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The Effect of Health Care Entrepreneurship on Local Health: The Case of MedExpress in Appalachia

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Abstract: We test the hypothesis that the opening of an Urgent Care Center (UCC) has positive impacts on the local community. There are several mechanisms through which a UCC can have an impact: lower health care costs, emergency room decongestion, and improved access to medical information. We examine the entry of MedExpress into Appalachian counties between 2001 and 2013. Employing data from Health Resources Files, which provides information for all counties for specific years, we use Propensity Score Matching to create a year 2000 control group for the counties "treated" by MedExpress entry beginning in 2001. We then employ a standard difference-in-difference model on an unbalanced panel between 2001 and 2013. Our results suggest that MedExpress has a positive impact on different health outcome variables.

Keywords: Appalachia, Health, MedExpress, Urgent Care Center

JEL Classification: R5

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1. Introduction

There is an "epidemic of dying hospitals across rural America" (Goldstein, 2017). Since 2010, almost 80 hospital have closed in rural communities (Goldstein, 2017). This decline in the number of hospitals increases the importance of other health care providers, such as urgent care centers (UCC). Although not a perfect substitute to hospitals, UCCs can fill in the gap for the treatment of non-life threating conditions and provide local communities health care at a lower cost than most hospitals.

This paper examines the impact of the entry of a UCC on health outcomes of a local community. Specifically, we focus on MedExpress and Appalachia. Appalachia is a poor and rural area of the U.S. with a poverty rate of 17.2% over 2010-2014 according to the Appalachian Regional Commission. Due to the distressed nature of the region, Appalachia has several shortcomings, including adequate health care provision. MedExpress is an entrepreneurial UCC founded in Morgantown, WV by four West Virginia University medical graduate students in 2001. MedExpress expanded especially through Appalachia, and currently is the second largest UCC chain in the country with over 180 centers in 16 states.

Entrepreneurial activity is key to rural-regional development, especially as rural communities move away from traditional agricultural and mining industries (MacKenzie, 1992). While historically most research on rural entrepreneurship has focused on Europe (Pato and Teixeira, 2016), there is a growing empirical literature focusing on the United States. Examples include Stephens et al. (2013), Jackson et al. (2017), Goetz et al. (2010), Schaeffer et al. (2014), Komarek and Loveridge (2014), and Goetz and Rupasingha (2014). Pato and Teixeira (2016) and Ellis and Biggs (2001) review the literature on rural entrepreneurship and development.

Goetz et al. (2010) discuss one important feature of rural communities that affects rural entrepreneurship: the lack of agglomeration economies coming from density. Because rural areas are sparse in terms of population and firms, getting certain types of businesses to thrive can be difficult. As a demand-driven industry, health care provision can suffer if there is not enough demand in an area due to low population (Goldstein, 2017).

Schaeffer et al. (2014) note that rural areas are moving closer to urban areas in terms of industry composition. Nonetheless, rural areas are still poorer, less educated and have a stagnant population. Several studies such as Arcury et al. (2005), Haynes and Gale (2000), Laditka et al. (2009), Blazer et al. (1995), Kenny (1993), Hartley (2004), and Eberhardt and Pamuk (2004) show rural and urban health care provision, access, utilization and costs are still quite different. These studies show that rural communities are in disadvantage in comparison to their urban counterparts. Moreover, Hartley (2004) suggest that there may exist a "rural culture" that affects health care and healthy behaviors. By concentrating in the Appalachian region we hope to mitigate possible concerns with such "culture" influencing our results.

We make use of the Area Health Resource Files (AHRF) and use an unbalanced panel of counties from 2001 to 2013 to estimate the impact of MedExpress entry on local health outcomes at the county level. Because we do not have demand information from individuals on their health outcomes and behavior, we analyze several variables that should be impacted by MedExpress entry. To control for the non-random placement of MedExpress we employ a Propensity Score Matching (PSM) method to create a better control group.

Our results suggest that MedExpress has an overall positive impact on the "treated" counties in Appalachia. More specifically, our results imply a decrease in hospital utilization in Appalachian counties with MedExpress. We find that Appalachian counties with a MedExpress, compared to

the PSM control counties, have reduced short-term admissions to hospitals, fewer inpatient days, reduced emergency room visits, and fewer outpatient visits.

The remaining of our paper is as follows: Section 2 presents information on the Appalachian Region and MedExpress, Section 3 introduces the data, Section 4 describes our empirical approach and results, and Section 5 discusses the implication of our results and concludes.

