The Effect of Any Willing Provider and Freedom of Choice Laws on Prescription Drug Expenditures

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Pharmacy benefit managers (PBMs) potentially lower costs associated with prescription drugs through increased bargaining power with manufacturers. PBMs engage in selective contracting with pharmacies which has the potential to reduce retail competition, leading to increased prices. Proponents of "Any Willing Provider (AWP)" and "Freedom of Choice (FOC)" laws limiting this selective contracting claim increased retail competition will lower prescription drug spending. Examining the passage of such laws over the period 1991–2009, we find that AWP laws increase spending on prescription drugs by ∼5% beyond any pre-existing trends in spending while FOC laws have no significant effect. (*JEL*: L42, I13, I18, K21)

1. Introduction

Health care expenditures in the United States have risen for decades. Of these expenditures, prescription drug spending is particularly concerning. Identifying solutions to rising health care costs remains an issue of considerable economic significance. Contracting mechanisms among firms

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provide one possible avenue of cost-reduction. Pharmacy benefit managers (PBMs) facilitate agreements among pharmaceutical manufacturers, retail pharmacies, and health plan sponsors (Department of Justice and Federal Trade Commission, 2004). These PBMs engage in exclusive or selective contracting to create networks of these providers, which in turn participate in specified plans to distribute health care services and pharmaceutical drugs to patients who subscribe to the plans.

PBMs represent health plan sponsors in relations with pharmaceutical manufacturers and retail pharmacies. They negotiate with pharmaceutical manufacturers allowing them to obtain lower prices for prescription medications due to their ability to make high-volume purchases for distribution within the network. Additionally, they facilitate the administration of pharmacy services on the health plan sponsors' behalf. Membership in PBM networks is often highly exclusive (Klick and Wright, 2012). There is evidence this characteristic contributes to PBMs' ability to provide consumers access to prescription drugs more efficiently and at a lower cost than would otherwise be possible (Government Accountability Office, 2003).[1] The more exclusive the network, the higher the volume of a prescription drug a member manufacturer can expect to sell and the more customers a member pharmacy can expect to serve (Federal Trade Commission, 2005). Thus, bidding for membership in a network is highly competitive, leading bidders to offer steep discounts, the savings from which can be passed on to consumers.

Theoretically, however, these kinds of exclusive arrangements could lead to a reduction in competition that leads to higher prices and increased expenditures as consumers are limited in their retail choices. Because of this concern, a number of states have passed "any willing provider" (AWP) and "freedom of choice" (FOC) laws. State and federal AWP and FOC laws limit the ability of PBMs to engage in exclusive contracting and to create exclusive networks of pharmacies authorized to dispense drugs under a particular health plan. Similar legislation has been proposed at the federal level.

In this article, we examine the effect of these laws on prescription drug spending in the United States. Using more general specifications than have

1. PBMs are able to negotiate deeper discounts in retail pharmacy payments due to its smaller, more exclusive network (Government Accountability Office, 2003).

been previously used in the literature and examining a longer time horizon to capture the long-term competitive effects of these laws, we show that AWP laws are associated with significantly higher per capita spending on prescription drugs. Specifically, relative to background trends in prescription drug spending and relative to contemporaneous changes in other, unaffected, categories of health spending, we find that AWP laws lead to an increase in per capita prescription drug spending of $\sim$ 5% in real terms. Contrary to the claims of the supporters of AWP laws, it appears as though they do not generate cost savings. We also find that FOC laws do not have any effect on spending. The most likely explanation for this result is that FOC laws give consumers the freedom to leave the network, but at the cost of foregoing the savings created by selective contracting.

2. Theoretical Background

A critical question arising from the use of selective and exclusive contracting in the health care sector is whether these contracts result in higher or lower expenditures. We focus upon the exclusive or selective contracts between PBMs and one or more pharmacies to distribute the drugs of a particular health care plan. For example, a PBM might negotiate with several large pharmacy chains before ultimately agreeing with CVS to distribute exclusively the drugs of a particular health care plan.

Exclusive or selecting contracting can reduce costs, lower prices, and better align incentives (Cooper et al., 2005; Abbott and Wright, 2009; Federal Trade Commission, 2014). We briefly discuss the efficiency justification most relevant to exclusive or selective contracting in this setting. Specifically, in the presence of AWP or FOC laws, health insurers, plans, or PBMs "cannot give providers any assurance of favorable treatment or greater volume in exchange for lower prices" which will reduce incentives to "invest in plan designs and complex negotiations with pharmacies and manufacturers" (Federal Trade Commission, 2014).

