The Impact of Retail Clinics on Cost, Utilization and Welfare

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Abstract

Retail Clinics are a recent and growing health care delivery organization offering low cost, convenient access to the simple treatment of low acuity conditions. We examine the impact of retail clinics on cost and utilization using a comprehensive health insurance administrative database representing millions of American insured consumers. We address the potential endogeneity of retail clinic utilization using both fixed effects and an instrumental variable strategy where distance to the clinic after it has opened is used to instrument for retail clinic use. We find that for those patients who visited retail clinics cost were reduced by $347. Importantly, we find no evidence that quality of care provided by retail clinics is lower than that received in physician offices. Our welfare estimates indicate that the removal of retail clinics would reduce aggregate welfare by approximately $433 million annually.

JEL Classification: I1

1. Introduction

Over the last decade important and potentially transformative organizational forms for the delivery of medical care have arisen in the US health care system. In general, innovation is welfare enhancing whether it is through new products, through the reorganization of manufacturing processes and service delivery. However, this need not be the case in the US health care sector. The large role of public programs, the importance of private third-party payers and the presence of asymmetric information imply that new organizational forms can reduce consumer well being. That is, these organizations could be designed to exploit administrative pricing irregularities, the inability of insurers to curtail patient utilization or knowledge gaps between patients and providers over the quality and necessity of the care they receive. Thus, whether the new organizational structure is a stand-alone MRI clinic, a specialty hospital or a retail clinic, these new health care delivery organizational forms are often controversial. Advocates for these new institutions argue that they improve the efficiency of an extremely inefficient health care delivery system – they provide care that is at least equal in quality (and may be superior) for lower cost. Critics complain that these new forms of providers simply exploit and ultimately add to the large health care system inefficiencies. In this paper, we use a unique and detailed data set to analyze the impact of retail clinics on the cost and quality of primary care delivery.

Retail clinics are new health care delivery organizations that compete with physician clinics for the diagnosis and treatment of several common, low acuity conditions. The first retail (or convenience) clinic, MinuteClinic, opened in Minneapolis-St. Paul area Cub Foods stores in May 2000. The prices for each service are typically posted at the clinic as well as online making the patient financial obligation transparent. These fees are much lower than most physician office visit charges making retail clinics a more attractive option for the uninsured. In general, health insurance will cover care at retail clinics at the same rate as an office visit for the purposes of co-pays and deductibles. Care at these clinics is provided by advanced trained nurses who are overseen by a physician.

Since their introduction in 2000 the retail clinic market structure has evolved. Currently over 1,000 retail clinics owned by over 40 different organizations are operating in 33 states.[1] These clinics are located in a many different settings including grocery stores, pharmacies, big box retailers and even airports.[2] Large retail chains have introduced their own brand of convenience clinics. For example, Target Corporation developed a retail clinic venture that, combined with its pharmacy and health products businesses, creates a vertically integrated organization. MinuteClinic itself has been acquired by CVS pharmacy and Walgreens operates retail clinics under the Take Care brand. Traditional health care organizations have also opened convenience clinics. The Mayo Clinic, Geisinger, Sutter and HealthPartner health care systems have all opened retail clinics. As of 2008, the largest chains are MinuteClinics with 514 outlets, Take Care Clinics with 176 clinics and The Little Clinic with 60 locations.[3]

Although growing in their demand, retail clinics are not without critics. Family practice physicians have expressed concern that retail clinics provide lower quality medical care and disrupt the continuity of that care (Konrad, 2009; Kamerow, 2007; Rosenblatt et al, 2006, Steenhuysen, 2007; Future of Family Medicine Project Leadership Committee, 2004). To date, no nationwide study has examined the quality or total cost of care provided by these clinics. In

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[1] Rudavsky et al. (2009), Laws and Scott (2008) and the Convenience Clinic Association (www.convenienceclinic.org)

[2] AeroClinic has two airport locations.

[3] Rudavsky et al. (2009)

principle, these clinics could be care substitutes or complements for physician care. If these clinics are lower cost substitutes for physician office visits or emergency room care without significantly impacting the quality of care, then retail clinics are likely to be a welfare enhancing innovation. Retail clinics may be complements to physician care if, after visiting a clinic, patients subsequently visit a physician's office to either verify the care they received at the clinic was appropriate or to correct any problems that may have arisen from inappropriate care. However, if retail clinics are complements to physician care (e.g. patients usually follow up with their physician after visiting a retail clinic), then the welfare consequences of retail clinic utilization will turn on utility gain patients receive from visiting a clinic versus the increase in the total cost of care they induce.

In this paper we attempt to understand the impact of the introduction of retail clinics on the cost, utilization and, ultimately, welfare of health care consumers. To accomplish this we estimate the parameters from demand and cost relationships for retail clinics. We also examine whether retail clinic utilization compromises the quality of care. In addition, we examine the impact of retail clinic use on two venerable populations – those with a chronic condition and pediatric patients.

