Mergers in Medicare Part D: Decomposing Market Power, Cost Efficiencies, and Bargaining Power

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Abstract

We examine horizontal mergers amongst Part D insurers with the aim of decomposing market power, cost efficiency, and bargaining power merger effects. We apply a differences-in-differences identification strategy to panel data on plans offered between 2006 and 2012 to document the effects of mergers on plan premiums and drug coverage characteristics. The results indicate substantial market power as mergers cause premiums to rise. But, premiums fall and drug coverage improves for merging insurers that restructure plans and renegotiate contracts with drug suppliers by consolidating existing plans. We attribute these effects to improved cost efficiencies and increased bargaining power.

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 there have been waves of merger and acquisition (M&A) activity as insurers adapted 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 coverage characteristics of prescription drug plans offered in the Medicare

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Part D 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 plans is directly affected by an M&A deal. More, even larger deals are on the docket. If they all proceed, 22 of the top 25 Part D insurers will have gone through a merger.

Theory suggests three major channels through which mergers affect markets. First, horizontal mergers may be beneficial if they result in increased productive efficiency. In health insurance, efficiency gains can be achieved through scale economies that appear as firms consolidate their administrative and marketing activities. Second, horizontal mergers alter bargaining dynamics with upstream suppliers as the combined firm gains monopsony 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 more favorable terms with providers. This merger effect is of particular importance in Part D. The program designers relied heavily on the ability of private insurers to bargain with drug suppliers and explicitly prohibited the government from participating in negotiations (Duggan and Scott-Morton, 2010; Frank and Newhouse, 2008). Mergers could have a positive effect if the improved bargaining position allows insurers to increase the scope of covered drugs or negotiate lower drug acquisition costs, which can be passed to enrollees either directly through reduced cost sharing on drug copays or indirectly through lower insurance premiums. Finally, horizontal mergers give firms more market power as markets become more concentrated. Reduced competition can lead to higher prices for consumers or lower product quality if firms compete on quality dimensions.

Anti-trust authorities care about whether the beneficial effects of mergers (cost efficiencies and monopsony power) in fact exist, and if so, whether they outweigh negative market power effects. Stylized facts about Medicare Part D give reason for concern. Since the program's inception in 2006, premiums increased by more than 26% in real terms. Coverage has declined. The number of drug offerings on plans' formularies has fallen by 29% and out-of-pocket costs paid by enrollees for the most popular drugs has nearly doubled. While the typical consumer still has many choices—an average of 30 plans available in each market—there has been a drastic 31% decrease in the number of plan offerings coinciding with this period of rising premiums and declining coverage.

Much of the decrease in the number of plan offerings can be attributed to merging insurers consolidating their plan offerings; even more is due to non-merging insurers consolidating

their plans. By consolidation we mean that an insurer takes two or more plans offered in the previous year and consolidates them in a single plan for the upcoming year. In any given year, about 20% of plans are consolidated. To distinguish terminology, mergers can be thought of as *inter*-firm combinations; plan consolidation, as *intra*-firm combinations. The distinction is important for anti-trust purposes. If an insurer can realize the beneficial effects of mergers (cost efficiencies and monopsony power) organically by consolidating its own plans, without engaging in a merger with an outside firm, then there is a weaker case to be made in favor of mergers. Our empirical methodology explicitly distinguishes mergers from consolidation to test whether merger effects only appear through external mergers or can be achieved internally.

Plan consolidation is a particularly important policy topic in Medicare Part D. In 2011, Medicare began publishing regulations encouraging insurers to consolidate their plans. It recommended that insurers consolidate low enrollment and "meaningfully" similar plans. Many insurers complied, however there is no evidence of this rule being enforced. As of 2014, significantly more stringent rules have been proposed that not only restrict incumbent insurers, but also limit entry of new Part D providers.

In our application to Medicare Part D, we analyze the effects that horizontal mergers have on market outcomes with the aim of separately identifying the three channels through which M&A activity affects plans: cost efficiencies, monopsony power with upstream drug suppliers, and market power. We use panel data on all plan offerings between 2006 and 2012 (over 9,000 plan-year observations) and consider two types of outcome variables: plan premiums and measures of plan coverage, specifically the number of drugs covered on insurers' formularies and an index of the out-of-pocket cost sharing an enrollee pays in drug copays.

To identify the treatment effect that M&A deals have on plans we use a differences-in-differences approach. In our first specification, 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. This approach measures the combined effect of all three channels, which is useful to run a horse race gauging whether the beneficial effects outweigh the adverse effects for insurers. However, simply comparing outcomes of merged and non-merged plans is not informative about the magnitudes of the three competing effects and indicates nothing about whether the benefits of mergers can be achieved internally through plan consolidation.

In our second specification, we sort out the three competing theories of mergers. To do so, we modify the differences-in-differences treatments to distinguish mergers that involved plan consolidation from mergers that did not. Our hypothesis is that merging on its own—without consolidating plans—does not allow a firm to realize cost efficiencies and implies it is not exercising its increased monopsony power to renegotiate contracts with drug suppliers. Thus,

only market power effects appear as the merging insurers coordinate pricing decisions. By merging and restructuring plan offerings through consolidation, merging insurers can realize all three merger effects. In other words, we can separate market power from cost efficiency and monopsony power effects by contrasting mergers with and without plan consolidation. Finally, we examine cases where non-merging firms consolidate plans. Our hypothesis is that non-merging insurers only improve cost efficiencies by consolidating plans; they gain no additional market power, nor monopsony power.

To further gauge outcomes, we examine coverage characteristics. The effects of mergers on coverage are important as both prices and the terms of coverage are jointly determined in insurance contracts. Under Part D regulations, coverage is heavily determined by the bargaining process between insurers and drug suppliers. These results provide more robust evidence about the monopsony power effects than can be gleaned from evidence on insurance premiums and constitute an important contribution to the merger literature which often lacks detailed analysis of product characteristics.

In summary, our results show that all three channels are at play. When insurers merge and do not consolidate plans, premiums increase by an average of 9%. We attribute the rise to a strong market power effect. For insurers that merge and consolidate plans, the net effect on premiums is an average decrease of 4%, outweighing market power effects. Breaking down the results based on our comparisons of non-merging insurers that consolidate plans, about two-thirds of the premium decrease is due to cost efficiencies that even non-merging firms can realize, and the remaining one-third comes from the increased monopsony power gained by merging.

The results for coverage characteristics corroborate the findings on premiums and highlight the significance of the bargaining process between insurers and drug suppliers. For insurers that merge and consolidate plans, there are large improvements in coverage. These plans increase the number of drug offerings on their formulary by an average of 14%, and decrease enrollee out-of-pocket copay costs by 4%. Merging without consolidating plans has a near zero effect on drug coverage. Likewise, there is little effect for non-merging firms that consolidate. The evidence supports our hypothesis that bargaining gains cannot be achieved internally, only for merged insurers that consolidate plans.