The economic mechanism by which the use of exclusive deals or selective contracts results in greater competition, reduced costs, and lower prices is well understood. Exclusive contracts can enable input suppliers or retailers to secure greater discounts for their consumers by intensifying upstream

competition for distribution (Klein and Murphy, 2008). Considering the example of competition for retail distribution, Klein and Murphy explain that a retailer can also increase the perceived elasticity of demand faced by a manufacturer, and thus intensify price competition, by shifting its loyal customer base to one of the competing manufacturers through exclusive dealing. Retailers are not merely passive transmitters of exogenous consumer preferences. Multi-product retailers face downward sloping demand curves and have some discretion to shift product mix without losing their entire customer base. Because consumers are loyal to the overall bundle of goods provided by a retailer, they are unlikely to switch retailers just because a retailer no longer carries one of its preferred products. Thus, a manufacturer is willing to provide greater discounts to bid for access to a retailer's loyal customers who might otherwise prefer a different brand. This greater incentive to provide discounts for access to the input supplier's customer base is passed on to consumers and provides competitive benefits.

However, economic theory also provides reasons to believe that exclusive or selective contracting poses competitive risks under certain conditions (Cooper et al., 2005; Kobayashi, 2005). Indeed, concerns that selective contracting might reduce competition and consumer choice motivated the "any willing pharmacy" provisions in the Center for Medicare and Medicaid Services' recent Proposed Rule governing Prescription Drug Benefit Programs.[2]

Some of this theoretical work might apply to the use of the exclusive and selective contracts between health plans or PBMs and pharmacies. One such scenario involves competition between multiple PBMs. For example, work by Rasmussen et al. (1991) and Segal and Whinston (2000) might suggest that each PBM gains the entire current benefit of lower prices from its exclusive dealing but bears only part of the future cost of reduced competition that affects all PBMs. In addition, competition among PBMs impacts the competitive effects of exclusive dealing arrangements. Simpson and Wickelgren (2007) demonstrate that substantial incentives remain to enter into exclusive contracts even when downstream competition is intense.

2. 79 Fed. Reg. 1918, 1979, 1982 (January 10, 2014) (noting CMS's desire to "maximize opportunities for price competition" and "improve market competition" through proposals on any willing pharmacy standards).

They explain further that because price approaches marginal cost in a competitive market, the benefit of lower-priced inputs is passed on to downstream buyers, and there is little incentive for retailers to obtain lower-priced inputs from new entrants. Thus, an incumbent monopolist may be able to support exclusionary exclusive dealing contracts with only small side payments.

In sum, economic theory provides reasons to believe exclusive or selective contracting might enhance competition and decrease prices as well as scenarios under which the same contracts might be employed to harm competition and result in higher prices. Our paper attempts to identify which of these effects is more important in the prescription drug market in the U.S. Because patents already provide a legal monopoly for many prescription drugs, it is tempting to assume that any restraint of retail competition will have little chance to harm upstream competition. However, since even patented drugs will often have imperfect substitutes, this need not be the case.

In response to concerns that selective contracting might harm competition and consumer choice, many states have adopted AWP and FOC laws. AWP laws require managed care sponsors to allow any provider into the networks that is willing to meet the networks' terms of membership.[3] FOC laws allow an insured individual ("enrollee") to choose any provider he wants regardless of whether that provider is in the managed care sponsor's network. Because the enrollee will bear any additional cost arising from using the out of network pharmacy, FOC laws may not be as disruptive to a PBM's negotiating position as those additional costs will limit the degree to which enrollees go to out of network pharmacies.

These laws frequently apply to pharmaceutical services and thereby prohibit PBMs from excluding pharmacies that enrollees choose or pharmacies

3. "Every … health care provider … shall have the right to become a participating physician or approved health care provider … under such terms or conditions as are imposed on other participating physicians or approved health care providers" (Ga. Code Ann. § 33-20-16 (2010)). "No hospital, physician or type of provider … willing to meet the terms and conditions offered to it or him shall be excluded" (Va. Code Ann. § 38.2-3407 (2008)). "No policy of group health insurance providing benefits for hospital and medical expenses … may … [p]revent any person who is a party to or beneficiary of any health insurance policy from selecting a licensed pharmacy of his choice to furnish the pharmaceutical services offered under any policy or plan …" (S.D. Codified Laws § 58-18-37 (1990)).

that are willing to accept the terms PBMs offer. Recently, "The Pharmacy Competition and Consumer Choice Act of 2011" proposed similar legislation on the national level (H.R. 1971, 112th Cong. (2011); S. 1058, 112th Cong. (2011)). Like state AWP laws, this bill would prohibit PBMs from "exclud[ing] an otherwise qualified pharmacist or pharmacy from participation in a particular network provided that the pharmacist or pharmacy … accepts the terms, conditions and reimbursement rates of the PBM …."