Our analyses relies on administrative claims data from a large health insurer operating in multiple markets across the United States. These data include information on utilization and actual costs to the insurer and enrollee for physician office, emergency department, urgent care, prescription drug and retail clinic utilization. With these data we can formulate a panel of cost and utilization of care by provider modality. We supplement these data with information on the location and the timing of the opening of all retail clinics with whom the insurer contracts.

Specifically, we know the exact date when the retail clinic came online and was included in the set of covered providers for the insurer.

By their very nature, retail clinics are likely to attract patients with lower acuity than physician offices, urgent care centers and emergency departments. While we construct rich measures of severity of illness, it is likely that we will be able to fully control for aspects of health status that affect health care utilization and retail clinic choice. That is, it is likely retail clinic utilization is endogenous.

We use two different identification strategies to estimate the impact of retail clinics on the outcomes of interest. As we have individual-level panel data that spans several years, we can estimate the parameters of interest in a fixed effect framework. This approach will control for time invariant factors that affect retail clinic choice and health expenditure. We compliment this strategy with an instrumental variable approach. We possess information on the location of the retail clinics and the enrollees' home ZIP code and use this information to construct distance measures to the clinic. We use these distance measures as instruments for retail clinic use.

We find that retail clinic utilization significantly reduces medical care expenditures. For those individuals with a diagnoses that is commonly treated at a retail clinic, episode of care costs are reduced by 75% relative to care provided in physician offices. This translates to an average cost savings of $153 per episode. The impact of retail use is estimated to be even larger when we consider a 6-month time frame. Retail clinic users have 14% ($347) lower health care expenditures than non-users over a 6-month period. There is no evidence that retail clinic use leads to increases in subsequent emergency department use or hospital admissions. However, we find that retail clinic utilization does not impact the cost or the quality of care for those with chronic conditions and its impact on the pediatric population is modest. Using our estimates of costs as well as estimating preferences for retail clinics we calculate the welfare impact of their introduction. We find average, per-capita consumer surplus from the introduction and diffusion of clinics of $449.1 million or approximately $2.05 across every insured US resident under-65 years of age. Private health care expenditures in the US are approximately $1.2 trillion. Thus, while retail clinics have a meaningful impact on expenditures, their impact on the health care system is an extremely modest .04%.

2. Literature on Retail Clinics

While the rise of retail clinics has attracted the attention of the popular press and the provider community, there is little research into the impact of these organizations on the cost, quality and access to care. Furthermore, the analyses that do exist are limited to geographically small area primarily located in Minnesota.

Since the introduction of retail clinics, they have spread throughout the country many parts of the United States. Rudavsky et al. (2009) documents the ownership structure and geographic distribution of retail clinics in the US. They find that retail clinics are both organizationally concentrated. Approximately, 73% of clinics are owned by three organizations. Retail clinics started in Minnesota and have geographically dispersed across much of the country. Retail clinics are present in 33 states, however 44% of clinics are located in the five states of Florida, California, Texas, Minnesota and Illinois. A large percentage of the US population currently has ready access to a retail clinic. Rudavsky et al. (2009) finds that approximately 28% of the US population is within a 10-minute drive of a retail clinic and in several metropolitan areas over 90% of the population within a 10-minute drive to a retail clinic. Mehrotra et al. (2008)

The impact of retail clinics on the quality and cost of care has been addressed in only a few studies. All of these papers focus on populations within a single health care system with a disproportionate share of the patients residing in Minnesota. A synthesis of the results from these papers is that care at retail clinics is provided at substantially lower cost than in physician offices, urgent care centers and emergency departments without measurable differences in the quality of care for the low acuity services typically provided by retail clinics.

Mehrotra et al. (2009) analyze data from HealthPartners, a Minneapolis/St. Paul based integrated health care delivery and insurance system, to measure the impact of retail utilization on cost and quality of care. For the three episodes of care they examined, care at retail clinics cost the insurer 34% less than care at a physician office with no meaningful difference in the quality of care metrics they construct. Thygeson et al (2008) also study data from HealthPartners and find that the cost of care at retail clinics is $50 to $55 less than the care given in other settings. Woodburn et al. (2007) examine the rate of guideline adherence for the treatment of acute pharyngitis in retail clinics. They find that less than .5% of the retail clinic patients received care outside of practice guidelines.

Two papers have examined the impact of retail clinic use on subsequent medical care utilization. Rohrer et al. (2009) finds that within a large single medical practice group located in Minnesota, patients that sought care at a retail clinic were no more likely to return to the physician office to seek care than those that originally sought care at a physician's office for the same conditions. Rohrer et al. (2008) repeats this analysis for pediatric patients and also finds that there is no difference in the likelihood of returning to physician's office in the two week period following an initial visit for patients who initially sought care at a retail clinic and those that originally were treated in a physician's office.

In sum, the data seem to indicate that retail clinics are a lower cost substitute for the treatments of the approximately 10 conditions they are designed to treat. The quality of care at these clinics seems comparable to that received in other care settings. However, these studies do not attempt to control for unobservable dimensions of quality. No study has examined the impact of these clinics on care seeking behavior. The long-term consequences of retail clinic use have not been studied nor has an assessment of the value of access to these clinics been attempted. We attempt to fill those gaps in the literature with our work.