The remainder of the paper is organized as follows. In section 2 we discuss related 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 method, and in 6, the results. Section 7 concludes.

2 Healthcare Competition Literature

Economists have long been concerned about whether healthcare markets are competitive and, if so, whether unfettered competition ensures the first best. Ellis (2012) cites evidence of high levels of concentration and raises concerns about market power in both provider markets (hospitals, physician networks, pharmaceuticals) and insurance markets. Apart from market power, two other channels—cost efficiencies and the balance of bargaining power in the vertical relationship between insurers and healthcare providers—determine the performance of markets. This paper contributes to the literature by decomposing these three channels as they apply to health insurance markets. Merger studies provide an excellent avenue for analyzing competition as mergers events change the structure of the industry.

The literature on health insurance claims an insurer's scale as measured by enrollment, which we associate with cost efficiencies, is an important determinant of its cost structure. There is a strong correlation between scale and insurance loads: the difference between what is collected in premiums and paid out in benefits. For employer sponsored health insurance plans Karaca-Mandic et al. (2011) document loads ranging from 4% for the largest insurance plans with over 10,000 enrollees to over 40% for the smallest with under 50. In Part D, the size of plans spans this same range. A leading cause is that large insurance plans economize on administrative costs. Part D administrative costs may be particularly high due to Medicare's stringent compliance and reporting standards and the added complexities of real-time pharmacy claims processing at the point of sale. In the Medigap market, insurers have high loads because of marketing costs (Starc, 2012). Insurers use the same marketing tools for their Part D plans. Horizontal mergers may have tremendous benefits if the increased scale of merging insurers reduces administrative and marketing costs. Legislation in the PPACA aims to reduce loads by imposing minimum loss ratios (MLR) on insurers. Starting in 2014, MLRs will be implemented in Medicare Part D. Mergers may be one of the most effective ways for insurers to reduce costs so that they can meet the new MLR requirements.

The next channel we consider is the vertical market relationship between insurers and providers. The industry has shifted towards a model where insurers selectively contract with providers through a bargaining process. Insurers decide which providers to include in their network, providers decide which networks to join, and the two parties negotiate over reimbursement rates and the terms of enrollee cost sharing. There is a large literature on bargaining from the perspective of hospitals, (Ho, 2009; Ho and Lee, 2013; Gowrisankaran et al., 2013; Lewis and Pflum, 2011), but less is known from the insurance side, particularly for prescription drugs. In Part D, bargaining is quite important and has been credited with reducing drug prices for the Medicare population (Duggan and Scott-Morton, 2010).

Our merger study allows us to gain a greater understanding of how competition impacts the bargaining process. Mergers alter bargaining positions. The threat point in the Nash-bargaining models applied to the industry is determined by the number of people enrolled by the insurer. Insurers can expand their base of enrollees through merger to gain greater bargaining power. That can translate into some combination of lower premiums, expanded network coverage, and reduced cost sharing for its enrollees. We also provide evidence on whether internal plan consolidation, which makes plans larger but doesn't change the size of the insurer, affects bargaining power.

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 authors find non-trivial market power as evident in their ability to price discriminate by charging higher premiums to more profitable employers, especially so in highly concentrated markets. A similar conclusion is reached by Bates et al. (2012) that finds higher prices and lower rates of health insurance enrollment in more concentrated markets.

Dafny et al. (2012) employs the same data set as Dafny (2010) to study the effect of concentration on premiums and payments to physicians and nurses. They focus on the 1999 merger of Aetna and Prudential, two of the largest insurers in their sample. The deal between them resulted in a sharp change in the Herfindahl-Hirschman concentration Index (HHI). Their 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.

We build on Dafny et al. (2012) in two important ways. First regards the data. Whereas they examine just 1 merger case, we use panel data that includes all merger activity between 2006 and 2012. The high churn rate of mergers yields a large sample of both treated (merged plans) and a control group of plans (unmerged plans) to identify merger treatment effects. We also have detailed plan-level data on coverage characteristics, not just premiums, that we consider as merger outcomes. This is important as both prices and the terms of coverage are jointly determined in insurance contracts. Our second contribution is to disentangle the three merger effects. Their results show market power dominates, but are not informative of the extent to which the merger created cost efficiencies or altered bargaining power.

The effect of mergers on market performance is also an important topic in the finance literature. While we address the question using product-level data, most papers in finance use event studies on a set of multiple M&A deals. Most closely related is Fee and Thomas (2004)

that specifically aims to identify how mergers affect market power, cost efficiencies, and vertical bargaining power. They use a large cross-industry sample of deals from 1980 to 1997 and examine stock price movements for the merging firms, horizontal rivals, and upstream suppliers. Maksimovic et al. (2011) examines post-merger plant closures and restructuring of supplier contracts as means of improving efficiency. The analog to plant closures and restructuring in our paper is plan consolidation.

Finally, our paper contributes to a growing literature on Medicare Part D. Several papers (Lucarelli et al., 2012; Miller and Yeo, 2013; Ericson, 2014; Decarolis, 2012) examine firm conduct and competition, include important institutional details related to subsidies and market regulations. Another strand of the literature (Abaluck and Gruber, 2011; Heiss et al., 2013; Ketcham et al., 2011; Kling et al., 2012) uses individual level data on consumer choice and finds evidence that enrollees make poor plan choices. These studies have been influential in guiding policy decisions. The consumers' choice problem could be eased by reducing the number of available plan offerings. The question becomes a matter of how to implement policy to reduce choice without compromising competition or the breadth of offerings. There are two standing proposals involving plan consolidation; forced consolidation of low enrollment plans and forced consolidation of meaningfully similar plans. The most recent 2014 proposals extend these criteria to forbid new entry. Alternatively, anti-trust authorities could adopt a tolerant stance towards merger cases. This study sheds light on the policy debate by showing the effect that mergers and consolidation have on prices and coverage.

3 Medicare Part D Background

Medicare Part D introduced a prescription drug benefit to the Medicare program. It was authorized under the 2003 the "Medicare Prescription Drug, Improvement, and Modernization Act" and fully enacted in 2006. The legislation created a coverage mandate requiring beneficiaries to obtain prescription drug coverage when they first become eligible for Medicare or face penalties for late enrollment. 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 offered in this exchange are the focus of our study. About 60% of the Medicare population is covered by a Part D plan; the remainder either lack coverage or obtain prescription coverage through other means such as employer/retiree benefits or another government program.

The Part D exchange 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. Insurers are also largely responsible for the benefit design. Each insurer selectively chooses which drugs to cover on its formulary and sets cost sharing copay/coinsurance rates on a drug-by-drug basis. Drug prices are determined through a bargaining process between and drug manufacturers, wholesalers, and pharmacies. Per regulation, negotiated prices must be passed on to enrollees. This has been seen as a controversial feature of the program because the legislation explicitly prohibits the government from being involved in price negotiations with the pharmaceutical industry (Frank and Newhouse, 2008) as is the case for other government drug benefits such as Medicaid.

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, insurers 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 conditions.

