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Substantial variation has been observed in the use of prescription drugs from retail pharmacies, the level of services provided by retail pharmacies, and the prices paid for prescriptions from retail pharmacies. It is not clear whether local area retail pharmacy market structures affect these pharmacy outcomes. The goal of this paper is to discuss the potential research avenues to address these issues. The discussion provides: 1) background on the retail pharmacy and its place within the pharmaceutical supply chain; 2) a discussion of the data that are available to address these issues and the measures that can be developed from these data; and 3) a review of existing research findings and gaps in knowledge.

In 2004, Americans spent more than $160 billion on prescription drugs from retail pharmacies and obtained an average of 10.6 prescriptions each (Kaiser Family Foundation 2007).[1] The average number of prescriptions per capita from retail pharmacies, though, varied across states in 2004 from 6.5 in Alaska to 15.5 in Tennessee (Kaiser Family Foundation 2007). It has been estimated that consistent use of services from retail pharmacies, such as medication therapy management, could reduce drug-related morbidity and mortality from 53% to 63% and save the U.S. health care system over $45 billion in direct health care costs per year (Johnson and Bootman 1997). Despite these findings, retail pharmacies vary substantially in the level of pharmacy services they provide patients (Doucette et al. 2006). In addition, significant variation has been observed in the prescription prices paid by cash-paying patients at retail pharmacies (Brooks, Sorofman, and Doucette 1999; Caffrey and Gold 2002; Querna 2004) and in the prescription prices negotiated by third-party payers with retail pharmacies (Brooks, Doucette, and Sorofman 1999).

Many factors may underlie the observed variation in prescription utilization, the provision of pharmacy services, and prescription prices. The structure of local area retail pharmacy markets may be a significant factor in the variation of these measures. Using data from the National Council of Prescription Drug Programs (National Center for Prescription Drug Programs 2005) and the U.S. Census Bureau, we calculated the number of retail pharmacies at the county level in 2002

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and found substantial variation in pharmacy availability. The 90th percentile county had 3.74 pharmacies per 10,000 people, whereas the 10th percentile county had only 1.35 pharmacies per 10,000 people. It is possible that competition may force pharmacies in markets with more pharmacies per capita to increase access hours and move to convenient locations, which may lead to higher prescription use by patients. Patients may be more likely to fill prescriptions if pharmacies are readily available, and physicians may be more likely to prescribe if they know their patients are more likely to fill these prescriptions. Likewise, pharmacies in competitive areas may feel compelled to broaden the range of pharmacy services they provide to distinguish their pharmacies from others in the local market. In addition, retail pharmacies in more competitive markets may be forced to discount prescriptions for cash-paying patients to maintain market share and may be more likely to acquiesce to less lucrative contracts with third-party payers.

The goal of this paper is to discuss the research avenues available to explore the relationships between local area retail pharmacy market structure and the performance of local markets in terms of utilization, services offered, and pricing. This will include discussion of retail pharmacy market structure measures and potential data that can be used to estimate these measures. In the first section, we provide an overview of retail pharmacy markets and the data available to study these markets. This is followed by a brief description of where the retail pharmacy is placed within the pharmaceutical product supply chain. We then examine the potential to analyze factors affecting local area retail pharmacy market structure, and finally the relationships between retail pharmacy market structure and prescription utilization, pharmacy service provision, and prescription prices.

Retail Pharmacy Market Background and Available Data

Two main channels currently exist from which patients can fill their prescriptions for pharmaceutical products—local retail "brick-and-mortar" pharmacies and mail-order pharmacies. The National Council of Prescription Drug Programs (NCPDP) maintains a database containing the active retail pharmacies in the United States (National Center for Prescription Drug Programs 2005). Retail pharmacies have an incentive to maintain their correct information with NCPDP because NCPDP supplies information such as addresses and unique pharmacy identification numbers to government agencies and third-party payers. A report from the Food and Drug Administration (FDA) defines independent pharmacies as those pharmacy retailers with three or fewer stores, and chain pharmacies as those with four or more stores (FDA 2001). However, retail pharmacies can classify themselves in the NCPDP database as independent or part of a chain. Often retail pharmacies that are part of a small, locally owned chain will choose to designate themselves as independent in the NCPDP database. Chain pharmacies are further grouped in the NCPDP database as stand-alone retail or those with department store or grocery store affiliation. Chain pharmacies with the same ownership in the NCPDP database can be linked using distinct chain identification numbers.