Earlier empirical studies suggest AWP and FOC laws increase state per capita health care expenditures and, in particular, pharmaceutical expenditures. Vita (2001) examined AWP and FOC laws promulgated prior to 1997 and found a modest but significant increase in per capita health spending in states adopting more stringent AWP/FOC laws. Durrance (2009), studying prescription drug expenditures between 1988 and 1998, similarly found that AWP laws resulted in an increase in per capita pharmaceutical spending of $\sim 6\%$.

We improve upon Vita and Durrance's earlier work by expanding the data to include more recent years and by using more modern econometric techniques to identify causal relationships between AWP/FOC laws and health care costs. Vita considers the impact of laws passed prior to 1997. Durrance's analysis extends one additional year. Though a majority of the AWP/FOC laws were enacted by 1998, we extend the data to 2009 for three reasons.[4] First, our data extends to 2009 to account for more recent changes in AWP/FOC laws not previously captured by either study. These changes include nine newly enacted and repealed AWP/FOC laws (see Table A1). Secondly, the changing legal landscape makes the effects of AWP/FOC laws especially important and warrants an update. Congress has considered bills that would impose constraints on exclusive contracting, but the cost of health care will be increasingly important as the Affordable Health Care Act is implemented. Thirdly, a majority of states (25 of 39) with AWP/FOC

4. We generated the database of AWP/FOC laws as follows. We began with data from Ohsfeldt et al. (1998). We expanded it to 2010 by searching legal databases one state at a time for AWP and FOC laws. We also compared our results with the National Conference of State Legislatures' data. We found inconsistencies in the state codes and the existing Ohsfeldt data, which we corrected. We also found inconsistencies in the state codes and the National Conference of State Legislatures' data that we reconciled by deferring to the state codes. Our data are based upon the effective date of statutes and include subsequent repeals (see Table A1).

laws enacted or changed their laws between 1993 and 1998. This is important because the central anticompetitive concern associated with exclusive contracting is that rivals will be foreclosed from access to a critical input required to compete and—in the long run—will be driven from the market. To evaluate these longer run potential concerns associated with exclusive contracting, more recent data are required.

We focus on prescription drug spending because of the bill Congress is considering that will apply to pharmacies and PBMs.

3. AWP and FOC Laws

AWP and FOC laws vary from state to state in terms of their substantive requirements, breadth of applicability, and level of enforcement. Breadth of applicability refers to how many aspects of health care are covered by the law (Vita, 2001).[5] Some laws narrowly focus upon single providers such as optometrists[6] or pharmacists.[7] Other laws define providers broadly and include nearly every imaginable aspect of health care.[8] Most AWP laws fall

5. "[A]n AWP law can either greatly interfere with regular plan operations or have little effect in practice. The strongest versions require plans to accept all providers who apply to participate .... Less restrictive or weaker forms of these laws allow health plans to limit the number and classes of providers to some degree ...." (Marsteller et al., 1997).

6. "No agency ... shall deny to the recipients or beneficiaries of their aid or services the freedom to choose a duly licensed optometrist ... as the provider of care or services which are within the scope of practice of the profession of optometry as defined in this Chapter" (N.C. Gen. Stat. Ann. § 90-127.1 (1973)).

7. "[N]o provider of pharmaceutical services ... who complies with the terms and conditions established by the ... contracting health maintenance organizations and prepaid health plans shall be excluded from contracting for the provision of pharmaceutical services ..." (Colo. Rev. Stat. Ann. § 25.5-5-504 (2006)).

8. "'Health care provider' or 'provider' means those individuals or entities licensed by the State of Arkansas to provide health care services, limited to the following: (A) Advanced practice nurses; (B) Athletic trainers; (C) Audiologists; (D) Certified orthotists; (E) Chiropractors; (F) Community mental health centers or clinics; (G) Dentists; (H) Home health care; (I) Hospice care; (J) Hospital-based services; (K) Hospitals; (L) Licensed ambulatory surgery centers; (M) Licensed certified social workers; (N) Licensed dieticians; (O) Licensed durable medical equipment providers; (P) Licensed professional counselors; (Q) Licensed psychological examiners; (R) Long-term care facilities; (S) Occupational therapists; (T) Optometrists; (U) Pharmacists; (V) Physical therapists; (W) Physicians and surgeons (M.D. and D.O.); (X) Podiatrists; (Y) Prosthetists; (Z) Psychologists; (AA) Respiratory therapists; (BB) Rural health clinics; (CC) Speech pathologists; and (DD) Other health care practitioners as determined by