3. Data

Our primary source of data is administrative claims information obtained from United Healthcare (UHC) a subsidiary of United Health Group. United Healthcare offers health insurance products across most of the US covering over 32 million lives.

From the United Healthcare administrative data, we extract eligibility and claims data for a cohort of continuously enrolled health plan members from market areas across the United States who had dates of service in calendar years 2004 through 2007. These markets (essentially MSAs) are those in which new retail clinic operations were established sometime during the sample time frame. These data span 24 states. UHC began contracting with and including retail clinics in their provider network in 2005. In general, enrollees must pay a co-payment to utilize a retail clinic -- the copayments are equivalent to the physician office cost-sharing but are less than the co-payments if they sought care at an emergency room.

Retail clinic use is a relatively rare event—approximately .9 percent of UHC enrollees visit a retail clinic in a given year. Because of infrequent use of retail clinics, we oversample retail clinic users and then attempt to draw a ‘control’ population that is similar on some important observable attributes. The retail use population is comprised of enrollees who lived in a health plan market area where retail clinics were available and who used the services of a retail clinic during at least once during our time frame. The non-retail use population is a random sample of enrollees residing in areas where a retail clinic was available but did not seek care there and received a diagnosis of the ten most common conditions treated at a retail clinic at least once during our time frame. This sample construction strategy will necessitate that we account for the imbalance in the samples relative to their underlying population frequencies.

In order to reduce the impact of unobservable factors that are correlated with the home location decision, we limit the sample to those individuals who eventually live within 20 miles of a clinic. The original size of the treatment selection population was 23,227. The starting population for the control population was 27,008.

The data contain all the information necessary to process a health care claim including diagnosis, procedures performed, dates of service, provider information, patient demographics, patient's home ZIP code and the amounts billed and paid by the health plan and the patient. For all the patients in our data, we use 2004 claims data to construct health risk measures according to the Johns Hopkins Adjusted Clinic Groups system (ACGs).

We construct two analysis datasets. These datasets differ by the time window in which we aggregate utilization experience—one uses a 14 days window from the initiation of one of the 10 most common retail clinic services and the other constructs 180-day windows for the utilization of any service for those enrollees who, prior to the retail clinic became available, utilized retail services. There is no clear guide for defining the appropriate length of the window. Most of the conditions we examine have very short acuity periods if treated appropriately, however the effects of inappropriate diagnosis and care for these conditions may take months to manifest. A window that is too short would potentially miss the impact of inappropriate care on costs or the potential impact of provider agency, which may stretch over a long period of time. A longer window means that we include medical care that is unrelated to retail clinic utilization thereby adding noise to on or our dependent variables. Using ACGs to control for patient severity should help mitigate the fact that our larger window includes many extraneous conditions and treatments.

We construct measures of distance from a retail clinic to an enrollee's home ZIP code using data provided by UHC. These data include clinic name, location, contract start date as well as the clinic ZIP code. Figure 1 graphs the number of retail clinics in UHC's network over time. By 2007, UHC contracted with 349 clinics.

We construct the distance to the nearest retail clinic for each enrollee in our sample by using U.S. Census bureau provided geo-coding latitude and longitude estimates for all ZIP codes. We then use the great circle formula to compute distances in miles between each enrollee and the possible clinic combinations surrounding them. We also merged in median per-capita ZIP code information from the Census Bureau.

Cost, Use and Quality of Care Measures

In our analysis we examine cost as the allowed amount reported by the health plan. This allowed amount includes both what the insurer paid the provider and the consumer's out-of-pocket payment. Using this approach, we develop cost metrics for total care, physician office care, pharmacy care, inpatient care, outpatient care and emergency room visit care as well as corresponding counts of medical care utilization for these same five categories of service.

For the conditions we analyze, quality of care measures are not readily constructed from the administrative claims data. Given this constraint the most natural measure of the quality of care is an absence of an adverse event signal namely an inpatient admission or an emergency room visit. While these measures are not direct markers of poor quality care for many chronic conditions such as heart disease, hypertension, pediatric asthma and diabetes they are the primary entry point for a crisis.

Table 1 lists the top 10 diagnoses and procedures performed at retail clinics and their frequency among the retail and control populations. Not surprisingly, these conditions are low acuity and have simple well-understood treatments. Retail clinic users are more likely to have conditions that are treated at retail clinics than the non-retail clinic users.

Table 2 presents the demographic and utilization summary statistics for retail clinic user population at baseline (i.e., before the clinic opened) and those who did not use retail clinics when they were opened in their market area. There are some differences between the two populations. Retail clinic users are younger (2.8 years), are more likely to be female, live in poorer ZIP codes and, importantly, live much closer (3.4 miles versus 7.8 miles) to a retail clinic (conditional on the clinic operating). All of these differences are statistically significant at traditional levels of confidence.