In 1994, the NCPDP database listed 56,595 retail pharmacies in the United States (25,808 independent pharmacies, and 30,787 chain affiliated). In 2002, the number of retail pharmacies was fairly consistent with the earlier total (55,851), but the mix of pharmacies changed (20,051 independent pharmacies, and 33,625 chain affiliated). Between 1992 and 2002, among chain pharmacies, the number of groceries with pharmacies increased 79% and the number of department stores with pharmacies increased 57% (Fraher et al. 2005). Previous research found that customers generally prefer the service they receive at independent retail pharmacies (*Consumer Reports* 1999), but that independent retail pharmacies often have lower prescription volumes and lower sales of nonprescription items that lead to higher pharmacy costs per prescription (Carroll, Miederhoff, and Waters 1996; Stratton 2001).

Mail-order pharmacies mainly cater to the needs of the beneficiaries of third-party

payers and pharmacy-benefit managers (PBMs). The majority of mail-order pharmacies are owned by PBMs (California HealthCare Foundation 2003). Eighty-seven percent of employer-sponsored health plans offered mail-order pharmacy services in 2001 (Mercer/Foster Higgins 2001). Mail-order pharmacies appeal to third-party payers because they are less costly, provide high dispensing accuracy, and enable third-party payers to implement more easily therapeutic switching to less costly but equivalent products (California HealthCare Foundation 2003). Arguments claim, however, that mail-order pharmacy provides a "substandard form of pharmacy practice" because it leads to less provider contact and the inability to recognize and deal with patient problems in real time (Lawrence 1998; National Association of Chain Drug Stores 2004; Spurgeon 1995).

From 2000 to 2004, the percentage of prescription revenue generated by mail-order pharmacy increased from 14.8% to 19.7%, while the percentage of prescription revenue generated by chains fell from 50.1% to 48.8%; revenue from independents fell from 23.1% to 19.4%. Prescription revenue generated by grocers and department stores changed little during this period (an increase from 12% to 12.1%) (IMS Health 2000, 2004). There have been no published studies assessing the effects of mail-order pharmacy diffusion on regional retail pharmacy market performance, though it is believed that retail pharmacies are being competitively challenged in areas where a large percentage of the population has access to mail-order pharmacy (Lawrence 1998).

Data to assess the relationships between the structure of local area retail pharmacy markets and prescription utilization, pharmacy services provided, and prescription prices are being collected, but are not easily obtained for research purposes. A "point-in-time" cut of the NCPDP database can be purchased from affiliated data vendors for $4,500 to $8,000, depending on the level of information received. The pharmacy type and address information within the NCPDP database can be employed to count the number of pharmacies by type in geographic regions defined by the researcher. In addition, the chain ownership identification numbers can be used to measure the ownership concentration within individual markets using measures such as the Herfindahl-Hirschman index (HHI) based on the ownership shares of pharmacy locations within a local market (Pepall, Norman, and Richards 2001).

Companies like IMS Health and Per-Se Technologies (formally NDCHealth) collect data on prescription volume through participating pharmacies around the country, including mail-order pharmacies. Through these pharmacy affiliations, IMS Health claims to observe 76% of the prescriptions dispensed in the United States (IMS Health 2005). Per-Se Technologies claims to process more than 70% of all pharmacy transactions in the United States and says that 90% of the U.S. retail pharmacies use its software (Per-Se Technologies 2007). The information collected for each prescription at a retail pharmacy includes product designation, payment, prescriber, and payer (e.g., patient, private insurer, government program). Using these retail pharmacy locations, IMS Health and Per-Se Technologies data can be used to estimate local area prescription volumes and average payments by pharmaceutical product and payer type. Prescription data at the 3-digit zip code level from an earlier competitor to these firms, Source Informatics (it was eventually purchased by IMS Health), were used to assess factors related to regional variation in prescription prices for retail pharmacy cash-paying patients (Brooks, Sorofman, and Doucette 1999).

IMS Health data have been used to assess patterns in retail pharmacy participation in state Medicaid programs (Adams and Gavin 1996/1997). Per-Se Technologies data have been used to examine the relationships among health disparities, Medicaid restrictions, and access to physicians (Headen and Masia 2005). In addition, these firms collect mail-order prescription data that include product designation, payment, payer, and prescriber location from which regional mail-order prescribing information can be summarized. It should be noted that the "off-the-shelf" data products produced by these firms are marketed toward pharmaceutical manufacturers and are often ill-suited to deal with the research questions posed here. In addition,