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).

Nearly all major health insurance companies and many regional insurers entered the Part D market in the first two years of the program. There has been almost no entry in later years. Geographically, the market is separated into 39 markets drawn around state boundaries. Insurers offer and price plans individually for each market. In the typical market, enrollees can choose from about 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. We exclude Medicare Advantage plans that bundle Part D coverage with other Medicare coverage components. The data span 7 years from 2006 when

Medicare Part D was introduced to the most recently available data in 2012 and cover all 39 geographical markets. The sample is constructed using both publicly available and restricted use data obtained from the Centers for Medicare and Medicaid Services (CMS).

Enrollment in stand-alone Part D plans has grown from about 17 million in 2006 to over 20 million by 2012. The average plan has 11,347 individuals enrolled per year. 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. About 40% of the enrollees receive additional premium and copay subsidies through the low income subsidy (LIS) program. Table 1 presents information on market level 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 by 2012. Much of this decrease can be attributed to merger activity and plan consolidation. During the sample period average premiums increased by 26% in real terms (by 43% in nominal terms), and the average plan's market share increased 37%.

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

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

We collect information on each plan's premium, deductible, gap coverage, and drug formulary. Table A.1 reports summary statistics on the plan-level data for 2006-2012. A plan's *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. The open enrollment runs from October through December, and the contract year begins January 1st. Premiums are paid monthly by the insured. Qualified individuals are provided with the "Extra Help", or low-income subsidy (LIS) by Medicare. This LIS program covers in full or partially the monthly premium amount, deductible, co-payments and coinsurance, and eliminates the coverage gaps.

The *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. The 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. Most enhanced PDPs eliminate the deductible so that the enrollee receives first dollar coverage.

The gap in coverage or "*donut hole*" begins when the insured reaches the limit on the expenses covered by the initial coverage zone ($2250 in 2006). Prescription costs beyond the limit and below the "catastrophic" level ($5100 in 2006) are paid by the insured out-of-pocket. Many enhanced PDPs provide full or partial coverage in the donut hole. The ACA legislation eliminated the donut hole effective 2014.

The *formulary* is a comprehensive list of the medicines covered by the plan, identified by the National Drug Code (NDC).[1] The formulary files 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 drug pricing data that was first published in 2009. The pricing data 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.

To measure the comprehensiveness of formulary coverage, we count the number of drugs listed on the plan's formulary. The first measure counts the number of top 100 drugs. In early years, the average plan covered more than 90 of the top 100 and fell to 75 by 2012. The second measure counts the total number of NDCs on a formulary which plans select from a set of 5300 unique drugs that qualify for coverage under Part D.[2] Like the top 100 drug, the total number of covered NDCs fell throughout the sample period.

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 (up to 7 tiers), for the purposes of comparison we normalize a 2 on a scale of 1 to 3, to 0.5 on

[1] NDC 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.

[2] The method for counting NDCs changed after 2006. In 2006, identical drugs made by different manufacturers were "double-counted" as distinct drugs. 2007 onward, identical drugs were only counted once.

a 0 to 1 scale. The formularies also might have up to three types of *restrictions* placed on drug consumption: step therapies, prior authorization, and quantity limits. We sum up the restrictions and calculate the average number of restrictions on a formulary using a 0 to 3 scale.

We use drug prices and cost sharing rates to construct a price index to compare out-of-pocket copay prices across plans. This is our most refined measure of the generosity of plan coverage. It is constructed by using actual copay/coinsurance rates and pharmacy prices to calculate the out-of-pocket price an enrollee pays for a basket of the top 100 drugs ranked by the number of prescriptions 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 enrollees will have to pay the full retail price out-of-pocket. We construct separate price indexes for the initial coverage zone and donut hole. Three sources of variation affect the out-of-pocket 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 out-of-pocket 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 that are priced below the market average of basic plans. Benchmark plans qualify for the full subsidy amount of the low income subsidy (LIS). They also qualify to receive Medicare/Medicaid dual eligible beneficiaries. Dual eligibles—who account for about 20% of the Medicare and 40% of Part D enrollment—are randomly and uniformly assigned to the LIS eligible plans if they don't otherwise actively select a plan. Given the large number of dual eligibles, LIS eligible plans receive a big boost in enrollment from random assignment, which can be thought of as a characteristic making those plans more desirable. The theoretical foundations for this interpretation are explained in companion work by Miller and Yeo (2012). We include these other plan characteristics as control variables to ensure that our differences-in-differences results attribute price changes to merger effects, and not pricing responses to changes in coverage characteristics.

4.2 Data on M&A Deals

We collect 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 pri-

vate 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 lists the details on each of the selected deals. All of the deals involve major Part D insurers that offer plans across the entire nation with the exception of the Medical Mutual of Ohio/ Carolina Care Plan acquisition. Note that some of the major plan providers were involved in multiple deals during the sample period.

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.

We restrict attention to horizontal mergers and acquisitions of assets where either participants or their immediate subsidiary offered a Part D plan 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 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 reports and compa-

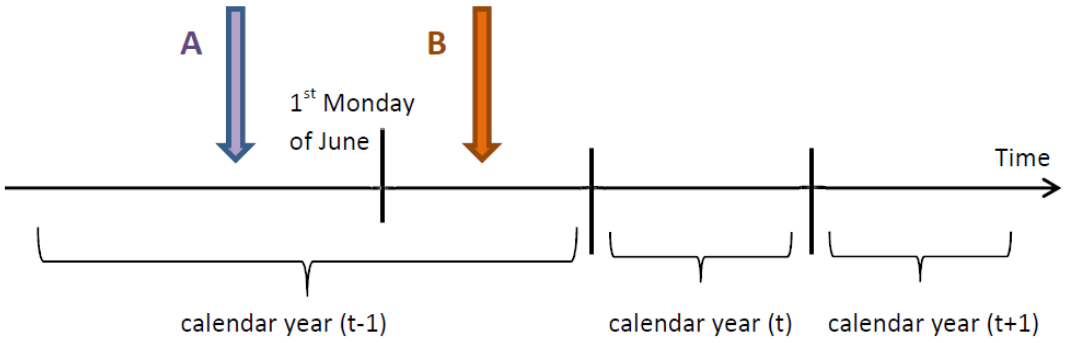

Figure 1: M&A deals timing with repect to the bid deadline date

nies' 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. There are about 100 unique parent companies whose subsidiaries offer Part D plans 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 with the requirement that at least one plan qualifies as a basic plan.

