial coverage zone. This cost depends on the copay or coinsurance rates established by the plan, as well as on the drugs that are covered and their list prices. If a drug is not covered by the plan, we assume that the insured pays the average regional (if available) or national drug price out of pocket. For each plan we generate a price index that puts a dollar value on the basket of top100 drugs, where each drug is equally weighted.

Table 5: Difference-in-Difference Estimates: Formulary, All Drugs.

	A		B		C	
	(1)	(2)	(1)	(2)	(1)	(2)
Merger-affected plan	43.56 (25.83)	-182.80 (338.65)			-47.08 (29.15)	-320.23 (354.33)
Consolidated plan			16.57 (22.58)	30.60 (109.96)	-45.12 (24.29)	-62.34 (123.18)
Consolidated x Merger plan					373.07 (56.41)	552.93 (221.75)
Year & Region F.E.	Y	Y	Y	Y	Y	Y
Insurer F.E.		Y		Y		Y
N of year-pairs	7,396			F-test	34.9	0.2
N of M&A affected plans	1,082					
N of consolidated plans	1,746					
N of M&A consolidated plans	276					

Notes: Dependent variable is the change in the number of drugs included into the formulary. 2006-2007 year-plan pairs are excluded. Standard errors are in parentheses, clustered by pre-merger insurer for specification with insurer fixed effects. Coefficients on the suppressed controls are presented in Table A.6 of the Appendix.

Panel A of table 6 presents the merger treatment effect. Given the average price index of \$63, the effect is small and negative for the specification that includes insurer fixed effects and relatively larger and positive, when insurer fixed effects are included. Note that both estimates have large standard errors and the actual sign of the effect is unclear.

Point-estimates on the consolidation treatment effect shown in Panel B are positive and significant, when insurer fixed effects are excluded. They vary from \$0.9(1.4%) to \$1.7(2.7%), depending on the specification. These estimates are small, although more precisely estimated than merger treatment effect.

The main results are shown in Panel C. They include the interaction term for the firms that merge and consolidated their plans. As was found for the formulary coverage, merging and consolidating plans improves drug coverage, here through reduced cost-sharing rates. Improved bargaining position results in lower drug acquisition prices for the insurer that have to be passed on to the enrollees by law.

Controlling for plan consolidation, merging on its own has little effect on price index (Panel C). However, the firms that consolidate plans offer significant cost savings to their enrollees. The price of the top100 drug basket declines by \$2.7(4.3%) in the specification excluding insurer fixed effects, where it is significant, and by a similar amount in the other specification. Unfortunately, the combined effect on price index for the insurers that merge

and consolidate their plans, is statistically indistinguishable from zero. It is slightly negative in the specification (1) and slightly positive in (2).

Whereas merging and consolidating plans reduces out-of-pocket cost for the enrollees, consolidating plans in non-merged firms has a positive effect on drug prices. This represents a deterioration in plan quality. Perhaps, for the price index consolidation effect is a blend of cost efficiencies and market power effects. As with the number of drugs covered, “intra-firm” mergers do not result in increased bargaining power for the non-merging insurers. A small drug price increase might point at the market power effect stemming from the consolidation of products that a firm offers. This effect certainly deserves more detailed analysis in the future.

In sum, we showed that from the consumers’ perspective, when firms merge, realize cost efficiencies, and take advantage of improved bargaining position with upstream suppliers plan coverage improves along two dimensions. Enrollees obtain access to more extensive drug formularies, where drugs are offered at no worse prices. These two results provide evidence that merging can have a strong effect on insurers’ bargaining positions with drug suppliers.

Table 6: Difference-in-Difference Estimates: Price Index.

	A		B		C	
	(1)	(2)	(1)	(2)	(1)	(2)
Merger-affected plan	-0.424 (0.311)	1.755 (2.240)			0.076 (0.344)	2.441 (2.033)
Consolidated plan			1.706 (0.280)	0.908 (1.152)	2.132 (0.300)	1.440 (1.299)
Consolidated x Merger plan					-2.723 (0.722)	-3.070 (3.311)
Year & Region F.E.	Y	Y	Y	Y	Y	Y
Insurer F.E.		Y		Y		Y
N of year-pairs	8,839			F-test	0.7	0.98
N of M&A affected plans	1,375					
N of consolidated plans	1,994					
N of M&A consolidated plans	296					

Notes: Dependent variable is the change in the weighted price of the basket of top100 drugs under each plan. Standard errors are in parentheses, clustered by pre-merger insurer for specification with insurer fixed effects. Coefficients on the suppressed controls are presented in Table A.7 of the Appendix.