Table 2 also shows that there are no statistically significant differences in cost and utilization between retail and non-retail clinic users. Retail clinic users have somewhat less overall expenditures ($2,827 versus $2,987) and physician service expenditures ($1,922 versus $2,019) but these differences are not statistically significant. As for the other cost categories, the differences in average expenditures across the two groups are minimal.

4. Empirical Framework

There are several mechanisms through which seeking care at retail clinic may affect health care costs. First, the clinic may offer their services at prices that are lower than comparable services (with comparable quality) at a physician office. While it is clear that their list prices are lower than list prices at physicians' offices, it is not clear whether that is true for the rates negotiated between insurers and physicians. If this characterizes how retail clinics function, then seeking care at a retail clinic should reduce medical expenditures compared to the counterfactual of being treated in another health care setting. Second, the quality of care delivered at the clinic may be inferior to that typically given in a physician office. This, in turn, may lead retail clinic patients to later seek care in physicians' offices, emergency departments or in extreme cases, in the inpatient setting. Physician advocacy groups have made this argument. Under this scenario, retail clinic care is complementary to physician office care and the availability of retail clinic services will lead to an increase in total health care costs. Third, if physician agency is important or if physician's are more likely to practice defense medicine than the nurses working in retail clinics, then seeking care at a retail clinic may lead to longer run reductions in medical care costs. Here agency refers to the ability of physicians to leverage their informational advantage to order tests and perform services that are of marginal medical value in order to enhance their income. Retail clinics offer many fewer services than physician offices and therefore are constrained in the amount of agency they can practice.

To assess the impact of retail clinic utilization on the expenditures and the patterns of care for enrollee *i* in market *m* in period *t* we estimate parameters from the following model.

(1) $$y_{it} = \alpha_m + \rho r_{it} + x_{it}\beta + e_{it},$$

where y_{it} is one of several different measures of expenditures or utilization, α_m is a market fixed effect, x_{it} is a vector of individual demographic, condition and severity controls, r_{it} is an indicator for whether the enrollee visited a retail clinic and e_{it} is a mean zero residual. The parameter of primary interest is ρ which captures the impact of retail clinic utilization on the outcome of interest. We analyze the impact of retail clinic utilization over two different time windows. The first is the two-week period after the initiation of a visit for one of the retail clinic diagnoses. The second time frames are 6-month periods.

If the dependent variable of interest is an expenditure level then it is transformed by the logarithm for the analysis. If the dependent variable is a discrete variable then we estimate the parameters using a fixed effects logit (Chamberlin, 1984), or an instrumental variable probit model (Newey, 1987).

Identification

An obvious concern is the endogeneity of the decision to use a retail clinic. That is, unobserved enrollee characteristics are plausibly correlated with retail clinic usage. Retail clinics are designed to treat low acuity conditions, so we should expect them to attract a lower acuity (both observably and perhaps unobservably to us) population. The claims data we use contain a large amount of medical care and diagnosis information that we use to construct measures to control for the individual severity. As we document below, these measures account for over 40% of the variation in health expenditures in our sample. While we are able to explain a significant component of the variance of health care expenditures that does not imply that endogeneity is not a concern. We address this concern using two classic empirical approaches: the inclusion of individual fixed effects and instrumental variable approach.

Our data span the period from at least six months to the opening of the clinic.[4] Thus, we can use individual fixed effects to control for time invariant, individual specific factors that affect health and thus medical expenditures. Identification is obtained as individuals often seek care at both retail clinics and physician offices for the common retail conditions and services.

[4] Often we have claims information for a given individual for year and a half prior to the opening of the clinic.

The impact of retail clinic utilization is inferred from within individual differences in health care expenditure between periods in which a retail clinic was utilized and the periods in which retail clinic was not utilized.

For our instrumental variables approach, our instrument is the distance from the patient's home ZIP code to the nearest retail clinic in operation. The idea behind this instrument choice is simple. Enrollees who live near a clinic are more likely to seek care there and, importantly, conditional on our covariates, the location of an individual is correlated with their health care expenditures. Rudvasky et al. (2009) argues that most retail clinic utilization will be by those within a short drive of a clinic. Also, United Healthcare charges the same office co-pay for retail clinic and physician office visits thus, for our patient population, the primary advantage of retail clinic use is its convenience. Gowrisankaran and Town (1999) and Geweke, Gowrisankaran and Town (2003) use a similar identification strategy to measure hospital quality. As mentioned above, we limit our sample to those enrollees living within 20-miles of an eventually opened retail clinic. We choose that cutoff because few individuals living further than 20 miles from a retail clinic seek care at that facility, and including enrollees that live further away from a retail clinic may increase the likelihood that the distance to the clinic is correlated with health care expenditures thereby contaminating our instrument.

To be a valid instrument the distance to the clinic must be correlated with convenience clinic utilization and this distance must be uncorrelated with the residual in (1). In Table 3 we present the first-stage estimates from the logit model on the impact of distance and its interaction with variables on retail clinic utilization. The parameter on distance to the clinic is negative and very precisely estimated indicating that the first condition for instrument validity is met.

Likelihood ratio and F-statistics in a linear probability model all reject they hypothesis that the coefficients on distance and its interactions are zero at a p-value that is less than .00001.