We look at the short-term merger effects by comparing plans prices and coverage characteristics 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 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, and drug prices can change across years. Terminated plans simply stop being offered for the 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

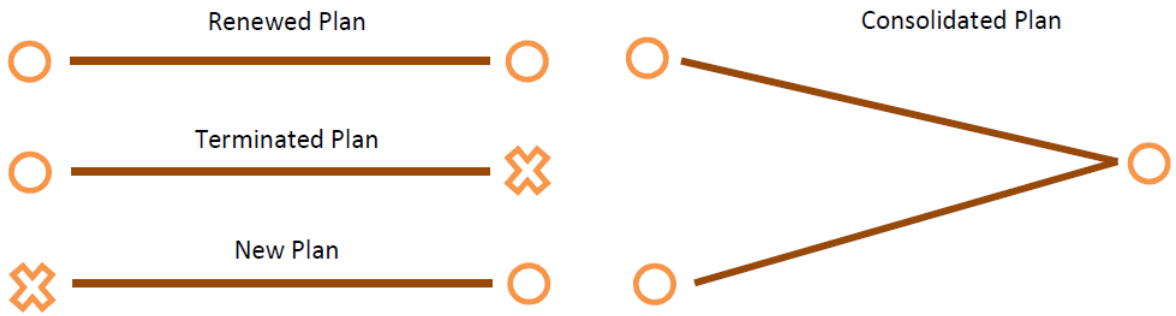

Figure 2: Plan transitions from year-to-year

participate in a deal. We posit that the main reasons behind plan consolidation are to achieve cost efficiency gains and, for merging insurers, as a means to renegotiate contracts with drug suppliers. 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 terminating plans is highly undesirable because enrollees are lost. Part D insurers are better off consolidating plans when they want to restructure plans offerings so as to retain enrollees.

Table 1 shows the total number of plans offered during the sample period in each year and the 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. 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 method requires a plan to be observed for at least two consecutive years. By definition, terminated and new plans do not meet this criteria. 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 treatment group, plans offered by companies involved in a merger deal. The pre-merger plan characteristics of merger affected plans are generally similar to all other plans.

5 Estimation Strategy: Differences-in-Differences

To estimate the effect of mergers and plan consolidation, we use a differences-in-differences (DD) identification strategy. Differences-in-differences is a popular method for identifying effects of policy "treatments" 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, there are notable 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.

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

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 specific error term. To estimate the effect of mergers on plan characteristics, we apply the DD approach to drug formulary counts, f, and the out-of-pocket drug price index, *copay*. The dependent variables in these regressions are the first differences in outcome measures, $f_{it} - f_{it-1}$ 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 the deal to premiums immediately after. 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 plans, excluding new and terminated plans (see figure 2). The unit of observation is indexed to year $t-1$ in equation (1). This timing

issue 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.[3]

On the merger status dimension, we compare merger-affected plans to a control group of plans unaffected by an M&A deal. 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 merger (treatment group) and non-merger (control group) plans shows a (44.81-45.16=)$0.36 *decrease* in premiums caused by a merger.

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. Note, unlike Dafny et al. (2012), we do not include measures of market competition such as Herfindahl-Hirshman Index (HHI) as it is controlled for by the fixed effects.

[3]Note that there is no "splitting" of plans. That is, plan A in year $t-1$ cannot be split into plans B and C for year t.

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, 22 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 possibility 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, including rivals to merging parties, gain market power when a merger increases market concentration. Likewise, mergers can increase monopsony power with upstream suppliers for all firms in a market. 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. (2012) 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. (2012), 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 estimate 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.[4] 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-year and make it difficult for new plans to attract enrollees (Miller and Yeo, 2012; Ericson, 2014). Second, subsidy amounts are calculated based on the previous year's enrollment figures which discourages plan entry and exit (Miller and Yeo, 2013). For these reasons new insurers that want to enter the Part D market do so by acquiring the plans of incumbent insurers, 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 includes plan consolidation as an additional treatment effect. 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

[4]The 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.

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 though of as an *inter*-firm combination, and plan consolidation is an *intra*-firm combination. Note that a non-merging insurer can consolidate its own plans; in periods that an insurer merges it can consolidate its own plans or consolidate with plans offered by its merger partner. 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 $D_{it-1}^{merge} = 1$ follows 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 event. 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 identification issues discussed above for mergers apply for plan consolidation treatment effects. The exogeneity assumption is perhaps more tenuous. A major concern is that insurers consolidate under-performing plans as a way to remove them from the market. In addition to the many product characteristic control variables, we control for under-performance by including measures of prior year enrollment and markets shares. There is also strong evidence that institutional features of the Part D program are primary drivers of plan consolidation. The rules for determining the LIS threshold and subsidies are pegged to enrollment figures, giving insurers a strong incentive boost enrollment by consolidating plans. This is evident in the data. The normal frequency of consolidation is 20%, but for plans that switch status to becoming LIS eligible benchmark plans, the frequency rises to 42%. The other marked increase in consolidation came in 2011 when Medicare first announced guidelines directing insurers to consolidate low enrollment and "meaningfully" similar plans. Year fixed effects and covariates for LIS status capture both of these institutional features. The interaction term of mergers and consolidation is plausibly exogenous given 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

One our of main objectives is to distinguish the three channels through which mergers affect markets: market power, cost efficiencies, and upstream monopsony power. In many industries, all three channels likely impact merger outcomes. Retrospective merger studies that examine product market prices are interesting in that they show the net effect of the three channels, but do not distinguish how much each factor contributes to the outcome. Prospective merger simulation studies have difficulty forecasting cost efficiency and monopsony power effects and instead are often based on modeling approaches that assume there are only market power effects (Weinberg and Hosken, 2013). Our contribution is to show that all three are important.

We use two extra pieces of information—over and above price data—to test the theories. First, we exploit the distinction between inter-firm mergers and intra-firm plan consolidation. Second, we test how mergers affect product characteristics: in our application coverage characteristics. Throughout the results section, we discuss a series of assumptions about the market to test the theories. The basic idea of our hypothesis can be summarized as follows. Only merging firms gain market power and monopsony power. Firms realize cost efficiencies and monopsony power by consolidating plans. Taken together, the hypothesis implies the merger dummy in specification (2) measures the market power effect on prices, the consolidation dummy measures cost efficiencies, and the interaction term measures monopsony power. The same logic applies to the product characteristic measures; however given the design of the Part D program we expect upstream monopsony power to be a more important determinant of coverage characteristics than market power. There is little reason to believe that administrative and marketing cost efficiencies would translate into changes in coverage characteristics.

6 Results

In this section we report results of the differences-in-differences estimates for plan premiums and the three coverage characteristics: the total number of drugs covered on formularies, the number of top 100 drugs on formularies, and the out-of-pocket cost for a basket of the top 100 drugs.

The results for each outcome variable are presented using three panels. Our main findings are shown in the panel labeled C. They are estimates from specification (2) that includes the merger treatment D^{merge}, consolidation treatment D^{cons}, and their interaction $D^{merge} \times D^{cons}$. Panel A shows results from specification (1) that includes only the merger treatment D^{merge};

panel B reports for the specification that only includes the consolidation treatment D^{cons}. These two specifications are reported for comparison purposes. We also show estimates with and without insurer fixed effects. The standard errors are large in specifications with insurer fixed effects because there is less within-insurer variation in the covariates. However, the point estimates generally have the same signs and magnitudes as the specifications without insurer fixed effects. We focus our interpretation on the results that include insurer fixed effects.