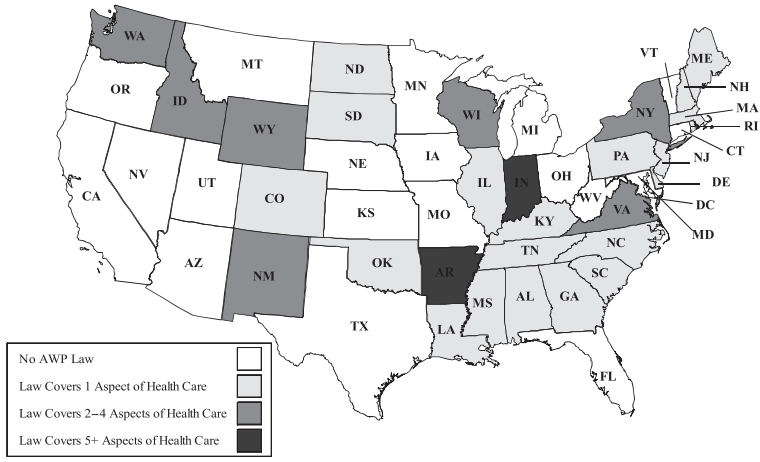

Figure 1. AWP Laws by State and Breadth of Law.

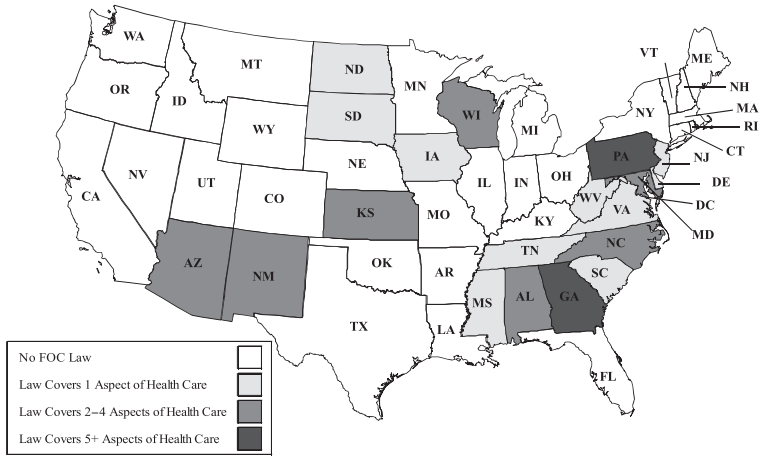

Figure 2. FOC Laws by State and Breadth of Law.

between these two extremes. Not all AWP/FOC laws identically apply to managed care companies: some only cover health management organizations (HMOs); some only cover preferred provider organizations (PPOs); some only cover PBMs; and some cover everything. Figure 1 provides data

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the department in regulations promulgated under the Arkansas Administrative Procedure Act" (ARK. CODE ANN. § 23-99-802(4)(A-DD) (2005)).

on current AWP laws' breadth of applicability.[9] Figure 2 does the same for FOC laws while adoption years are provided in Table A1.

AWP laws are also enforced differently across states. Some AWP/FOC laws have express enforcement mechanisms such as mandatory arbitration or other equivalent forms of due process.[10] Other AWP/FOC laws, however, do not require any particular grievance process.

4. DATA and Empirical Specification

Following Vita (2001) and Durrance (2009), we examine health expenditure panel data provided by the Centers for Medicaid and Medicare Services (CMSs). In addition to extending the time element of the panel relative to both earlier studies, we use the more appropriate medical care component of the CPI as our deflator. Prices in the health care sector have significantly outpaced inflation over the past few decades. Failure to account for this, as is the case in both Vita (2001) and Durrance (2009), might introduce bias into any estimate of the causal effect of AWP/FOC laws on prescription drug spending. We allow the deflator to vary by Census region.

While we focus on per capita expenditures aggregated by the consumer's state of residence, in subsequent analyses we also examine the data based on the location of the provider. We do this, in some sense, to track the earlier analyses by Vita (2001) and Durrance (2009) both of which focused primarily on provider based data. However, a provider focus might be problematic in that providers in other states can, at least in theory, benefit from a different state's AWP/FOC laws since the laws are generally written so as to apply

9. "Aspects of Health Care" describes how broadly applicable each state's laws are. For example, a law that covers "5+ Aspects of Health Care" would apply to doctors, hospitals, pharmacies, dieticians, dentists, and home health care (e.g. Arkansas). A law that covers "1 Aspect of Health Care" would, for example, only apply to pharmaceutical services (e.g. Colorado). We used our data to construct Figures 1 and 2. These two figures do not include information about past repealed statutes, though our regressions in Section 3 do incorporate past and repealed laws. Note 3 provides the source of the data.