The second validity condition is that the change in the distance to the nearest retail clinic induced by the opening of a new clinic is orthogonal to the residuals in (1). In general, this condition is more difficult to verify empirically. However, as we have claims data prior to the introduction of retail clinics in each location, we can explore the validity of this assumption by regressing the logarithm of total 6-month enrollee expenditures on our covariates and the distance to the clinic for the periods prior to the opening of the retail clinic for those with a retail clinic diagnosis. In this regression, the coefficient on distance is -.00000013 with a t-statistic of -.24. Distance is not meaningfully nor significantly correlated with health care expenditures prior to the opening of the retail clinic indicating that it is, in fact, a valid instrument.

We also examine the impact of retail clinic utilization on two subsets of patients. The first subset is the chronically ill as defined by an algorithm based on the ACG system used by Parente, Feldman and Chen (2008). The second sub-population is the pediatric population. Both of these populations have special care needs, and physicians and their specialty societies have expressed concern about quality of care rendered to these populations by retail clinics.

5. Results

Table 3 presents the estimates from the logit model of the retail clinic choice for those enrollees with a retail clinic diagnosis.[5] As mentioned above, the distance to the clinic has a large impact on the probability of its selection. An increase in distance of 5 miles reduces the probability of using the clinic by approximately 50% from .0094 to .0050. Health status affects the probability of retail clinic utilization. Those with a chronic illness and those with a more

[5] Observations are weighted by their population probability weights.

severe conditions as measured by the ADG algorithm are less likely to visit a retail clinic. Median, per-capita ZIP code income and age are negatively correlated with visiting a retail clinic and those who live in higher income ZIP codes are more sensitive to the distance to the retail clinic in affecting their likelihood of seeking treatment there.

Table 4 presents the unadjusted total medical expenditure costs for the 10 most common retail clinic diagnoses by the care location modality. For all conditions, care at a retail clinic is significantly less expensive. Across all conditions, care at a retail clinic is 75% less expensive than if the care were provided in a physician's office and 119% less than if the care were performed in an urgent care or emergency department setting. Translating percentages into nominal dollars implies that retail clinic care is, on average, $186 cheaper than the care provided in physicians offices and $295 less expensive than the care given in urgent care/emergency departments. These estimates do not control for observable or unobservable factors that affect health care costs and which likely contribute to a portion of the cost differential between retail clinics and other care sites.

Table 5 presents the impact of retail clinic utilization on episode of care costs controlling for demographics, measures of health status, market and time. Table 5 presents baseline OLS estimates as well as the fixed effects and IV results. The estimates indicate that controlling for patient-level observables and market fixed effects, retail clinics are, on average, 64% less expensive than care in other settings. This translates to a difference of approximately $153 between care delivered in the retail setting and the physician's office. The fixed effects and instrumental variable estimates are similar in magnitude suggesting that unobserved selection into retail clinic care is does not bias the OLS estimates. We also present estimates of the interaction of retail care utilization and the number of ADGs, a measure of the patient's health status. In an episode, the differential between the cost of care at retail clinics versus other care settings increases as the as the patient's health status declines.

The impact of retail clinic use on medical care costs in a longer time window (6-month) are present in Table 6. The sample is all enrollees with at least one retail clinic diagnosis in a given period. The OLS estimates without any controls indicate that retail clinic use is associated with a 40% reduction in health care costs – an implausibly high figure. The addition of demographic, diagnosis and health status estimates imply that retail clinic utilization is associated with significantly lower total medical care costs 24% during the 6-moth period. Instrumental variable and fixed effects estimates imply that retail clinic use is associated with a 19% and 14% reduction in costs, respectively. Using the smaller estimate as our measure of the impact of retail clinics indicate that retail use, on average, leads to a $347 reduction in medical costs. This figure is much larger than the estimate using the episode data suggesting that there may be significant long-term impact from retail use on the health care experience of its customers. The estimates in Table 6 suggest that unobserved selection is present and correcting for it reduces the estimated impact of retail clinic utilization. Hausman tests bear this observation out – differences between the OLS and IV and fixed effect parameter estimates are significant at the 1% level.[6] Failure to correct for this bias would overstate the welfare estimates of the impact of retail clinics by approximately 40%. Unlike the episode estimates, the estimates in Table 6 indicate that the benefits of retail use are declining in health status. Those with 6 ADGs receive no cost benefit from retail clinic utilization.

Table 7 decomposes the impact of retail clinic utilization into the important medical care cost categories. Here we only present fixed effect and instrument variable estimates. Not

[6] We perform generalized Hausman tests that accounts for the fact that our OLS estimates is not efficient under the null as we are weighting our observations by their population weights.

surprisingly, the primary impact of retail clinic use is on office visit expenditures. Interestingly, retail clinic users also experience a modest decline in pharmacy utilization conditional on receiving at least one prescription. There was no impact of retail use on the likelihood of filling a prescription or on the use of hospital services. There was also little evidence that retail utilization affects out-of-pocket expenditures, which is consistent with UHC's co-payment structure.