7 Conclusion

We examine the effect of firm mergers in the health insurance industry with a focus on the Medicare Part D market. Our method applies a differences-in-differences identification strategy to a large panel of all Part D plans sold between 2006 and 2012 to document the effect of mergers on prices faced by consumers and product characteristics as measured by drug coverage. We draw two main conclusions. First, we find evidence of a market power effect whereby firms raise prices as a result of a merger. We also find evidence that merging can lower prices through increased cost efficiencies and increased bargaining power vis-a-vis suppliers of drugs. These gains come when merging insurers combine assets and consolidate their plan offerings. The effect is likely stemming from two sources: economizing on administrative expenses and marketing activities, as well as combining contracts with drug suppliers to negotiate more favorable terms. That plans are negotiating better terms with drug suppliers is apparent in the results that examine drug formularies and copay/coinsurance rates. Merging firms that consolidate plans offer significantly better drug coverage at low prices. The net effect of merging and consolidating is improved drug coverage, and a near zero change in price. The price decrease is not large, because the cost savings gains are offset by the market power effect.

In contrast, we find a near zero effect of mergers on drug coverage for merging insurers that do not consolidate plans. Without consolidating, the only effect of mergers is an increase in price which we attribute to increased market power. We also think of plan consolidation for non-merging firms as a form of intra-firm merging. Some of the same market power, cost efficiency, and bargaining effects could be at play. Prices fall on average which we could attribute to either cost efficiencies or improved bargaining with drug suppliers. But the finding that drug coverage does not improve, if anything it decreases, suggests intra-firm consolidation lowers prices through cost efficiency channels as opposed to bargaining effects with suppliers.

Given the rapid pace of M&A activity in the industry, there is keen interest amongst policy makers to scrutinize these deals. From an anti-trust perspective that focuses on product prices and market power, we certainly find evidence of increased market power. However, we find there are desirable effects of mergers when firms consolidate their plans. These benefits likely stem from increased bargaining power with suppliers. Gains can also be found for non-merging firms that consolidate plans. Our evidence suggests these gains comes from increased cost efficiencies.

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A Tables

A.1 Part D Plan-level Summary Statistics, 2006-2012.

	2006	2007	2008	2009	2010	2011	2012
<i>Outcome variables</i>							
Premium	37.36 (12.82)	36.69 (15.08)	40.31 (20.02)	45.81 (20.70)	46.17 (19.13)	53.62 (25.27)	53.41 (26.72)
Out-of-pocket drug cost	45.12 (12.38)	46.99 (12.91)	53.36 (12.31)	58.02 (10.77)	71.25 (9.84)	77.05 (9.42)	87.48 (13.06)
N of NDCs covered*	14,688 (13,682)	4,791 (1,484)	4,117 (1,064)	4,014 (965)	3,401 (675)	3,359 (613)	3,441 (585)
N of top100 drugs covered	91.58 (5.92)	93.07 (5.96)	90.10 (7.67)	87.84 (9.14)	82.63 (7.43)	78.04 (6.96)	74.52 (7.38)
<i>Controls</i>							
Deductible	92.51 (115.84)	93.57 (121.81)	103.73 (128.40)	110.02 (136.56)	144.18 (135.57)	153.50 (141.97)	153.40 (152.51)
Mean tier, all drugs	0.22 (0.13)	0.27 (0.08)	0.30 (0.08)	0.32 (0.10)	0.30 (0.08)	0.33 (0.10)	0.37 (0.10)
Mean tier, top100 drugs	0.20 (0.14)	0.26 (0.09)	0.26 (0.09)	0.27 (0.12)	0.22 (0.08)	0.23 (0.09)	0.25 (0.10)
Mean restriction (0-3), all	0.16 (0.19)	0.20 (0.10)	0.28 (0.13)	0.32 (0.12)	0.33 (0.12)	0.33 (0.11)	0.36 (0.13)
Mean restriction (0-3), top	0.17 (0.19)	0.23 (0.16)	0.28 (0.17)	0.30 (0.15)	0.29 (0.12)	0.26 (0.11)	0.28 (0.12)
Mean restriction (1-3), all	1.07 (0.05)	1.11 (0.07)	1.15 (0.08)	1.15 (0.08)	1.15 (0.09)	1.14 (0.08)	1.14 (0.08)
Mean restriction (1-3), top	1.07 (0.10)	1.13 (0.13)	1.15 (0.14)	1.12 (0.10)	1.11 (0.12)	1.10 (0.12)	1.08 (0.08)
% of plans w/gap coverage	0.31	0.29	0.30	0.25	0.19	0.35	0.24
% of basic plans	0.58	0.52	0.48	0.45	0.51	0.57	0.52
% of benchmark plans	0.28	0.60	0.24	0.17	0.19	0.30	0.30
% of renewal plans		0.58	0.72	0.10	0.74	0.46	0.69
% of consolidated plans		0.12	0.14	0.82	0.19	0.46	0.19
% of new plans		0.30	0.10	0.03	0.06	0.01	0.09
N of observations	1,446	1,908	1,778	1,626	1,493	1,034	995