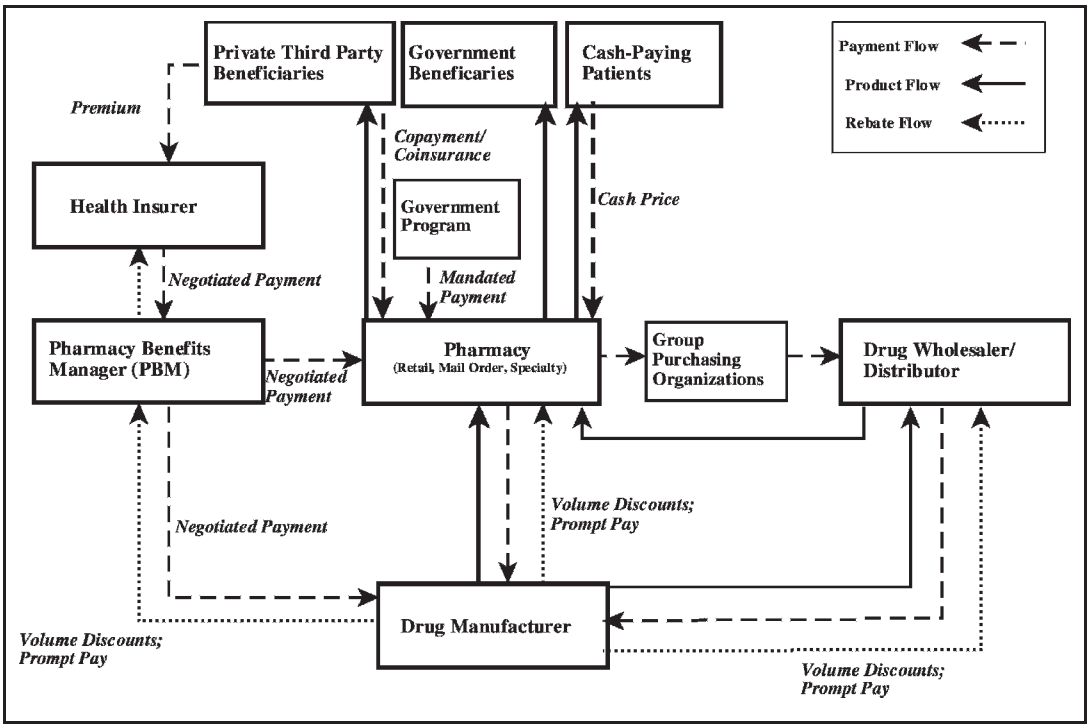

Figure 1. Product and money flows affecting the retail pharmacy market (Source: Adapted from Exhibit 1 within *Follow the Pill: Understanding the U.S. Commercial Pharmaceutical Supply Chain*. Report prepared by the Health Strategies Consultancy for the Kaiser Family Foundation, March 2005. www.kff.org/rxdrugs/upload/Follow-The-Pill-Understanding-the-U-S-Commercial-Pharmaceutical-Supply-Chain-Report.pdf)

"historical" data are not considered valuable to these firms and often are destroyed after a short time period (personal communication with IMS Health). It appears that significant research opportunities are possible if raw historical cuts of these databases could be made available to researchers.

Retail Pharmacy within the Pharmaceutical Supply Chain

Policies set by decision makers within retail pharmacy markets may affect patient access to prescription drugs and medication therapy management services. Initially, these decision makers must make pharmacy "open/close" decisions that impact the geographic access of patients to pharmacies and also affect the level of pharmacy competition in local areas. Existing pharmacies must make pricing decisions for prescription drugs, decide the extent to which they will offer medication therapy management services, and if so, they must decide how they will price these services. Each of these decisions must be made within the context of the resource supply markets and retail product markets that exist in each local area. The relationships in Figure 1 have been modified from a figure within a Kaiser Family Foundation report that describes the product and payment flows within pharmaceutical markets (Kaiser Family Foundation 2005). The figure has been modified to focus on the portion of the pharmaceutical supply chain related to the decisions made by individual retail pharmacies, including relationships with pharmaceutical product suppliers and the distinct demand and payment circumstances of pharmacy patients.

Pharmaceutical products are supplied to retail pharmacies either through drug wholesalers or directly from pharmaceutical manufacturers. It is estimated that 70% of pharmaceutical products reach retail pharmacies through drug wholesalers, while the remaining 30% are either supplied directly to

retail pharmacies or to the warehousing components of retail pharmacy chains (CMS 2003). Drug wholesalers, intermediaries between pharmaceutical manufacturers and retail pharmacies, buy large quantities of products from various manufacturers and warehouse and distribute these products to retail pharmacies. Drug wholesalers help retail pharmacies by reducing the number of relationships pharmacies must maintain to access products from the array of drug manufacturers and they help pharmacies reduce inventory costs (Kaiser Family Foundation 2005; Peters 2004). Drug wholesalers are paid for their services by marking up the pharmaceutical products they purchase from pharmaceutical manufacturers when they are resold to retail pharmacies. Independent retail pharmacies tend to use drug wholesalers more than chain pharmacies since the latter often have sufficient scale to self-warehouse supplies (FDA 2001). It has been reported, though, that retail chains are starting to re-evaluate the cost-effectiveness of self-warehousing and are using drug wholesalers more (Steere and Montagne 2004).