10. "Every insurance company issuing benefits pursuant to this chapter shall establish a grievance system for health care providers. Such grievance system shall provide for arbitration … or for such other system which provides reasonable due process provisions for the resolution of grievances and the protection of the rights of the parties" (Idaho Code Ann. § 41-2872 (1994)).

to insurance plans offered in a given state regardless of the provider location. Residence data are available beginning in 1991, while the data based on state where the service was provided run from 1980 to 2009. One final difference relative to Durrance (2009) is that we include public spending. While Durrance (2009) suggests excluding public spending is important given that Medicaid and Medicare spending will not generally be affected by state level changes in these laws, in our view, it is inappropriate to exclude the public spending. Doing so has the potential to conflate spending changes arising from changes in public coverage with changes arising from the laws themselves. Our statute data are based upon the date a statute is effective and includes information about subsequent repeals as shown in Table A1.

Summary statistics are offered in Table 1.

We focus on prescription drug spending in the log form. This is a departure from both Vita (2001) and Durrance (2009) who only examine levels. There is wide variation in per capita prescription drug spending by state and across time. Focusing on levels leaves open the possibility that if per capita spending is trending differentially by state and states with relatively low (high) spending are systematically more likely to adopt AWP/FOC laws, the AWP/FOC coefficients will be spuriously low (high). By examining the log specification, the coefficients will represent proportional changes and, therefore, are not susceptible to this criticism.

Also, distinct from Vita (2001) and Durrance (2009), our primary specifications include state-specific linear trends. Examination of such trends reveals that they are jointly statistically significant. Additionally, K-fold cross validation techniques demonstrate that models, including state-specific linear trends provide uniformly better prediction diagnostics relative to models that exclude state-specific linear trends. The results and methods used in the K-fold validation technique are available upon request.

5. Analysis and Discussion

We begin our analysis with a basic difference-in-difference analysis examining the change in the log of per capita prescription drug spending that occurs when a state adopts an AWP or FOC law. In this specification, we are identifying the average change in the log of per capita prescription drug spending that occurs upon adoption relative to the contemporaneous

Table 1. Descriptive Statistics

Variable	Mean	St. Dev.	Source
Per Capita Prescription Drug Expenditures (by residence)	$584	$260	CMS
Per Capita Prescription Drug Expenditures (by provider)	$471	$243	CMS
Per Capita Dental Expenditures (by residence)	$233	$80	CMS
Per Capita Expenditures on Durable Medical Products (by residence)	$85	$34	CMS
Per Capita Home Health care Expenditures (by residence)	$137	$71	CMS
Per Capita Nursing Home Expenditures (by residence)	$316	$138	CMS
Per Capita Expenditures on Other Health Care (by residence)	$247	$146	CMS
Per Capita Expenditures on Other Health Professional Services (by residence)	$142	$51	CMS
Pharmacy AWP	0.44	0.50	See Table A1
Pharmacy FOC	0.33	0.47	See Table A1
Medical Care CPI	2.73	0.60	BLS
Medical Care CPI (Northeast Region)	2.86	0.65	BLS
Medical Care CPI (Midwest Region)	2.68	0.61	BLS
Medical Care CPI (South Region)	2.67	0.54	BLS
Medical Care CPI (West Region)	2.76	0.61	BLS
Real Per Capita Income	16,979	2,634	BEA
Unemployment	0.06	0.02	BLS
Percent College	0.26	0.05	Census
Percent 65+	0.13	0.02	Census
Percent Black	0.13	0.08	Census
HMO Penetration	0.23	0.13	Census

Note: Data cover the period 1991–2009; BEA, Bureau of Economic Analysis; BLS, Bureau of Labor Statistics; Census, Statistical Abstract of the United States.

average change in non-adopting states. We examine spending deflated by the health care-specific CPI (allowed to vary at the Census region level).[11] The results are provided in Table 2 for models that both include and exclude state-specific trends, as well as models that include and exclude the following state level covariates: (1) real per capita income; (2) the unemployment rate; (3) the percent of the state population with a college education; (4) the

11. Although we believe the medical-specific CPI is the appropriate deflator, we examined results using the total CPI at the regional level as well. Because prescription drugs are an important component of the medical CPI, perhaps the argument could be made that deflating by the medical care CPI over-deflates. That is, if AWP/FOC laws have a causal price effect, it will be deflated away. Our choice of deflator does not affect our results in any important way.