6.1 Mergers and Plan Premiums

Table 3 reports the results for the effect on premiums. The tables suppress coefficients on the control variables; full results are in the appendix. Panel A shows the merger treatment effect in isolation, without regard to consolidation. The results indicate that when insurers merge, the premiums on their plans go up by \$3.61 relative to the premiums for insurers that do not merge. Given the average premium of \$45 across years, the rise corresponds to an 8% increase. Theory suggests the higher premium for merged firms is due to a strong market power effect dominating cost efficiency and upstream-monopsony power effects.

Panel B reports the consolidation treatment effect in isolation. The results show how premiums for plans that were consolidated (treatment group) change with respect to the premiums for plans that were renewed (control group). Premiums for consolidated plans are \$3.86 (8.7%) lower relative to the control group of plans that are renewed across years. This result suggests that insurers are either achieving cost efficiencies or gaining monopsony power over drug suppliers by consolidating their plans.

Panel C reports estimates from the specification that jointly estimates merger and consolidation effects. This specification measures three treatment effects relative to the omitted category of not-merging/not-consolidating. The coefficient on the merger dummy, D^{merge}, indicates premiums are \$3.84 (8.5%) higher for the plans of merged insurers that are renewed but not consolidated. This result supports a strong market power effect of mergers. The coefficient on the consolidation dummy, D^{cons}, shows consolidated plans of non-merging insurers are \$3.42 (7.6%) lower than renewed plans of non-merging insurers. This drop could either be caused by a cost efficiency or upstream-monopsony power effect. This result is not influenced by market power effects because the comparison is between plans of non-merged insurers. The difference in premiums between consolidated plans of merged insurers and renewed plans of non-merged insurers is given the by sum of the merger, consolidate, and interaction term coefficients, $D^{merge} + D^{cons} + D^{merge} \times D^{cons}$. The premiums are \$1.69 (3.8%) lower, suggesting cost efficiencies and/or monopsony power effects dominate market power

effects when merging insurers consolidate their plans.[5] This result stands in stark contrast to the finding that renewed plans of merged insurers are priced higher.

The results for plan premiums provide the first set of evidence that we use to disentangle the three competing effects in the merger theory. The effects are separately identified under two assumptions. First, if the act of renewing plans by merging insurers implies that the insurers do nothing to restructure the management of plans or renegotiate contracts with drug suppliers, then there is no cost efficiency or upstream-monopsony effect. Under this assumption the coefficient on the merger dummy measures the market power effect stemming from the ability of merging insurers to coordinate pricing decisions. Second, the cost efficiency and monopsony power effects can be separated by further assuming that monopsony power over drug suppliers is solely determined at the insurer level, not the plan level. To the extent that enrollment determines bargaining positions with drug suppliers, this assumption can be interpreted to mean that insurer-wide enrollment (in both Part D and non-Part D plans) matters for monopsony power, not how an insurer's enrollees are allocated across individual plans. Under this assumption the coefficient on the consolidation dummy measures the cost efficiencies achieved from restructuring the management and marketing of its plans. This coefficient does not measure a market power effect because no merger takes place, and, under our assumptions, it does not represent a monopsony power effect because there are no overall gains in enrollment at the insurer level for a non-merging insurer consolidating its plans. The monopsony power effect is given by the coefficient on the interaction of the merger and consolidate dummy: $D^{merge} \times D^{cons}$. If insurers renegotiate contracts with drug suppliers when they consolidate plans, a merged insurer with a larger base of enrollees will have stronger monopsony power.

In summary, the disentangled results indicate the market power effect of mergers raises premiums \$3.84, cost efficiencies reduce premiums \$3.42, and the extra monopsony power effect reduces premiums \$2.11. The net effect for merging insurers that consolidate plans is the sum of the three effects: a decrease in premiums of \$1.69.

6.2 Mergers and Drug Coverage: Formularies

Our next set of results investigates how mergers and plan consolidation affect coverage characteristics. First, we look at the composition of drug formularies to gauge the generosity of drug coverage offered by a plan. We use two measures: the number of top 100 drugs covered on a plan's formulary in table 4 and the total number of all NDCs in table 5. The

[5] When insurer fixed effects are excluded and the estimates are less noisy, the combined effect of merging and consolidating remains negative and passes an F-test of joint significance differing from zero. However it fails at reasonable significance levels in the specification with insurer fixed effects.

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

	A		B		C	
	(1)	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
Merger-affected plan	1.703	3.607			2.241	3.840
	(0.363)	(2.219)			(0.400)	(2.494)
Consolidated plan			-4.221	-3.861	-3.911	-3.422
			(0.320)	(1.339)	(0.343)	(1.547)
Consolidated x Merger plan					-2.199	-2.105
					(0.827)	(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.

top 100 captures how generous coverage is for a general Medicare population that is likely to take some of the most popular drugs. The all NDCs list reflects how well the plan serves a diverse population, with some individuals requiring special treatments outside of the most common medicines list. Note that these measures are not necessarily closely correlated. At the extreme, one plan may cover all drugs from the top 100 and a minimal number of drugs outside the top 100. Another plan may have a limited selection of the most common drugs but have a variety of other options on its formulary.

For the top 100 drugs, panel A and panel B show that mergers and plan consolidation when taken in isolation have a near zero effect on drug formularies. For the all NDCs list, the effects are also near-zero, however there may be some evidence in the specification with insurer fixed effects in panel A that mergers lead to less formulary coverage. Although these results don't reveal any meaningful effect on formulary coverage, we find large effects in the specification that includes the interaction of merging and plan consolidation in panel C. The coefficient on the merger dummy, D^{merge}, indicates renewed plans of merged insurers delist 1 of the top 100 drugs and 320 from the all NDCs list. Given that the average plan lists 90 out of top 100 drugs and 2,700 NDCs, these changes represent decreases in percentage terms of 1.2% and 11.9% respectively. The top 100 figure may seem small, but, stated equivalently,

one fewer listed drug corresponds to a 12% increase in the number of top 100 excluded from formularies. The coefficient on the consolidation dummy D^{cons} indicates a decrease in coverage, slightly less than the merger effect for the top 100 drugs (-0.9), and much smaller in magnitude for all NDCs (-62). The largest effect is for merged insurers that consolidate plans. The interaction term $D^{merge} \times D^{cons}$, is an increase in the top 100 of 4.5 top 100 drugs and 550 NDCs, which in percentage terms represent increases of 5% and 20% respectively. The combined effect of merging insurers consolidating plans nets a very large increase in drug coverage relative to the more modest effects for merging insurers that renew plans and non-merged insurers consolidating plans.

These results provide further evidence on the three theories of mergers. The large increase in coverage for consolidated plans of merged insurers indicates a strong monopsony power effect. By consolidating and renegotiating contracts with drug suppliers, merged insurers with a larger base of enrollees have greater bargaining power to extract better terms from drug suppliers. The results suggests greater bargaining power allows insurers to offer substantially broader drug coverage for both top 100 drugs and across the full spectrum of all NDCs. Apart from greater bargaining power, it is also plausible that the merging insurers are able to combine their pre-merger formularies into a single more extensive formulary.