Notes: The unit of observation is a plan. All stand-alone Part D plans are included. Out-of-pocket cost of top 100 drugs assigns a 1/100 weight to each drug. In 2006, requirements on formulary listing of NDCs differ from the requirements in 2007-2012. Gap coverage and deductible standards for Part D plans were altered through 2006-2012 as described in detail in the paper. All prices are in nominal terms. Standard deviations are in parentheses.

A.2 Control and Comparison Groups, 2006-2012.

	Plans affected by M&A		Plans unaffected by M&A	
	Before	After	Before	After
Premium	40.27 (16.83)	44.81 (19.51)	42.54 (19.94)	45.16 (22.03)
Out-of-pocket cost of top100 drugs	57.90 (16.65)	63.47 (18.03)	56.71 (15.78)	63.45 (17.59)
N of NDCs covered	3,983 (1,143)	3,847 (960)	4,036 (1,190)	3,712 (900)
N of top 100 drugs covered	88.22 (10.54)	86.31 (11.15)	88.06 (8.35)	85.32 (9.49)
Deductible	121.46 (139.07)	117.78 (145.21)	112.52 (130.37)	118.14 (135.06)
Mean tier, all drugs	0.30 (0.09)	0.32 (0.08)	0.29 (0.10)	0.31 (0.09)
Mean tier, top100 drugs	0.24 (0.13)	0.25 (0.13)	0.24 (0.10)	0.25 (0.09)
Mean restriction (0-3), all	0.23 (0.15)	0.29 (0.14)	0.27 (0.14)	0.30 (0.13)
Mean restriction (0-3), top100	0.19 (0.14)	0.23 (0.13)	0.27 (0.16)	0.28 (0.14)
Mean restriction (1-3), all	1.11 (0.07)	1.14 (0.06)	1.13 (0.08)	1.15 (0.09)
Mean restriction (1-3), top100	1.13 (0.14)	1.10 (0.06)	1.12 (0.12)	1.13 (0.13)
Plan market share	0.014 (0.024)	0.019 (0.033)	0.008 (0.016)	0.009 (0.017)
Enrollment	15,825 (33,560)	22,940 (47,206)	9,583 (23,577)	11,562 (25,447)
LIS enrollment	8,681 (18,393)	12,167 (25,319)	4,436 (13,244)	5,276 (14,171)
% of plans with gap coverage	0.26	0.24	0.27	0.26
% of basic plans	0.59	0.53	0.50	0.51
% of benchmark plans	0.33	0.41	0.31	0.29
% of renewal plans		0.76		0.67
% of consolidated plans		0.21		0.18
% of new plans		0.02		0.12
% of terminated plans		0.02		0.03
N of observations		1,379		7,598

Notes: The unit of observation is a plan. Only renewal and consolidated renewal stand-alone Part D plans are included. Out-of-pocket cost of top 100 drugs assigns a 1/100 weight to each drug. Since the requirements on formulary listing of NDCs differ from the requirements in 2007-2012, the data on NDC coverage in 2006-2007 are excluded. Standard deviations are in parentheses.

A.3 Comparative Summary Statistics for Non-renewed Plans, 2006-2012.