About 90% of the drug wholesaling business nationally is concentrated within three firms: McKesson HBOC, Inc., Cardinal Health, Inc., and AmeriSource Corp. (Peters 2004). As many as 70 regional drug wholesalers compete with these three firms, according to one estimate (FDA 2001). While drug wholesaling is a highly concentrated business nationally, it is generally perceived that the average margins attained by drug wholesalers on the pharmaceutical products they distribute to retail pharmacies are low (California HealthCare Foundation 2003; Kaiser Family Foundation 2005; Peters 2004). These low margins suggest that despite the high national concentration in the drug wholesaling industry, competition among drug wholesalers in local areas is strong. It is also possible that these low margins reflect increased concentration among retail pharmacy purchasers in dealing with wholesalers. Many independent retail pharmacies have formed group purchasing organizations, or GPOs, to exploit the ability to purchase in larger volumes when negotiating deals with drug wholesalers (FDA 2001; Kaiser Family Foundation 2005).

Local Area Retail Pharmacy Market Structure

Doucette and colleagues (1999) theorized that local area pharmacy supply will be related to the underlying health care system and socioeconomic conditions in the local area. Using NCPDP data from 1994 aggregated to the county level, Doucette and colleagues found that counties with a larger percentage of elderly people, a larger percentage of rural population, and higher per capita incomes had more retail pharmacies per capita. The positive relationship between a county's rural population and the number of retail pharmacies per capita suggests that retail pharmacies in rural areas operate at smaller scales and higher average costs. Counties with higher health maintenance organization (HMO) penetration rates, counties in which employees were concentrated among fewer employers, and counties in states with "any willing provider" laws had fewer pharmacies per capita. A higher proportion of independent retail pharmacies were found in counties with lower average wages and larger percentages of elderly, rural, and below-poverty level people. HMO penetration rates were negatively related to the proportion of independent retail pharmacies in a county. In addition, counties with more concentrated ownership of chain retail pharmacies had a higher proportion of independent retail pharmacies.

Because the Doucette et al. (1999) study was based on cross-sectional data, the causal nature of the relationships found in that study are unclear. To further assess these relationships, we investigated the extent to which baseline socioeconomic conditions in a county contributed to *changes* in retail pharmacy supply and mix. We obtained NCPDP data for 1998 and 2002 and computed county-level counts of retail pharmacies per 10,000 population and the proportion of retail pharmacies that were independent in these years. We next estimated the independent variables used in Doucette et al. for 1998 employing updated versions of the data sources used in the previous research. We regressed the *change* in county-level retail pharmacy counts per capita from 1998 to 2002 and the *change* in county-level propor-

Table 1. Effects of baseline county market factors on changes in the number of retail pharmacies per 10,000 population in counties, 1998–2002

Market factors	Coefficient estimate	*t*-statistic
Population factors		
Percent elderly[a]	−.55	−1.72
Percent rural[a]	.07	1.42
Percent in poverty[a]	−1.30	−5.20*
Per capita income[a]	−.008	−1.95
Unemployment rate[a]	.02	4.21
Payer factors		
Percent of population on public assistance[a]	.16	1.99*
State per-beneficiary Medicaid pharmacy payment[b]	.0002	3.34*
HMO penetration rate[a]	.16	2.11*
Employee concentration index among employers[c]	−.05	−.17
Health care system factors		
Physicians per 10,000 population[a]	.004	2.46*
Hospital admissions per 10,000 population[a]	−.00003	−1.32
Any willing provider law in 1998[b]	−.004	−.18
Competitive factors		
Chain pharmacy ownership concentration index[d]	−.10	−2.71
Number of non-retail pharmacies[d]	.03	1.57

Notes: $N = 2{,}941$; $R^2 = .0298$; Model F statistic = 6.43 ($p < .0001$).
[a] Area Resource File.
[b] National Pharmaceutical Council, *Pharmaceutical Benefits Under State Medical Assistance Programs*, 1998.
[c] U.S. Census Bureau, *County Business Patterns*, 1998.
[d] Calculated from NCPDP database, 1998.
* $p < .05$.

tion of independent retail pharmacies from 1998 to 2002 on baseline levels of the independent variables in 1998. Table 1 contains estimates of the effects of the baseline county factors on changes in the number of retail pharmacies per 10,000 population. Retail pharmacies per capita increased in counties within states that had more generous Medicaid pharmacy payments, and decreased in counties with higher poverty rates. After controlling for poverty rates, counties with a higher baseline percentage of patients on public assistance had higher numbers of retail pharmacies per capita. Counties with higher baseline chain ownership concentration lost pharmacies.