The near zero effects (or modest effects) on formularies found for merged/non-consolidated and non-merged/consolidated plans are also of interest. That consolidation by non-merging insurers does not increase coverage (or somewhat decreases for top 100 coverage) supports the hypothesis that bargaining power is not determined at the plan level. Returning to interpretation of the premium results, these formulary results indicate the large drop in price from consolidation are attributed to efficiency factors, not monopsony power. The modest negative effect on coverage for merged insurers that renew plans could be indicative of a market power effect, whereby the larger firm exercises market power by reducing the quality of their plan offerings. That the negative effect is larger for the NDCs measure than the top 100, could indicate insurers exercise monopoly power by horizontally differentiating their formularies. That is, after the merger, drugs for some specialized classes of medical conditions are retained for one of their plans, yet dropped on another plan to make the plans appeal to different sets of consumers.

6.3 Mergers and Drug Coverage: Out-of-pocket Drug Cost

For a complete picture of the effect on drug coverage, we consider out-of-pocket drug costs. The outcome of interest is the out-of-pocket cost in copays/coinsurance that an enrollee pays for a basket of top 100 drugs in the initial coverage zone after deductibles have been met.

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

	A		B		C	
	(1)	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
Merger-affected plan	0.391	-0.146			-0.492	-1.081
	(0.172)	(1.872)			(0.189)	(2.025)
Consolidated plan			-0.196	-0.176	-0.866	-0.880
			(0.155)	(0.922)	(0.165)	(0.940)
Consolidated x Merger plan					4.357	4.459
					(0.396)	(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.

Three components influence out-of-pocket costs: the number of drugs out of top 100 list covered by a plan's formulary, copay and coinsurance rates, and the list price for each drug negotiated with drug manufacturers. The negotiated price matters for out-of-pocket costs for drugs covered by a coinsurance scheme (percentage of drug price) as opposed to copayment which is a fixed dollar amount. If a drug is covered by the plan, it enters the basket with its respective copay rate or its coinsurance rate times negotiated price. For drugs not listed on the formulary, we assume that an enrollee pays the full retail price which we set to the average regional (if available) or national drug price. The out-pocket-cost complements the formulary count outcome as it measures not just the number of covered drugs, but also the cost of covered drugs. With negotiated prices and copay/coinsurance rates included, it encompasses the most direct measure of the bargaining power insurers have with drug manufacturers and as such may be a better indicator of monopsony power effects.

The results for the out-of-pocket cost measure are generally consistent with those found for the drug formulary measures but are noisier. The most stark result in panel C of table 6 is the large negative coefficient (-$3) on the interaction term of merging and consolidating. Given an average cost for the basket of top 100 drugs of $63, the result represents a decrease in cost of 4.8%. Following our interpretation of the theories, the decrease indicates a strong monopsony power effect that merging insurers can achieve by consolidating plans. For non-

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

	A		B		C	
	(1)	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
Merger-affected plan	43.56	-182.80			-47.08	-320.23
	(25.83)	(338.65)			(29.15)	(354.33)
Consolidated plan			16.57	30.60	-45.12	-62.34
			(22.58)	(109.96)	(24.29)	(123.18)
Consolidated x Merger plan					373.07	552.93
					(56.41)	(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.

merging insurers, consolidation has the opposite effect; out-of-pocket costs increase $1.40. This supports the notion that insurers cannot increase their monopsony power by consolidating plans, and further supports the hypothesis that premium reductions for consolidated plans are due to cost efficiency effects. The estimate on the merger dummy D^{merge} indicates a monopoly power effect for merging insurers that renew plans. Although the regulations require insurers to pass on all negotiated drug prices to enrollees, they can exercise monopoly power over out-of-pocket drug costs by raising copay and coinsurance rates. This appears to be happening for renewed plans of merged insurers, in which out-of-pocket costs increase by $2.41. However, the result is not robust to the exclusion of insurer fixed effects.

Comparing the results on formulary coverage to out-of-pocket costs for the interaction term, $D^{merge} * D^{cons}$ leads to the same conclusion that merging and consolidating plans improves coverage through increased monopsony power. But the combined effects $D_{merge} + D^{cons} + D_{merge} * D^{cons}$, which is the ultimate outcomes for consumers, leads to divergent conclusions. Drug coverage increases in terms of the number of drugs on the formulary (+2.5 top 100 drugs and +170 NDCs), yet decreases in terms of out-of-pocket costs (a rise of $0.80 for the top 100 drugs). Whether coverage improves depends on what is more important: drug costs or the scope of covered drugs. The bargaining process between insurers and drug manufacturers is certainly very complicated, involving many decisions about the inclusion

of drugs, copay/coinsurance rates, and drug prices. The relatively stronger effect on the interaction term for formulary counts relative to that for the out-of-pocket cost, suggests that the decision about what drugs to include on formularies matters more in the bargaining process than the costs of those drugs.

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

	A		**B**		**C**	
	(1)	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
Merger-affected plan	-0.424	1.755			0.076	2.441
	(0.311)	(2.240)			(0.344)	(2.033)
Consolidated plan			1.706	0.908	2.132	1.440
			(0.280)	(1.152)	(0.300)	(1.299)
Consolidated x Merger plan					-2.723	-3.070
					(0.722)	(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

This paper examines the effects of horizontal mergers amongst Part D insurers on prices and coverage characteristics. Our method applies a differences-in-differences identification strategy to a large panel of all Part D plans sold between 2006 and 2012. We make a distinction between mergers—inter-firm combinations—and plan consolidation—intra-firm combinations—to decompose the three channels through which mergers affect markets: market power, cost efficiencies, and upstream monopsony power.

We draw two main conclusions. First, we find evidence that mergers cause premiums to rise, indicative of a strong market power effect. However, market power is offset when merging insurers consolidate plans. These cost savings stem from two sources: economizing on administrative expenses and market activities (cost efficiencies) and improving bargaining positions with drug suppliers (monopsony power). As further evidence on bargaining power,

we find merging and consolidating plans leads to greatly improved drug coverage, yet merging on its own has a near zero effect on coverage. Our second conclusion is that plan consolidation by non-merging firms results in lower premiums, but does not improve drug coverage. These results suggest insurers can organically achieve cost efficiencies through plan consolidation, but only mergers alter market power and monopsony power.

Given the rapid pace of M&A activity in the industry, there is keen interest amongst anti-trust authorities and healthcare policy makers to scrutinize these deals. Our results offer a few lessons. Merger deals create considerable market power. However, there can be benefits in the form of lower premiums and improved coverage if the merging insurers restructure their plans to streamline costs and exercise monopsony power. Yet, cost efficiency alone is not a sufficient justification as non-merging insurers can also realize cost efficiencies. Balancing bargaining power and market power and weighing the importance of coverage versus price become the keys to an anti-trust investigation. There are also specific ramifications for Part D. Current policy aims to reduce the number of plans. Our results suggest policies should favor plan consolidation, as opposed to the elimination of insurers and restrictions on new entrants. Consolidation has the added benefit of creating cost efficiencies, and the further benefit of improved drug coverage if consolidation involves merging insurers.