We also explore the impact of retail use on the likelihood of being treated in an emergency department or experiencing an inpatient admission. These are two admittedly crude measures of the quality consequences of retail clinic use. The estimates from both the fixed effects and instrumental variable models indicate that retail use has no significant impact on the likelihood of emergency department use or hospital admission. While the parameter estimates from these regressions are large in magnitude, they imprecisely estimated.[7] This is not surprising as emergency department use and admissions variables have a high signal to noise ratio making precise inference challenging.

Table 8 presents the impact of retail clinic utilization on enrollees with chronic conditions and the pediatric population. Retail use has no impact on the cost, hospital admission probability or the likelihood of emergency department use for those with chronic conditions. This result suggests that at least some of the physician societies concern that the benefits of retail clinics might not extend to those with chronic conditions is warranted. However, our results also suggest there is no measurable impact of retail clinic use on the quality of care as measured by emergency department use and inpatient admissions. For the pediatric population, retail clinics care reduces costs by 11% ($128) according to the fixed effect model estimates. The instrumental variable estimates are extremely imprecise and thus difficult to interpret.

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[7] The p-values on the retail clinic use coefficients from the emergency department and inpatient admission are .10 and .33, respectively.

Impact of Retail Availability on Utilization

Given that many retail clinics are located in high traffic commercial retail store locations (e.g. Target Stores), it is plausible that their rise could lead to an increase in utilization for the conditions they specialize in. If present, this increase in use could increase welfare or could induce patient moral hazard because of the increased access combined with low co-payments leads to use where the marginal value to the patient exceeds the marginal cost.

We explore this possibility by regressing an indicator for the presence of a retail clinic diagnosis (independent of where that diagnosis was made) on the ultimate distance to the clinic, the interaction of the distance to the clinic with an indicator of whether the clinic was open, demographic and condition covariates, and market fixed effects. Logistic regression is used to perform this analysis. The coefficient on the interaction of the distance to the clinic whether the clinic was open indicates the impact of the clinic on the probability that the enrollee seeks care for a retail clinic condition. The coefficient of interest is positive (.0046) but insignificant (p-value .145) indicating that retail clinics do not affect the total demand for primary care services.

Welfare Impact of Retail Clinics

We have estimated retail clinic demand and cost relationships and, with some additional assumptions, we can construct measures of the net impact of the introduction of retail clinics on welfare. The value of the introduction of new products has been estimated by Petrin (2002) for minivans, Gentzkow (2007) for online newspapers and Weber (2008) for ambulatory surgical centers. Here we take the perspective of the consumer assuming that any decrease in average health care costs paid by the insurer are passed down to the consumer in the form of lower average premiums. The analysis above indicates that a single retail clinic utilization, on average, reduces health care expenditures $153 per episode relative to physicians offices ($247 relative to care administered in urgent care and emergency departments) and $347 relative to other care sites within a six-month window.

To calculate welfare we need to construct and include measures of the consumer surplus gain from the availability of retail clinics. As we have estimated a retail clinic choice model in a logit framework, it is straightforward to construct surplus measures (McFadden, 1981). Let u_{itr} be the random utility that an individual with a retail clinic diagnosis receives from care at a retail clinic. Normalizing the utility received from care in other settings to zero, an individual will seek care at a retail clinic if $u_{itr} > 0$. Parameterizing utility as $u_{itr} = x_{it}\beta + \varepsilon_{it}$ where x_{it} is the set of demographic and diagnostic variables and the error term is assumed to be from a mean zero, Type I extreme value. These assumptions imply that the retail clinic choice parameter estimates presented in Table 3 can be used to construct expected utility. As shown by McFadden (1981) and Small and Rosen (1981) the logit error term implies that expected surplus, EU_{it}, is given by: $EU_{it} = \ln(1+\exp(x_{it}\beta))$.[8]

Given our estimates it is straightforward to calculate EU_{it}. However, to monetize this utility based measure we need to normalize EU_{it} by the marginal utility of income. Since there is no variation in co-payments between physician offices and retail clinics for the enrollees in our sample, we do not have a direct measure of the marginal utility of a dollar. To construct the marginal utility of a dollar, we take advantage of the variation in the distance to the closest retail clinic that exists across enrollees in our data. That is, the estimates of the logit model allow us to construct a marginal utility of an increase in the distance traveled to a clinic. We multiply this measure by an estimate of the average travel time to go one mile in urban areas which we take to

[8] Our approach makes several strong functional form assumptions. In particularly, we assume logit errors and no unobserved demand heterogeneity over retail clinic characteristics. In future versions of this paper we will attempt to relax those assumptions.

be approximately .08 of an hour and translates the marginal utility of a mile traveled to the marginal utility of an hour. To translate that figure into the marginal utility of income we simply multiply it by the value of an hour of travel, which Brownstone et al. (2003) estimates a median value of $15 per hour.[9] Call this estimate α_i. Our measure of consumer surplus, conditional on having a retail clinic diagnosis is $CS_{it} = \frac{EU_{it}}{\alpha_i}$. Per-capita consumer surplus is then $CS_{it} \times \Pr_{retail}$ where $\Pr_{retail}$ is the probability of seeking care for a retail clinic diagnosis.