Table 2. Difference-in-Difference Estimates (Standard Errors Clustered by State)

	ln (Per Capita Prescription Drug Spending)			
Pharmacy AWP	−0.018 (0.027)	−0.012 (0.029)	0.042 (0.027)	0.036 (0.024)
Pharmacy FOC	−0.005 (0.044)	−0.004 (0.038)	−0.040 (0.056)	−0.050(0.051)
ln (Real Per Capita Income)		0.303 (0.240)		0.360 (0.235)
Unemployment Rate		−0.911 (0.863)		−0.764 (0.582)
Percent College		0.423* (0.232)		0.124 (0.221)
Percent 65+		−0.408 (1.482)		3.475 (2.789)
Percent Black		2.241* (1.300)		7.257* (3.926)
HMO Penetration		−0.008 (0.099)		0.011 (0.113)
State Effects	Yes	Yes	Yes	Yes
Year Effects	Yes	Yes	Yes	Yes
State-Specific Trends	None	None	Linear	Linear

Note: All regressions weighted by state population. $n = 969$.
* $p < 0.10$ (against a two-sided test).

percent of the state population ages 65 and above; (5) the percent of the state population that is black; and (6) the state level HMO penetration rate.

In this simple difference-in-difference specification, the estimates are imprecise, generating no statistically significant coefficients for the passage of the AWP and FOC laws. The inclusion of state level covariates and/or state-specific linear trends does not generally change this, though the sign of the AWP law variable does flip when state-specific trends are included.

To account for more general trends in prescription drug spending, we employ a triple differences estimator that exploits health care spending in categories not covered by AWP or FOC laws. While physician and hospital spending could serve as useful predictors of prescription drug spending, many states' AWP and FOC laws cover these categories as well. We instead use spending on the following health care categories (correlation coefficient between real prescription drug spending per capita and the relevant other category presented in parentheses): dental services (0.80), durable health care products (0.70), home health care products (0.62), nursing home expenditures (0.63), and other spending on health products (0.85) and services (0.58). Each of these categories exhibits a high correlation coefficient (in state years where AWP and FOC laws are not present) with prescription drug spending that is statistically significant.

Table 3. Triple Differences Model (Standard Errors Clustered by State)

	ln (Real Per Capita Health Expenditures)
Pharmacy AWP	0.051* (0.025)
Pharmacy FOC	−0.014 (0.048)
State × Category Effects	Yes
Category × Year Effects	Yes
State × Year Effects	Yes
State × Category Trends	Linear

Note: All regressions weighted by state population. $n = 6,783$.
*$p < 0.01$ (against a two-sided test).

The triple differences specification also allows us to implicitly account for heterogeneity in price inflation across states since any generic proportional change in the price level for health care spending will be subsumed in the state × year effect. It is likely the medical price CPI is biased, and that bias differs year to year as well as from place to place (see, for example, Newhouse, 2001), increasing the attraction of such an approach.

Our basic regression model is as follows:

$$\ln(\text{real per capita spending}_{cst}) = \alpha + \beta \cdot \text{AWP}_{cst} + \phi \cdot \text{FOC}_{cst} + \Gamma_{cs} + \text{year}_{cs} + \text{T}_{ct} + \Upsilon_{st}$$

where the final four terms represent state × spending category fixed effects, state × spending category-specific linear trends, spending category X year fixed effects, and state × year fixed effects. The AWP and FOC terms only take the value of one for state years in which AWP and FOC laws applying to prescription drugs are in effect. We provide the triple difference results in Table 3.

AWP laws are associated with an increase in per capita prescription drug spending on the order of a 5% effect in real terms that is statistically significant at the 5% level. The effect of the FOC laws is not found to be statistically significant or economically large. While these point estimates are comparable to the difference-in-difference results, the estimates are much more precise. In unreported analyses, if we restrict attention to a sample consisting solely of states that adopt an AWP law at some point, investigating the possibility that this set of states is systematically different in

Table 4. Triple Differences Model Expenditures by Provider Location (standard errors clustered by state)

	ln (Real Per Capita Health Expenditures)
Pharmacy AWP	0.059* (0.029)
Pharmacy FOC	−0.029 (0.046)
State × Category Effects	Yes
Category × Year Effects	Yes
State × Year Effects	Yes
State × Category-Specific Trends	Linear

Note: All regressions weighted by state population. $n = 6{,}783$.
* $p < 0.05$ (against a two-sided test).

unobservable ways, the results do not change. In none of these cases is the effect of FOC laws distinguishable from zero.

Table 4 provides analyses based on expenditures aggregated by the state of the provider. Again, formally, this approach is problematic since providers in a given state can "benefit" from the laws of a separate state, potentially biasing any treatment effect toward zero. However, to facilitate comparison of our results with those provided in Vita (2001) and Durrance (2009), both of which focused on provider based data, we present provider based results.

Once again, we find little change, suggesting the finding that AWP laws are associated with an increase in prescription drug spending of ∼ 5% is robust.