There are several avenues for extending this work. A similar analysis could be conducted for vertical mergers. There are two types: mergers with pharmacies, such as the CVS Caremark deal, and M&A deals with pharmacy benefits managers (PBMs). PBMs historically acted as third party administrators who process claims and consult on formulary construction. Recently PBMs have been entering the market by acquiring the Part D assets of health insurers; at the same time, health insurers have been bringing PBM functions in-house through acquisition. Much of the current merger activity impacts broader health insurance markets outside Part D. A key difference is that bargaining with providers (hospitals, doctors) occurs at a local level, whereas it is at a national level for prescription drugs. Finally, new individual level administrative claims data is becoming available for Part D. Future work could examine how mergers and plan consolidation affect enrollment decisions and prescription drug usage.

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A Tables

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

	2006	2007	2008	2009	2010	2011	2012
Outcome variables							
Premium	37.36	36.69	40.31	45.81	46.17	53.62	53.41
	(12.82)	(15.08)	(20.02)	(20.70)	(19.13)	(25.27)	(26.72)
Out-of-pocket drug cost	45.12	46.99	53.36	58.02	71.25	77.05	87.48
	(12.38)	(12.91)	(12.31)	(10.77)	(9.84)	(9.42)	(13.06)
N of NDCs covered*	14,688	4,791	4,117	4,014	3,401	3,359	3,441
	(13,682)	(1,484)	(1,064)	(965)	(675)	(613)	(585)
N of top100 drugs covered	91.58	93.07	90.10	87.84	82.63	78.04	74.52
	(5.92)	(5.96)	(7.67)	(9.14)	(7.43)	(6.96)	(7.38)
Controls							
Deductible	92.51	93.57	103.73	110.02	144.18	153.50	153.40
	(115.84)	(121.81)	(128.40)	(136.56)	(135.57)	(141.97)	(152.51)
Mean tier, all drugs	0.22	0.27	0.30	0.32	0.30	0.33	0.37
	(0.13)	(0.08)	(0.08)	(0.10)	(0.08)	(0.10)	(0.10)
Mean tier, top100 drugs	0.20	0.26	0.26	0.27	0.22	0.23	0.25
	(0.14)	(0.09)	(0.09)	(0.12)	(0.08)	(0.09)	(0.10)
Mean restriction (0-3), all	0.16	0.20	0.28	0.32	0.33	0.33	0.36
	(0.19)	(0.10)	(0.13)	(0.12)	(0.12)	(0.11)	(0.13)
Mean restriction (0-3), top	0.17	0.23	0.28	0.30	0.29	0.26	0.28
	(0.19)	(0.16)	(0.17)	(0.15)	(0.12)	(0.11)	(0.12)
Mean restriction (1-3), all	1.07	1.11	1.15	1.15	1.15	1.14	1.14
	(0.05)	(0.07)	(0.08)	(0.08)	(0.09)	(0.08)	(0.08)
Mean restriction (1-3), top	1.07	1.13	1.15	1.12	1.11	1.10	1.08
	(0.10)	(0.13)	(0.14)	(0.10)	(0.12)	(0.12)	(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	0.82	0.74	0.46	0.69
% of consolidated plans		0.12	0.14	0.10	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	44.81	42.54	45.16
	(16.83)	(19.51)	(19.94)	(22.03)
Out-of-pocket cost of top100 drugs	57.90	63.47	56.71	63.45
	(16.65)	(18.03)	(15.78)	(17.59)
N of NDCs covered	3,983	3,847	4,036	3,712
	(1,143)	(960)	(1,190)	(900)
N of top 100 drugs covered	88.22	86.31	88.06	85.32
	(10.54)	(11.15)	(8.35)	(9.49)
Deductible	121.46	117.78	112.52	118.14
	(139.07)	(145.21)	(130.37)	(135.06)
Mean tier, all drugs	0.30	0.32	0.29	0.31
	(0.09)	(0.08)	(0.10)	(0.09)
Mean tier, top100 drugs	0.24	0.25	0.24	0.25
	(0.13)	(0.13)	(0.10)	(0.09)
Mean restriction (0-3), all	0.23	0.29	0.27	0.30
	(0.15)	(0.14)	(0.14)	(0.13)
Mean restriction (0-3), top100	0.19	0.23	0.27	0.28
	(0.14)	(0.13)	(0.16)	(0.14)
Mean restriction (1-3), all	1.11	1.14	1.13	1.15
	(0.07)	(0.06)	(0.08)	(0.09)
Mean restriction (1-3), top100	1.13	1.10	1.12	1.13
	(0.14)	(0.06)	(0.12)	(0.13)
Plan market share	0.014	0.019	0.008	0.009
	(0.024)	(0.033)	(0.016)	(0.017)
Enrollment	15,825	22,940	9,583	11,562
	(33,560)	(47,206)	(23,577)	(25,447)
LIS enrollment	8,681	12,167	4,436	5,276
	(18,393)	(25,319)	(13,244)	(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	66.44	36.69	39.81	40.31	55.38	45.81	65.73	46.17	59.21	53.62	49.92
	(12.82)	(33.32)	(15.08)	(8.22)	(20.02)	(19.32)	(20.70)	(36.78)	(19.13)	(20.30)	(25.27)	(11.25)
Deductible	92.51	83.33	93.57	113.15	103.54	73.85	110.02	110.63	144.18	49.78	153.50	129.10
	(115.84)	(144.34)	(121.81)	(131.82)	(128.35)	(90.05)	(136.56)	(147.50)	(135.57)	(109.69)	(141.97)	(91.29)
Plan enrollment	10,730	267	8,473	122	8,573	310	9,415	1,514	10,594	3,263	16,201	568
	(25,159)	(443)	(23,066)	(487)	(21,155)	(750)	(21,912)	(3,058)	(24,187)	(14,307)	(37,194)	(1,123)
LIS enrollment	5,588	58	4,196	28	4,051	143	4,377	849	5,042	2,941	7,699	355
	(13,368)	(92)	(13,820)	(119)	(11,104)	(636)	(12,387)	(2,632)	(14,401)	(13,432)	(20,340)	(1,123)
Plan market share	0.009	0.00009	0.007	0.0001	0.007	0.0003	0.008	0.002	0.008	0.002	0.012	0.0006
	(0.018)	(0.0001)	(0.016)	(0.0004)	(0.015)	(0.0009)	(0.015)	(0.003)	(0.016)	(0.004)	(0.024)	(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	3.607			2.241	3.840
	(0.363)	(2.219)			(0.400)	(2.494)