The results from this exercise indicate that conditional upon living within 20 miles of a retail clinic location, mean, per-capita consumer surplus is $.44 per year. The expected reduction in health care expenditures (which accounts for the probability of having a retail clinic appropriate condition and the probability of seeking care at a retail clinic conditional upon have such a diagnosis) is $7.48 per year. Thus, the total per-capita welfare gain is $7.92 per year for those living within 20-miles of a retail clinic. We can construct a conservative aggregate welfare measure using the report figures in Rudvasky et al. (2009). Our 20-mile radius is larger than the 10-minute circle they construct and it is in that sense that our estimate is conservative. They estimate that 81 million US residents live within a 10-minute drive of a retail clinic. Putting this figure together with our rough estimates of the average, per-capita consumer surplus from the introduction and diffusion of clinics of $449.1 million or approximately $2.05 across every insured US resident under-65 years of age.[10] Private health care expenditures in the US are approximately $1.2 trillion. Thus, while retail clinics have a meaningful impact on expenditures, their impact on the health care system is an extremely modest .04%.

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[9] Weber (2008) uses a similar approach to calculate welfare from ambulatory surgical centers.

[10] We adjust our population measure for the uninsured and the elderly populations who are not part of our sample and whose preferences for retail clinic use may be very different from those in our sample.

5. Conclusion

The rise of retail clinics as a common source of primary care for Americans has the potential to reduce health care costs. However, this new form of health care delivery has its critics who claim that retail clinic use unnecessarily disrupts the care provided by physicians. This is the first empirical study to use a large administrative database controlling for endogenous retail utilization to examine the impact of retail clinic use on overall health care cost and utilization of an insured individual. We find that retail clinic is associated with lower cost of care and without any reduction in our admittedly crude measures of quality. However, we also find that retail clinic utilization by those with chronic conditions has little impact on both costs and quality of care.

We calculate the total welfare from the introduction of these new health care delivery organizations. We find that the average, per-capita consumer surplus from the introduction and diffusion of clinics of $449.1 million or approximately $2.05 across every insured US resident under-65 years of age.

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Table 1
Share of the Top 10 Most Common Retail Clinic Diagnoses Episodes by Site

Condition	Retail Population	MD Office
Upper Respiratory Infection	.48	.54
Immunizations	.18	.09
Otitis Media	.12	.12
Broncitis	.07	.05
Urinary Tract Infection	.03	.04
Eye Infections	.05	.05
Allergies	.03	.06
Viral infections	.01	.04
Tonsilitis	.01	.01
N	28,107	131,635

Table 2
Summary Statistics in the 6-Month Window Prior to Retail Clinic Availability

	Retail Clinic Users		Non-Retail Clinic Sample		
Variable Description	*Sample Mean*	*Standard Deviation*	*Sample Mean*	*Standard Deviation*	*T-test Sig*
	N=28,033		N=24,130		
Insured Characteristics					
Age in 2004	32.06	16.90	33.30	17.34	
Female	.63	0.48	.54	0.495	*
ZIP code Income	16,773	9,678	29,946	13,100	*
Insured has a chronic condition	.29	.46	.28	.48	
Number of unique medical conditions	2.00	1.88	1.52	1.72	
Travel distance to nearest clinic (miles)	3.56	4.00	7.81	5.04	*
Insured Costs					
Total allowed cost	1,990.53	4,089.61	1,931.63	5,650.92	
Emergency room costs	14.22	127.89	18.14	214.91	
Hospital costs	228.81	1,946.59	239.91	2,079.23	
Total physician costs	1,393.18	3,993.67	1,326.31	3,923.65	*
Pharmacy costs	369.10	1,195.39	365.42	1,483.89	
Insured Utilization					
Resource Value Units	14.27	27.88	13.21	28.16	*
Emergency room visits	.042	.28	.040	.23	
Hospital inpatient admissions	.056	0.51	.061	0.57	
Physician office services	6.70	10.88	5.34	10.46	*
Prescriptions received	3.99	7.81	3.64	8.08	

*Significance** p<=.0%

Table 3
Summary Statistics 1-Day Episode by Site

Condition	Retail Population	MD Office
Age	32.6 (16.8)	27.3 (18.76)
Female	.63 (.48)	.62 (.48)
Pediatric	.25 (.44)	.41 (.49)
Chronic Condition	.32 (.47)	.35 (.48)
ER Visit	.00053 (.023)	.0024 (.048)
Hospital Admission	.000071 (.0084)	.00031 (.018)
RVUs	1.31 (.66)	1.70 (.84)
Number of Services	2.44 (1.29)	2.34 (1.54)
Rx	.44 (.50)	.19 (.39)
Rx in 14 Days	.49 (.50)	.33 (.47)
Rx Expenditures ($)	29.10 (74.74)	18.77 (89.62)
Total Expenditures ($)	115.75 (188.25)	159.46 (376.61)
N	28,107	131,635