The estimated effects of baseline county factors on the proportion of pharmacies that were independent in each county are found in Table 2. While counties with high poverty percentages lost retail pharmacies from 1998 to 2002, the proportion of independent retail pharmacies in these counties increased, suggesting that retail chain pharmacies pulled out of high-poverty counties. Counties in states with any willing provider laws in 1998 had a decrease in the number of independent retail pharmacies, suggesting that these laws may have restricted third-party payers from offering reimbursement differentials to high-cost independent retail pharmacies, causing them to leave the market. In addition, independent retail pharmacies seemed to flourish in markets where the baseline concentration of chain pharmacy ownership was high. This result suggests that independent retail pharmacies were able to find market niches in areas where chains were not competing highly.

Future research in this area could investigate the factors affecting retail pharmacy market structure using market definitions other than county. County-level analysis has the advantage of matching pharmacy market structure measures with county characteristics from readily available data sources, such as the Area Resource File (ARF) or county-level data from the Census Bureau. However, county-level aggregation probably misses the nuances of many local retail pharmacy markets. The pharmacy address data within the NCPDP database enables researchers to

Table 2. Effects of baseline county market factors on changes in the proportion of independent retail pharmacies in counties, 1998–2002

Market factors	Coefficient estimate	*t*-statistic
Population factors		
Percent elderly[a]	.11	1.34
Percent rural[a]	.02	1.51
Percent in poverty[a]	.21	3.16*
Per capita income[a]	−.0007	−.70
Unemployment rate[a]	−.004	−3.328*
Payer factors		
Percent of population on public assistance[a]	.05	2.49*
State per-beneficiary Medicaid pharmacy payment[b]	−.00002	1.60
HMO penetration rate[a]	.01	.47
Employee concentration index among employers[c]	−.07	−.91
Health care system factors		
Physicians per 10,000 population[a]	−.0008	−1.87
Hospital admissions per 10,000 population[a]	−.000005	.90
Any willing provider law in 1998[b]	−.03	−4.23
Competitive factors		
Chain pharmacy ownership concentration index[d]	.06	6.06*
Number of non-retail pharmacies[d]	.01	2.24*

Notes: $N = 2{,}937$; $R^2 = .0455$; Model F statistic = 9.95 ($p < .0001$).
[a] Area Resource File.
[b] National Pharmaceutical Council, *Pharmaceutical Benefits Under State Medical Assistance Programs*, 1998.
[c] U.S. Census Bureau, *County Business Patterns*, 1998.
[d] Calculated from NCPDP database, 1998.
* $p < .05$.

define local area pharmacy markets based on aggregates of zip codes (e.g., 3-digit zip codes). Combining the NCPDP data prescription utilization data from either IMS Health or Per-Se Technologies also might allow researchers to define local area pharmacy markets based on the pharmacies that serve the patients within geographically defined regions.

Theory also suggests that local area pharmacy market structure may be affected by the cost of doing business in local areas. In 2006, drug costs represented 74% of the total costs for the average retail pharmacy (National Community Pharmacists Association 2006). It is possible the drug costs faced by pharmacies vary regionally with the level of competition among drug wholesalers and the extent to which GPOs exist. However, there is no previous research and little if any data to investigate the effects of drug wholesaler competition and GPOs on the cost of drugs to retail pharmacies. In antitrust litigation in which the Federal Trade Commission (FTC) attempted to block mergers within the drug wholesaling industry, the courts in their memorandum opinion also recognized the deficiency of regional data (FTC 1998). In this case, the FTC could only present aggregate data within a few selected markets to make a case that the merger would lead to restricted regional competition; the court stated that these data were insufficient to support the FTC's claims. IMS Health and Per-Se Technologies claim they record the drug acquisition cost associated with each prescription accumulated within their databases and from which regional pharmacy costs could be estimated. However, it is not clear whether these numbers reflect the actual acquisition cost of the product to individual retail pharmacies or are estimated costs using national wholesale cost averages.

The Effects of Retail Pharmacy Market Structure on Utilization, Services, and Price

Prescription Utilization

As described earlier, substantial variation has been observed in the utilization of prescrip-

tions from retail pharmacies across states (Kaiser Family Foundation 2007). In one state's Medicaid program, it has been shown that patients who lived in areas with limited geographic access to retail pharmacies used fewer prescriptions (Xiao, Sorofman, and Manasse 2000; Xiao et al. 2000). More general assessments of the causes of variation in prescription utilization and the extent to which local area retail pharmacy market structure affects it have not been done. It is suspected that the lack of access to population-based prescription utilization data limits this research. Standardized Medicaid claims files by CMS across states that are now available for research (ResDAC 2007a) and Medicare Part D prescription drug claims that eventually may be available through the Chronic Condition Data Warehouse (ResDAC 2007b) offer potential to fill this research gap.