	2006-2007		2007-2008		2008-2009		2009-2010		2010-2011		2011-2012	
	ALL	T	ALL	T	ALL	T	ALL	T	ALL	T	ALL	T
Monthly premium	37.36 (12.82)	66.44 (33.32)	36.69 (15.08)	39.81 (8.22)	40.31 (20.02)	55.38 (19.32)	45.81 (20.70)	65.73 (36.78)	46.17 (19.13)	59.21 (20.30)	53.62 (25.27)	49.92 (11.25)
Deductible	92.51 (115.84)	83.33 (144.34)	93.57 (121.81)	113.15 (131.82)	103.54 (128.35)	73.85 (90.05)	110.02 (136.56)	110.63 (147.50)	144.18 (135.57)	49.78 (109.69)	153.50 (141.97)	129.10 (91.29)
Plan enrollment	10,730 (25,159)	267 (443)	8,473 (23,066)	122 (487)	8,573 (21,155)	310 (750)	9,415 (21,912)	1,514 (3,058)	10,594 (24,187)	3,263 (14,307)	16,201 (37,194)	568 (1,123)
LIS enrollment	5,588 (13,368)	58 (92)	4,196 (13,820)	28 (119)	4,051 (11,104)	143 (636)	4,377 (12,387)	849 (2,632)	5,042 (14,401)	2,941 (13,432)	7,699 (20,340)	355 (1,123)
Plan market share	0.009 (0.018)	0.00009 (0.0001)	0.007 (0.016)	0.0001 (0.0004)	0.007 (0.015)	0.0003 (0.0009)	0.008 (0.015)	0.002 (0.003)	0.008 (0.016)	0.002 (0.004)	0.012 (0.024)	0.0006 (0.001)
% basic plans	0.58	0.34	0.52	0.83	0.48	0.10	0.45	0.44	0.51	0.49	0.57	0.94
% benchmark plans	0.28	0.00	0.60	0.25	0.24	0.05	0.17	0.06	0.19	0.12	0.30	0.06
% plans w/gap cover	0.31	0.67	0.29	0.15	0.30	0.90	0.25	0.38	0.19	0.51	0.35	0.06
N plans	1,446	3/0	1,908	89/2	1,776	87/0	1,627	16/0	1,493	104/2	1,034	33/27

Notes: The table compares plan characteristics of terminated plans to the all-plan average. For example, for 2006-2007 all plans offered in 2006 are compared to the plans terminated in the end of 2006. "T" stands for terminated plans. Number of plans in "T" panels reports the total number of terminated plans/number plans terminated by merging parties. Standard errors are in parentheses.

A.4 Difference-in-Difference Estimates: Premiums.