Consolidated plan			-4.221	-3.861	-3.911	-3.422
			(0.320)	(1.339)	(0.343)	(1.547)
Consolidated x Merger plan					-2.199	-2.105
					(0.827)	(2.127)
Covariates in 1st differences						
Price index	-0.189	-0.196	-0.186	-0.188	-0.177	-0.190
	(0.019)	(0.079)	(0.018)	(0.085)	(0.019)	(0.083)
Deductible	-0.023	-0.021	-0.026	-0.024	-0.026	-0.024
	(0.002)	(0.008)	(0.002)	(0.008)	(0.002)	(0.008)
Gap coverage	8.879	8.819	8.660	8.774	8.773	8.780
	(0.363)	(1.906)	(0.360)	(1.821)	(0.360)	(1.869)
LIS eligibility	-6.666	-6.557	-6.220	-6.085	-6.280	-6.224
	(0.290)	(0.852)	(0.288)	(0.823)	(0.289)	(0.846)
Benefit type	-2.645	-3.089	-1.330	-1.778	-1.235	-1.834
	(0.388)	(1.391)	(0.398)	(1.399)	(0.398)	(1.404)
Top100 drugs covariates						
N of covered drugs	0.025	-0.025	0.057	0.011	0.061	0.004
	(0.034)	(0.183)	(0.034)	(0.192)	(0.034)	(0.186)
Mean tier	0.236	-0.333	-0.069	-1.149	0.183	-0.435
	(2.254)	(14.373)	(2.235)	(14.575)	(2.233)	(14.420)
Mean number of restrictions	1.571	1.656	-2.003	0.593	-1.050	-0.388
	(2.675)	(13.715)	(2.657)	(14.532)	(2.658)	(14.028)
All drugs covariates						
N of covered drugs, per 100	-0.019	-0.019	-0.024	-0.024	-0.021	-0.021
	(0.003)	(0.008)	(0.002)	(0.007)	(0.003)	(0.008)
Mean tier	-5.334	-3.539	-7.181	-5.563	-6.938	-5.557
	(2.721)	(14.751)	(2.698)	(15.310)	(2.698)	(14.935)
Mean number of restrictions	0.349	-4.015	5.196	-1.406	2.770	-2.163
	(3.042)	(14.052)	(2.999)	(14.690)	(3.025)	(14.288)
Covariates in levels						
Lagged enrollment, in ('000)	-0.048	-0.023	-0.043	-0.022	-0.044	-0.021
	(0.006)	(0.014)	(0.006)	(0.013)	(0.006)	(0.013)
Lagged log mkt share, in fractions	0.834	0.291	0.758	0.245	0.759	0.236
	(0.077)	(0.284)	(0.076)	(0.313)	(0.077)	(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	-0.146			-0.492	-1.081
	(0.172)	(1.872)			(0.189)	(2.025)
Consolidated plan			-0.196	-0.176	-0.866	-0.880
			(0.155)	(0.922)	(0.165)	(0.940)
Consolidated x Merger plan					4.357	4.459
					(0.396)	(2.244)
Covariates in 1st differences						
Deductible	-0.005	-0.005	-0.005	-0.005	-0.004	-0.004
	(0.001)	(0.005)	(0.001)	(0.005)	(0.001)	(0.005)
Gap coverage	0.966	1.270	0.958	1.258	0.921	1.208
	(0.170)	(1.191)	(0.171)	(1.195)	(0.169)	(1.187)
LIS eligibility	0.450	0.647	0.483	0.656	0.393	0.561
	(0.138)	(0.346)	(0.139)	(0.323)	(0.138)	(0.326)
Benefit type	1.439	1.609	1.489	1.662	1.459	1.619
	(0.186)	(1.109)	(0.192)	(1.078)	(0.191)	(1.009)
Covariates in levels						
Lagged enrollment, in ('000)	-0.013	-0.007	-0.012	-0.007	-0.013	-0.006
	(0.003)	(0.005)	(0.003)	(0.004)	(0.003)	(0.005)
Lagged log mkt share, in fractions	0.084	0.088	0.086	0.082	0.035	0.017
	(0.037)	(0.129)	(0.037)	(0.132)	(0.037)	(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	-182.801			-47.084	-320.229
	(25.834)	(338.649)			(29.148)	(354.326)
Consolidated plan			16.570	30.604	-45.124	-62.340
			(22.582)	(109.959)	(24.292)	(123.18)
Consolidated x Merger plan					373.068	552.925
					(56.411)	(221.745)
Covariates in 1st differences						
Deductible	0.014	-0.143	0.009	-0.084	0.081	-0.017
	(0.118)	(0.991)	(0.118)	(0.954)	(0.119)	(0.953)
Gap coverage	558.694	628.355	556.604	644.435	542.380	607.703
	(30.792)	(158.959)	(30.795)	(181.823)	(30.887)	(144.682)
LIS eligibility	123.063	158.140	124.321	149.531	108.372	136.986
	(21.228)	(82.448)	(21.222)	(74.715)	(21.295)	(75.545)
Benefit type	340.647	428.907	333.272	417.181	333.451	416.994
	(29.097)	(188.929)	(30.509)	(189.715)	(30.429)	(185.607)
Covariates in levels						
Lagged enrollment, in ('000)	-1.101	0.674	-1.085	0.733	-1.150	0.872
	(0.418)	(0.930)	(0.418)	(0.970)	(0.417)	(1.062)
Lagged log mkt share, in fractions	-17.222	4.909	-16.649	2.633	-20.676	-2.332
	(5.378)	(16.24)	(5.371)	(18.206)	(5.390)	(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	1.755			0.076	2.441
	(0.311)	(2.240)			(0.344)	(2.033)
Consolidated plan			1.706	0.908	2.132	1.440
			(0.280)	(1.152)	(0.300)	(1.299)
Consolidated x Merger plan					-2.723	-3.070
					(0.722)	(3.311)
Covariates in 1st differences						
Benefit type	-2.456	-3.212	-2.978	-3.468	-2.967	-3.482
	(0.337)	(2.072)	(0.348)	(1.939)	(0.348)	(1.889)
LIS eligibility	0.609	0.087	0.440	0.078	0.504	0.079
	(0.251)	(1.237)	(0.252)	(1.213)	(0.252)	(1.237)
Deductible	0.0002	0.003	0.001	0.003	0.001	0.003
	(0.001)	(0.009)	(0.001)	(0.009)	(0.001)	(0.009)
Gap coverage	-0.176	-1.385	-0.114	-1.282	-0.092	-1.317
	(0.309)	(2.188)	(0.309)	(2.167)	(0.309)	(2.183)
Covariates in levels						
Lagged enrollment, in ('000)	0.015	-0.001	0.014	-0.003	0.014	-0.002
	(0.005)	(0.010)	(0.005)	(0.009)	(0.005)	(0.009)
Lagged log mkt share, in fractions	-0.121	-0.103	-0.095	-0.063	-0.059	-0.037
	(0.067)	(0.263)	(0.067)	(0.260)	(0.067)	(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.