While the results above, which employ very general time effects which allow for both state year effects and state category-specific linear trends, provide robust evidence that AWP laws are associated with an increase in prescription drug spending, an even more general model would allow for the effects of AWP laws to develop over time (as the competitive effects hypothesized above may take time to materialize as entry and exit to the market are affected). Further, to bolster claims of causality, it would be useful to examine any "lead" effects of the laws which would suggest that the estimated AWP effect is spurious. In Table 5, we provide an event study type analysis where we allow for individual effects for five or more years before adoption as well as each of the 4 years preceding an AWP law's adoption (with the year before adoption used as the reference category), as well as the year of adoption, each of the subsequent four years after adoption, and

Table 5. Event Study (standard errors clustered by state)

	DD	DDD
	ln (Real Per Capita Prescription Drug Expenditures)	ln (Real Per Capita Health Expenditures)
5+ Year Lead	−0.059 (0.045)	−0.069 (0.046)
4 Year Lead	−0.005 (0.016)	−0.023 (0.021)
3 Year Lead	−0.010 (0.016)	−0.026 (0.019)
2 Year Lead	−0.011 (0.007)	−0.013 (0.009)
1 Year Lead (Reference Category)	0.00	0.00
AWP Adoption	0.021 (0.015)	0.024 (0.020)
Adoption + 1	0.031 (0.024)	0.032 (0.026)
Adoption + 2	0.032 (0.033)	0.032 (0.037)
Adoption + 3	0.041 (0.041)	0.041 (0.045)
Adoption + 4	0.034 (0.046)	0.026 (0.054)
Adoption + 5 and beyond	0.032 (0.057)	0.035 (0.069)
F-test for Leads	1.14 ($p < 0.35$)	1.08 ($p < 0.38$)
F-test for Adoption and Lags	1.96 ($p < 0.09$)	1.63 ($p < 0.16$)
Fixed Effects	State, Year	State × Category, Category × Year, State × Year
Trends	State-Specific Linear	State × Category-Specific Linear

Note: All regressions weighted by state population. $n = 6,783$.

the period of five or more years after adoption. We provide this analysis for both the difference-in-difference and the triple differences specifications.

The results of the event study analysis suggest, in both the difference-in-difference model and the triple difference model, that: (1) there is no clear pre-adoption trend in spending growth; and (2) spending growth spikes in the year of adoption and continues to grow at an accelerated rate following adoption. While the pre-adoption effects are clearly not jointly significant, the adoption effect and its lags are jointly significant in the difference-in-difference model. For the triple difference model, although not statistically significant, the joint effect of the adoption year and its lags are clearly larger than the joint effect of the leads.

Taken together, the empirical analyses suggest that the adoption of AWP laws clearly do not reduce per capita spending on prescription drugs. Contrary to the claims of the supporters of these laws, it appears as though

AWP laws lead to an increase in this spending relative to pre-existing trends and relative to spending growth in other areas of health care, on the order of 5% in real terms. This result is comparable to the 6% increase found by Durrance (2009), while providing confidence that her result is not driven by a failure to account for higher than average price inflation in the health care sector, her short-term perspective which may not have allowed for AWP laws reducing competition in the longer term, and the possibility that states with higher spending levels were systematically more likely to adopt the laws. These results also provide confidence that the earlier results were not driven by a focus on private spending alone (which may be influenced by changes in Medicare and Medicaid coverage independent of AWP laws) or a focus on spending by the location of the provider, given the possibility that providers in non-adopting states may avail themselves of other states' AWP laws.

We do not find a similar increase in prescription drug spending resulting from FOC laws. FOC laws obligate plans to reimburse for care obtained from a qualified provider even if the provider is not a member of the network. Both FOC and AWP laws appear to constrain selective contracting and thus suppress the same mechanisms to facilitate cost-reductions that might be passed on to consumers. The most likely explanation for our finding that FOC laws do not impact expenditures is that while those laws allow consumers the freedom to leave the network at the cost of higher prices as consumers forego in-network savings. Another possible, and non-mutually exclusive, explanation of our finding that AWP laws increase expenditures while FOC laws have little effect is that PBMs and health plans have greater ability to contract around the restrictions imposed by FOC laws—that is, more effective mechanisms for keeping consumers within the network, such as providing incentives to use mail-order pharmacies—than are available to avoid the burdens imposed by AWP laws.