	A		B		C	
	(1)	(2)	(1)	(2)	(1)	(2)
Merger-affected plan	1.703 (0.363)	3.607 (2.219)			2.241 (0.400)	3.840 (2.494)
Consolidated plan			-4.221 (0.320)	-3.861 (1.339)	-3.911 (0.343)	-3.422 (1.547)
Consolidated x Merger plan					-2.199 (0.827)	-2.105 (2.127)
<i>Covariates in 1st differences</i>						
Price index	-0.189 (0.019)	-0.196 (0.079)	-0.186 (0.018)	-0.188 (0.085)	-0.177 (0.019)	-0.190 (0.083)
Deductible	-0.023 (0.002)	-0.021 (0.008)	-0.026 (0.002)	-0.024 (0.008)	-0.026 (0.002)	-0.024 (0.008)
Gap coverage	8.879 (0.363)	8.819 (1.906)	8.660 (0.360)	8.774 (1.821)	8.773 (0.360)	8.780 (1.869)
LIS eligibility	-6.666 (0.290)	-6.557 (0.852)	-6.220 (0.288)	-6.085 (0.823)	-6.280 (0.289)	-6.224 (0.846)
Benefit type	-2.645 (0.388)	-3.089 (1.391)	-1.330 (0.398)	-1.778 (1.399)	-1.235 (0.398)	-1.834 (1.404)
<i>Top100 drugs covariates</i>						
N of covered drugs	0.025 (0.034)	-0.025 (0.183)	0.057 (0.034)	0.011 (0.192)	0.061 (0.034)	0.004 (0.186)
Mean tier	0.236 (2.254)	-0.333 (14.373)	-0.069 (2.235)	-1.149 (14.575)	0.183 (2.233)	-0.435 (14.420)
Mean number of restrictions	1.571 (2.675)	1.656 (13.715)	-2.003 (2.657)	0.593 (14.532)	-1.050 (2.658)	-0.388 (14.028)
<i>All drugs covariates</i>						
N of covered drugs, per 100	-0.019 (0.003)	-0.019 (0.008)	-0.024 (0.002)	-0.024 (0.007)	-0.021 (0.003)	-0.021 (0.008)
Mean tier	-5.334 (2.721)	-3.539 (14.751)	-7.181 (2.698)	-5.563 (15.310)	-6.938 (2.698)	-5.557 (14.935)
Mean number of restrictions	0.349 (3.042)	-4.015 (14.052)	5.196 (2.999)	-1.406 (14.690)	2.770 (3.025)	-2.163 (14.288)
<i>Covariates in levels</i>						
Lagged enrollment, in ('000)	-0.048 (0.006)	-0.023 (0.014)	-0.043 (0.006)	-0.022 (0.013)	-0.044 (0.006)	-0.021 (0.013)
Lagged log mkt share, in fractions	0.834 (0.077)	0.291 (0.284)	0.758 (0.076)	0.245 (0.313)	0.759 (0.077)	0.236 (0.306)
Year & Region F.E.	Y	Y	Y	Y	Y	Y
Insurer F.E.		Y		Y		Y
N of year-pairs	8,839			F-test	29.7	0.6
N of M&A affected plans	1,375					
N of consolidated plans	1,994					
N of M&A consolidated plans	296					

Notes: Panel A shows estimates for the plans involved in a merger; this specification does not distinguish between mergers that consolidated plans and mergers that didn't. Panel B shows estimates for the plan consolidation effect on premiums. Panel C includes the merger-consolidated plan interaction term. The F-test null hypothesis is that the sum of the coefficients on merger dummy, consolidation dummy and their interaction term is zero. Standard errors are in parentheses, clustered by pre-merger insurer for specification with pre-merger insurer fixed effects.

A.5 Difference-in-Difference Estimates: Formulary, Top 100 Drugs.

	A		B		C	
	(1)	(2)	(1)	(2)	(1)	(2)
Merger-affected plan	0.391 (0.172)	-0.146 (1.872)			-0.492 (0.189)	-1.081 (2.025)
Consolidated plan			-0.196 (0.155)	-0.176 (0.922)	-0.866 (0.165)	-0.880 (0.940)
Consolidated x Merger plan					4.357 (0.396)	4.459 (2.244)
<i>Covariates in 1st differences</i>						
Deductible	-0.005 (0.001)	-0.005 (0.005)	-0.005 (0.001)	-0.005 (0.005)	-0.004 (0.001)	-0.004 (0.005)
Gap coverage	0.966 (0.170)	1.270 (1.191)	0.958 (0.171)	1.258 (1.195)	0.921 (0.169)	1.208 (1.187)
LIS eligibility	0.450 (0.138)	0.647 (0.346)	0.483 (0.139)	0.656 (0.323)	0.393 (0.138)	0.561 (0.326)
Benefit type	1.439 (0.186)	1.609 (1.109)	1.489 (0.192)	1.662 (1.078)	1.459 (0.191)	1.619 (1.009)
<i>Covariates in levels</i>						
Lagged enrollment, in ('000)	-0.013 (0.003)	-0.007 (0.005)	-0.012 (0.003)	-0.007 (0.004)	-0.013 (0.003)	-0.006 (0.005)
Lagged log mkt share, in fractions	0.084 (0.037)	0.088 (0.129)	0.086 (0.037)	0.082 (0.132)	0.035 (0.037)	0.017 (0.130)
Year & Region F.E.	Y	Y	Y	Y	Y	Y
Insurer F.E.		Y		Y		Y
N of year-pairs	8,839			F-test	77.4	1.48
N of M&A affected plans	1,375					
N of consolidated plans	1,994					
N of M&A consolidated plans	296					

Notes: Dependent variable is the change in the number of drugs ranked in top100 by prescriptions filled, in the formulary. Standard errors are in parentheses, clustered by insurer for specification with insurer fixed effects.