Table 4

Mean Cost of Retail Diagnosis, 1-Day Episodes by Treatment Location

Condition	Retail Clinic		Physicians Office		Hospital Based/ Urgent Care	
	($)	RVU	($)	RVU	($)	RVU
Allergies*	105	1.38	164	1.83	768	1.16
Bronchitis*	129	1.36	172	1.78	763	1.48
Eye Infection	125	1.38	149	1.89	599	1.24
Immunizations*	69	.74	144	1.19	---	---
Otitis Media*	132	1.43	173	1.92	1,132	1.10
Tonsillitis*	116	1.43	177	2.01	---	---
Upper Respiratory Tract Infection*	127	1.47	164	1.67	1,027	1.26
Urinary Tract Infection*	107	1.34	182	1.69	861	1.31
Viral Infection	127	1.61	165	2.07	1,087	1.32

* Differences in means between Retail and Physicians Offices groups are statistically significant at the 1% level.

Table 5

Linear Probability Model Estimates of the Determinants of Retail Clinic Utilization

Variable	Coefficients (S.E)
RVU	.0045*
	(.00056)
Female	.00082
	(.00053)
Age	.00059*
	(.000093)
Age^2	-.0000071*
	(.0000012)
Pediatric Indicator	.0012
	(.00078)
ZIP Code Income/1000	-.00079*
	(.000010)
Chronic Condition	-.0029*
	(.00038)
N	73,617
R^2	.063

Note: Regression includes a constant, integer distance indicators, market and time dummies. Observations are weighted by the probability of sample inclusion and the standard errors
*Significant at the 1% level.

Table 6

Impact of Retail Clinic Utilization Relative to Physician Office Visit Total Medical Care Costs in 1-day window

Variable	Dependent Variable is Logarithm of Total Expenditures in 1-day window						
	OLS (1)	OLS (2)	OLS (3)	LAD (4)	FE (5)	FE (6)	IV (7)
Retail Use	-.23* (.013)	-.16* (.015)	-.14* (.014)	-11.99* (.29)	-.19* (.0047)	-.17* (.0071)	-.19* (.089)
Retail x log(RVU)	---	---	-.13* (.011)	--	--	-.11 (.010)	---
Visit Dx Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
ADG/RVU/Service Controls	No	Yes	Yes	Yes	Yes	Yes	Yes
Market Fixed Effects	Yes	Yes	Yes	Yes	---	---	Yes
N	159,729	159,729	159,729	159,729	159,729	159,729	100,877
R^2	.025	.41	.41	--	.44	.44	---
F-statistic statistic	--	--	--	--		--	43.03

Note: All regressions include time dummies. Fixed-Effect regressions include individual fixed effects. The instruments in the instrumental variable regressions are distance to the clinic, its square and its logarithm.

*Significant at the 5% level.

Table 7

Impact of Retail Clinic Utilization Relative to Physician Office Visit Total Medical Care Costs in 14-day window

Variable	Dependent Variable is Change in Logarithm of Total Expenditures between the 1-day and 14-day window					
	ΔExpd>0 Logit (1)	ΔExpd | ΔExpd>0 OLS (2)	ΔExpd | ΔExpd>0 OLS (3)	ΔMD Expd | ΔExpd>0 OLS (3)	Hospital Admission Logit (4)	ER Use Logit (4)
Retail Use	-.077 (.041)	.12* (.037)	.16* (.018)	.13* (.036)	-.13 (.27)	-1.01* (.40)
14 Day RVU/ Service Controls	---	No	Yes	---	---	---
Visit Dx Controls	Yes	Yes	Yes	Yes	Yes	Yes
ADG Controls	Yes	Yes	Yes	Yes	Yes	Yes
Market Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
N	159,729	39,949	39,949	39,949	159,729	159,729
R^2	.12	.05	.05	.05	.17	.28
F-statistic p-value	--	--	--	--	--	--

Note: All regressions include time dummies. Fixed-Effect regressions include individual fixed effects.

*Significant at the 1% level.

Table 8

Impact of Retail Clinic Utilization on Total Medical Care Costs for Pediatric Chronic Condition Populations in 1-month window

Variable	Dependent Variable is Logarithm of Total Expenditures or Indicator of Service Utilization in 6 months							
	Chronic Condition Population				Pediatric Population			
	Total Expenditure		Hospital Admission	ER Use	Total Expenditure		Hospital Admission	ER Use
	OLS	FE	Logit	Logit	OLS	FE	Logit	Logit
Retail Use	-.15*	-.18*	-.33	-1.63*	-.076*	-.14	-.84	-1.31
	(.021)	(.0091)	(.32)	(.59)	(.020)	(.076)	(.56)	(.59)
N	55,805	55,805	55,805	55,805	56,794	56,794	56,794	56,794
R^2	.42	.42	.29	.06	.49	.46	.08	.22

Note: All regressions include time dummies. Fixed-Effect regressions include individual fixed effects. *Significant at the 1% level.

Figure 1

Total Number of Contracted Clinics