Pharmacy Service Provision

Patient access to medication therapy management services depends on the willingness of local retail pharmacies to provide these services. Local area retail pharmacy market structure may affect the willingness to provide pharmacy services. Most previous research in this area described the types of services performed by retail pharmacies and the individual pharmacy characteristics related to service provision (e.g., chain/independent, staff training), but did not focus on how local area retail pharmacy market structure affected the decision of pharmacies to provide pharmacy services (Doucette et al. 2006; McDermott and Christensen 2002; Schommer and Pederson 2001). A single study assessed whether retail pharmacy market factors were related to the willingness of retail pharmacies to supply medication reviews (Brooks et al. 2007). This study used data from a pre-Part D program for Medicare-eligible Iowans without prescription drug coverage. The program offered $25 coupons for its members to obtain medication reviews from retail pharmacies in Iowa. Using NCPDP data, pharmacy competition was measured using retail pharmacy ownership concentration ratios in a 20-mile radius around each retail pharmacy. Retail pharmacy ownership concentration had a statistically significant nonlinear "U-shaped" relationship with the number of medication reviews provided by the retail pharmacies. Retail pharmacies in areas with competition extremes (highest and lowest) supplied the greatest number of medication reviews. It was theorized that retail pharmacies in highly competitive areas may have promoted medication reviews in an attempt to differentiate themselves from other retail pharmacies. Retail pharmacies in areas with very low competition may have been making higher profits and been willing to use a portion of these profits to increase the quality of care they provided patients by offering medication therapy management services.

Prescription Prices

With regard to prescription pricing, retail pharmacies sell prescriptions to distinct groups of patients and have varying discretion in setting prices for these groups. Generally, retail pharmacy patients can be grouped as: 1) beneficiaries of government-based reimbursement programs; 2) beneficiaries of private third-party reimbursement plans; or 3) cash-paying customers. In 1998, cash-paying customers provided 35%, private third-party beneficiaries 44%, and government program beneficiaries 21% of prescription drug expenditures (CMS 2005). By 2003, the percentage of prescription drug expenditures from cash-paying customers fell to 30%, while the percentage from private third-party beneficiaries and government program beneficiaries increased to 46% and 24%, respectively (CMS 2005). With the advent of the Medicare Prescription Drug, Improvement, and Modernization Act (MMA), CMS projects in 2010 the percentages of prescription drug expenditures from cash payers and private third-party beneficiaries to be reduced to 20% and 37%, respectively, while the percentage of prescription drug expenditures for government program beneficiaries will increase to 43% (CMS 2005).

As noted previously, from the perspective of retail pharmacy decision-making, these patient groups can be classified by the amount of discretion that retail pharmacies have over pricing decisions. Medicaid phar-

macy reimbursements are set at the state level following the federal mandated condition that the reimbursement level is high enough to attract sufficient providers so that Medicaid beneficiary access to providers is equivalent to that of the general population (Wolfgang 2004). States can be flexible in their reimbursement design to pharmacies, but their reimbursement formulas generally include payment for the drug acquisition cost plus a fixed dispensing fee (Gencarelli 2005). The state formulas for drug acquisition cost reimbursement for brand-named drugs are based upon a benchmark price known as the average wholesale price (AWP). In theory, AWP is an average national reported "list price" that wholesalers charge and which is published by information vendors such as First DataBank and Thomson Medical Economics (Gencarelli 2005; Kaiser Family Foundation 2005). AWP is known to overstate the actual acquisition cost of prescriptions by retail pharmacies, and states generally apply a percentage discount off AWP when reimbursing pharmacies for drug acquisition costs through Medicaid (Gencarelli 2005).

Given the potential fluctuations of AWP, states often will override these formulas for certain products by issuing a maximum allowable cost (MAC) for the product to be reimbursed by Medicaid (Gencarelli 2005; Kaiser Family Foundation 2005). Dispensing fees also are set by the state and must by law be high enough to attract sufficient pharmacy participation in the Medicaid program (Gencarelli 2005; Wolfgang 2004). The only discretion retail pharmacies have with state Medicaid programs is over the decision to participate in the program. It has been found that lower Medicaid reimbursement rates decrease pharmacy participation in the Medicaid program and the number of prescriptions received per Medicaid beneficiary (Adams and Gavin 1996/1997).