A.6 Difference-in-Difference Estimates: Formulary, All Drugs.

	A		B		C	
	(1)	(2)	(1)	(2)	(1)	(2)
Merger-affected plan	43.555 (25.834)	-182.801 (338.649)			-47.084 (29.148)	-320.229 (354.326)
Consolidated plan			16.570 (22.582)	30.604 (109.959)	-45.124 (24.292)	-62.340 (123.18)
Consolidated x Merger plan					373.068 (56.411)	552.925 (221.745)
<i>Covariates in 1st differences</i>						
Deductible	0.014 (0.118)	-0.143 (0.991)	0.009 (0.118)	-0.084 (0.954)	0.081 (0.119)	-0.017 (0.953)
Gap coverage	558.694 (30.792)	628.355 (158.959)	556.604 (30.795)	644.435 (181.823)	542.380 (30.887)	607.703 (144.682)
LIS eligibility	123.063 (21.228)	158.140 (82.448)	124.321 (21.222)	149.531 (74.715)	108.372 (21.295)	136.986 (75.545)
Benefit type	340.647 (29.097)	428.907 (188.929)	333.272 (30.509)	417.181 (189.715)	333.451 (30.429)	416.994 (185.607)
<i>Covariates in levels</i>						
Lagged enrollment, in ('000)	-1.101 (0.418)	0.674 (0.930)	-1.085 (0.418)	0.733 (0.970)	-1.150 (0.417)	0.872 (1.062)
Lagged log mkt share, in fractions	-17.222 (5.378)	4.909 (16.24)	-16.649 (5.371)	2.633 (18.206)	-20.676 (5.390)	-2.332 (16.356)
Year & Region F.E.	Y	Y	Y	Y	Y	Y
Insurer F.E.		Y		Y		Y
N of year-pairs	7,396			F-test	34.9	0.2
N of M&A affected plans	1,082					
N of consolidated plans	1,746					
N of M&A consolidated plans	276					

Notes: Dependent variable is the change in the number of drugs included into the formulary. 2006-2007 year-plan pairs are excluded. Standard errors are in parentheses, clustered by pre-merger insurer for specification with insurer fixed effects.

A.7 Difference-in-Difference Estimates: Price Index.

	A		B		C	
	(1)	(2)	(1)	(2)	(1)	(2)
Merger-affected plan	-0.424 (0.311)	1.755 (2.240)			0.076 (0.344)	2.441 (2.033)
Consolidated plan			1.706 (0.280)	0.908 (1.152)	2.132 (0.300)	1.440 (1.299)
Consolidated x Merger plan					-2.723 (0.722)	-3.070 (3.311)
<i>Covariates in 1st differences</i>						
Benefit type	-2.456 (0.337)	-3.212 (2.072)	-2.978 (0.348)	-3.468 (1.939)	-2.967 (0.348)	-3.482 (1.889)
LIS eligibility	0.609 (0.251)	0.087 (1.237)	0.440 (0.252)	0.078 (1.213)	0.504 (0.252)	0.079 (1.237)
Deductible	0.0002 (0.001)	0.003 (0.009)	0.001 (0.001)	0.003 (0.009)	0.001 (0.001)	0.003 (0.009)
Gap coverage	-0.176 (0.309)	-1.385 (2.188)	-0.114 (0.309)	-1.282 (2.167)	-0.092 (0.309)	-1.317 (2.183)
<i>Covariates in levels</i>						
Lagged enrollment, in ('000)	0.015 (0.005)	-0.001 (0.010)	0.014 (0.005)	-0.003 (0.009)	0.014 (0.005)	-0.002 (0.009)
Lagged log mkt share, in fractions	-0.121 (0.067)	-0.103 (0.263)	-0.095 (0.067)	-0.063 (0.260)	-0.059 (0.067)	-0.037 (0.236)
Year & Region F.E.	Y	Y	Y	Y	Y	Y
Insurer F.E.		Y		Y		Y
N of year-pairs	8,839			F-test	0.7	0.98
N of M&A affected plans	1,375					
N of consolidated plans	1,994					
N of M&A consolidated plans	296					

Notes: Dependent variable is the change in the weighted price of the basket of top100 drugs under each plan. Standard errors are in parentheses, clustered by pre-merger insurer for specification with insurer fixed effects.