Our finding that AWP laws increase prescription drug spending by ∼5% on average seems plausible given what is known about the potential for increased bargaining power in the prescription drug market. As a back of the envelope calculation, in the period covered, at least two-third of the U.S. population could not have been affected by these laws due to ERISA preemption, as well as the fact that Medicare and Medicaid enrollees would be unaffected. This suggests that our coefficient estimates imply effective cost

savings of at least 15% for affected consumers. Interestingly, this number is comparable to the cost savings found by Kanavos et al. (2013) when comparing drug prices in the United States to those observed in Canada, where province-wide negotiations of pharmaceutical prices presumably generate many of the same benefits of the PBM networks. Similarly, Lakdawalla and Yin (2013) find that increased negotiating power for private insurers arising from the growth in their customer base due to the implementation of Medicare Part D generated price reductions between 5 and 9% for prescription drugs.

These results are also consistent with the work that examines the effect of increased bargaining power due to the larger consumer networks represented by managed care organizations outside of the prescription drug context. Cutler et al. (2003) hypothesize that the bargaining power of HMOs provides similar price concessions in treatments for a range of medical conditions. Wu (2009) directly examines the effect of increasing a managed care organization's membership volume and the degree to which the managed care organization can direct patients to providers on hospital prices, finding large price elasticities with respect to both of these indicators.

6. Conclusion

PBMs create substantial health care savings through negotiating rebates from drug manufacturers and decreasing costs from pharmacies. The economics of exclusive dealing and selective contracting have long revealed both procompetitive and anticompetitive uses of restricting contracting. In particular, selective contracting and the ability to discriminate in price or other terms may increase the intensity of competition among providers. That form of competition for distribution is an important part of the competitive process that reduces costs and generates welfare increases for consumers. AWP laws restrict the ability of PBMs to facilitate selective contracting and, consistent with economic theory exploring the benefits of these agreements, reduce competition. Among the reasons states implement AWP laws is to prevent exclusivity and selective contracting from harming firms that keep prices low by competing in the market and thus place downward pressure on health care costs. Our analysis suggests AWP laws are more likely

to increase health care costs than to reduce them by preventing restrictive contracting.

We do not find similar effects for FOC laws. One explanation is that enrollees under FOC laws still have a disincentive to use out of network pharmacies since they bear some additional costs for doing so. In other words, consumers may use out of network pharmacies but have little incentive to do so at significantly higher prices. Regardless of the precise mechanism, however, our results suggest that FOC laws have no systematic effect on prescription drug spending and thus legislation implementing those laws is not likely to have a significant impact on expenditures. AWP laws, on the other hand, appear to significantly increase such spending.

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Appendix

Table A1. AWP and FOC Laws By Type and Year of Implementation

	AWP Laws				FOC Laws			
	Doctor	Hospital	Pharmacies	Misc.	Doctor	Hospital	Pharmacies	Misc.
Alabama			1988		1994		1988	1982
Arizona					1990			
Arkansas	1995	1995	1991		1991	1995	1995	
Colorado			2006					
Connecticut			1982 (1997)					
Delaware			1994					
Florida			1993 (2000)					
Georgia	Pre-1980	Pre-1980	1991				1999	
Idaho	1994	1994					1991 (1997)	
Illinois	1985		2000					
Indiana	1984	1984	1984					
Iowa							1999	
Kansas					Pre-1980		1994	
Kentucky	1994	1994	2003	1998				
Louisiana							1992	
Maine			2010					
Maryland					1997			
Massachusetts			1994					
Minnesota	1994	1994	1994					

Mississippi			1994			1994	2010 (2012)
Montana	1991	1991	1991			1993	
New Hampshire			1992				
New Jersey			1994			1994	1997
New Mexico	1987	1998	1987	Pre-1980	Pre-1980		
New York	1993	1993	1987 (1997)				
North Carolina			1993			1993	
North Dakota					1985	1985	
Oklahoma	1989	1989		1989	1996	1983	
Oregon			1993				
Pennsylvania	Pre-1980	1996					
Rhode Island			2004				
South Carolina			1994			1994	
South Dakota			1990	1990		1990	
Tennessee			1998			1998	
Texas	1992	1992	1991	Pre-1980	Pre-1980	1991 (1997)	
Utah	1985	1985	1985				
Virginia	1986	1986	1986			1994	
Washington	1995	1995	1995	1995			
West Virginia				2002			
Wisconsin				Pre-1980	Pre-1980	Pre-1980	
Wyoming	1990	1990	1990				

Notes: This table provides the year each law was enacted after 1980, what type of AWP or FOC law it is, and the year of any subsequent repeal. If a law was in effect before 1980, it is listed as Pre-1980. Our data come from three different sources: Ohsfeldt et al. (1998), National Conference of State Legislatures, and extensive manual searches of the legal databases. The category labeled as Miscellaneous AWP/FOC laws includes things that do not fall within the other categories. This includes AWP/FOC laws such as those governing dentists, orthodontists, and opticians.

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