Retail pharmacies have somewhat more pricing discretion when dealing with the organizations that manage the prescription drug benefits for large health care insurance plans. These organizations include the pharmacy benefit managers that large health care insurers often employ to administer their prescription drug benefits and the private pharmacy drug plans (PDPs) that CMS uses to provide Medicare Part D. In its final rules guiding implementation of Medicare Part D, CMS envisioned that the relationships between PDPs and retail pharmacies would be very similar to the present relationships that PBMs have with retail pharmacies (*Federal Register* 2005). PBMs provide several services for insurers including: setting up a network of retail pharmacies, developing prescription formularies to influence the prescription purchasing behavior of beneficiaries, and negotiating rebates from pharmaceutical manufacturers that enable the manufacturers to gain preferential status on the PBM formularies (California HealthCare Foundation 2003; FTC 2005). PBMs also often either directly provide or contract out for mail-order pharmacy services (California HealthCare Foundation 2003; FTC 2005). PBMs gain revenue through a mix of transactions fees charged to health insurers for each prescription claim adjudicated, retaining a portion of the rebates provided by pharmaceutical manufacturers, and payments from health care insurers for programs that promote less costly prescribing behavior (e.g., generic substitution programs) (California HealthCare Foundation 2003; FTC 2005). As many as 50 PBMs provide services, with the largest 12 PBMs covering more than 190 million lives (Atlas 2004). In 2003, the four largest PBMs (Medco Health Solutions, Express Scripts, Caremark/AdvancePCS, and ACS State Healthcare) accounted for 68% of the PBM prescription volume (Kaiser Family Foundation 2005).

PBM interaction with retail pharmacies includes negotiating pharmacy reimbursement levels, providing software to process claims, and reimbursing pharmacies for prescription drugs purchased by beneficiaries (California HealthCare Foundation 2003; FTC 2005). PBMs negotiate reimbursement levels with retail pharmacies in the process of creating a network of pharmacy providers. In creating these networks, PBMs must balance lower negotiated reimbursements with the value their beneficiaries place on preserving access to convenient and quality care. PBMs attempt to gain price concessions from retail

pharmacies by offering access to the prescription volume from the beneficiaries the PBM represents. The desire by beneficiaries to have convenient and quality pharmacy access constrains PBMs from implementing too miserly a pricing strategy with retail pharmacies. Some states have enacted laws mandating that health care insurance plans demonstrate a minimum geographic access to providers in order to market their product within a given region (National Association of Insurance Commissioners 2005). The PDPs within the MMA have to follow similar rules: 90% of a PDP's urban beneficiaries must live within two miles of a network pharmacy; 90% of a PDP's suburban beneficiaries must live within five miles of a network pharmacy; and 70% of a PDP's rural beneficiaries must live within 15 miles of a network pharmacy (FTC 2005).

The bargaining power an individual retail pharmacy has in price negotiations with a PBM depends on the value placed by a PBM's beneficiaries on having access to that pharmacy and the extent to which that pharmacy is needed within the PBM's network to meet mandated geographic access requirements. A known PBM pharmacy network development strategy is to first contract with major chains and other low-cost pharmacies in a region that may be willing to accept lower negotiated reimbursements in return for increased prescription volume. If this access level provides insufficient geographic coverage, the PBM then offers contracts at higher reimbursement levels to smaller pharmacies with higher costs until a region is covered (Navarro 1999). The existence of "any willing provider" laws in a state may limit the ability of PBMs to provide differential reimbursement contracts across retail pharmacies and potentially exclude higher-cost pharmacies from networks. Generally, any willing provider laws force health care plans to accept into their networks any provider willing to accept a universal standard contract (Ohsfeldt et al. 1998). Under these conditions, one might expect a health care plan to choose a reimbursement formula for its single standard contract that is closely aligned to what low-cost retail pharmacies are willing to accept, and these lower terms may be insufficient to attract many high-cost pharmacies.

Pharmacy trade associations have observed that the usual PBM negotiating strategy is to present retail pharmacies with "take it or leave it" contract offers, and these associations suggest that this is a sign that retail pharmacies have little bargaining power in price negotiations with PBMs (Anthony 1998). However, significant variation in reimbursement levels has been observed in PBM contracts across pharmacies (Brooks, Doucette, and Sorofman 1999, 2002) using data from large self-insured firms within the Medstat Marketscan database. These observations suggest that PBMs tailor contract offers to individual pharmacies in such a manner that each pharmacy accepts the initial offer. This research also has shown that independent pharmacies have greater bargaining power with insurers than chain pharmacies; this supports the notion that PBMs first negotiate lower reimbursements with chains and successively offer more lucrative contracts with independent pharmacies until a region is covered (Brooks, Doucette, and Sorofman 1999). It also has been found that retail pharmacies in areas with fewer pharmacies per capita, fewer pharmacies per employer, and higher pharmacy ownership concentration had greater bargaining power with insurers, and insurers with a larger percentage of the prescription claims in a market had more bargaining power with pharmacies (Brooks, Doucette, and Sorofman 1999). Using data from a survey of independent retail pharmacies, it also was shown that pharmacies can influence initial contract offers from PBMs through their bargaining behavior *prior* to receiving a contract offer (Brooks, Doucette, and Sorofman 2002). Given the limited samples in these studies, it is not clear whether their findings can be generalized to the remainder of the retail pharmacy market. It is especially not clear whether these results can be generalized to the bargaining between the PDPs in Medicare Part D and retail pharmacies. These studies also provide no information on whether PBMs with mail-order pharmacies have additional leverage in negotiations with retail pharmacies. It may be possible to

assess this relationship in the future using regional retail pharmacy and mail-order pharmacy data from IMS Health and Per-Se Technologies.

In making pricing decisions for their cash-paying patients, retail pharmacies are constrained by their product costs and the perceived demand for services from their cash-paying patients. Nationally, studies have shown that on average cash-paying patients pay higher prices at retail pharmacies than patients affiliated with third-party drug plans or government programs (Frank 2001). Little published research has assessed whether prescription prices for cash-paying patients from retail pharmacies vary across markets. One 1994 study analyzed the average prices paid by cash-paying patients at the 3-digit zip code level for four distinct products—Dilantin, Humulin, Mevacor, and Zantac (Brooks, Sorofman, and Doucette 1999). Using data obtained from that study, we calculated the distributions of average cash prices for these four products across 3-digit zip codes and found approximately a 20% difference in the average price paid by cash-paying patients between the 10^{th} percentile and 90^{th} percentile 3-digit zip codes for these products. This research also showed relationships between the prices paid by cash-paying patients and retail pharmacy market structure. Cash prices were lower in areas with higher numbers of retail pharmacies per capita, and higher in areas with a greater percentage of independent pharmacies. State-level any willing provider laws had a positive impact on cash prices. The direction of the relationship between the generosity of state Medicaid pharmacy reimbursements and prices paid by cash-paying patients varied across Medicaid generosity levels. For states with generous Medicaid programs, decreases in Medicaid reimbursements appeared to *increase* the price paid by cash-paying patients—the standard cost-shifting result when it is assumed that health care providers maximize a utility function containing both profit and the number of patients treated (Brooks, Sorofman, and Doucette 1999; Dranove 1988). Whereas across states with stingy Medicaid programs, decreases in Medicaid reimbursements appeared to *lower* the price paid by cash-paying patients—the standard cost-shifting result when health care providers are assumed to only maximize profit (Brooks, Sorofman, and Doucette 1999; Morrisey 1993).

The revenues obtained by retail pharmacies depend on the payer mix of the patients that use each pharmacy and the reimbursement levels from each payer. It has been argued that the advent of the Medicare Prescription Drug, Improvement, and Modernization Act of 2003—Part D will place severe strains on rural pharmacies that have low prescription volumes and high average costs and which make a large percentage of their revenues from cash-paying elderly patients (Crouch 2004). With many of the cash-paying patients of these pharmacies now covered by Part D, it is possible that the lower payment levels that generally accompany third-party payer arrangements may force many rural pharmacies to close, with the unwanted effect of decreasing the geographic access to prescription drugs for many seniors (Fraher et al. 2005; Mueller et al. 2005). It can be argued, though, that because of the isolated locations of many rural retail pharmacies and the need for PDPs to demonstrate pharmacy network coverage across the geographic areas they serve, many rural retail pharmacies should have higher bargaining power with PDPs. At this stage, it is not clear whether rural retail pharmacies are exploiting this power. It would be possible to study the relationships between retail pharmacy payer mix, retail pharmacy market structure, and prescription prices using longitudinal data combined with data from NCPDP and IMS Health or Per-Se Technologies.

Summary

An enormous amount of data exists to study retail pharmacy market structure and its effects on utilization, pharmacy service levels, and prescription pricing. Vendors currently collect data that can be used to estimate market-level measures of pharmacy supply by type, prescription utilization by payer, prescription payments by payer, and costs. However, little research has been performed using these data because of their inaccessibility to investigators. Since the Medicare

Prescription Drug, Improvement, and Modernization Act of 2003 relies on retail pharmacy for provision of prescription drugs and medication therapy management services, the Agency for Healthcare Research and Quality should look to develop agreements with the vendors that collect these data. Such agreements could be crafted to protect the established market niches of the vendors, yet also make the data available to the research community and assure the creation of research databases over time.

Notes

1 The U.S. Census Bureau defines retail pharmacy as "establishments known as pharmacies and drug stores engaged in retailing prescription or nonprescription drugs and medicines" (U.S. Census Bureau 2007). In the rules underlying the implementation of the Medicare Prescription Drug, Improvement, and Modernization Act of 2003 (MMA)–Part D, the Centers for Medicare and Medicaid Services (CMS) define retail pharmacy as "any licensed pharmacy from which Part D enrollees could purchase a covered Part D drug without being required to receive medical services from a provider or institution affiliated with that pharmacy" (*Federal Register* 2005).

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