2. The Appalachian Region and MedExpress

2.1 The Appalachian Region

The Appalachian region is defined, according to the Appalachia Regional Commission (ARC, 2017) as a 205,000 square-mile area that spans from South New York to Northern Mississippi. The region is comprised of 13 states and 420 counties, and is considered a high poverty area. In terms of rurality, the ARC estimates that 42% of Appalachia's population lives in rural areas, while the national average is 20%. In terms of the economy, although the region has been diversifying its industry mix, Appalachia is still associated with industries that have struggled in recent years such as agriculture, mining and heavy industry.

2.2 Urgent Care Centers and MedExpress

According to the Urgent Care Association of America (UCAOA, 2017), urgent care started during the 1970s and 1980s at a very local level. The industry expanded during the 1990s and 2000s due to several factors: an increase in the awareness of health care, the difficulty in receiving primary care, emergency room overcrowding, and changing community needs. In addition, and influx of investment from private equity firms has recently led to even faster growth.

UCCs have several features that are important to rural communities and health care entrepreneurship. For example, their staffing model is a "physician-based" one, with general practitioners and emergency physicians assisted by medical assistants, nurses, and technicians where appropriate. Services offered range from primary care to below life-threatening or limb-threatening conditions. Because of Certificate-of-Need (CON) laws, UCC face different incentives and barriers to entry depending on the state, however, every state in the country has an urgent care center (Looney and Sundock, 2015).

MedExpress is the second largest UCC chain in the country with over 180 centers in 16 states (Table 1). The company was founded in Morgantown, WV in 2001 by four medical graduate students from West Virginia University. According to the founder Frank Alderman, their goal was to provide a patient-centered approach and provide health care to everyone who needed it (Perine, 2012). According to the company, their growth was organic in that it spread out from Morgantown into other parts of Appalachian West Virginia and Pennsylvania before recently expanding to other states such as Florida.

3. Data

We obtained the date and location of every MedExpress opening directly from MedExpress. To test the impact of the entry of MedExpress on health outcomes of a local community, we use the Area Health Resource Files (AHRF). According to the U.S. Department of Health and Human Services, the AHRF was designed to provide information on "the nation's health care delivery system and factors that may impact health status and health care in the United States." Data is collected from over 50 different sources and provides a comprehensive supply side perspective on the health care system for each county in the United States. Information in AHRF can be roughly

categorized into eight categories: Health Care Professions, Health Facilities, Population Characteristics, Economics, Health Professions Training, Hospital Utilization, Hospital Expenditures, and Environment.

Unfortunately, we do not have individual-level information on health outcome and behavior, i.e., the demand side of the health care system. We therefore choose some supply-side outcomes that should be impacted by the entry of MedExpress or changes in the demand of health care after MedExpress entry. MedExpress should impact the supply of health care through at least two mechanisms: decreased cost of medical care (including the opportunity cost of time) and increased information of medical related issues.[1] These mechanisms should affect supply-side variables differently, but we are not able to disentangle each of them due to the aggregated nature of the data. It is important to stress, however, that disentangling these effects is not the objective of this paper and remains an important topic for future research.

The outcome variables we focus on this paper are: (i) the number of short term admissions to general hospitals; (ii) the number of inpatient days in general hospitals; (iii) the number of emergency room visits in general hospitals; and (iv) the number of outpatient visits for purposes other than emergency in general hospitals.

For outcome variables (i) and (iii), because UCCs typically charge a lower price and are faster than hospitals and emergency rooms, we should see more consumers substituting for UCCs after MedExpress entry, especially for non-life-threatening issues. Additionally, if the lower cost or easier access is making people more likely to seek medical help sooner, individuals who end up utilizing hospitals should be healthier and thus need fewer days in the hospital upon referral.

[1] Another possible mechanism would be through labor markets as MedExpress entry should affect local demand for non-specialist health care professionals.

Lastly, the effect of MedExpress entry on outpatient visits is not clear *a priori*. On the one hand, if there was limited medical care locally prior to MedExpress or if it was too expensive or not convenient enough, MedExpress could increase the number of outpatient visits as more people seek medical help. On the other hand, MedExpress may be a substitute for outpatient visits in general hospitals, in which case we could see MedExpress entry leading to a decrease in outpatient visits.

4 Empirical Approach

4.1 Propensity Score Matching

MedExpress opening, especially in the Appalachia Region, was non-random. This selection effect will bias a difference-in-difference estimation approach if MedExpress systematically entered communities with above-average or below-average health care needs. Thus, to try to control for this selection effect we employ the PSM method to create a proper control group for our treated counties, in other words, those which received a MedExpress.

PSM is a popular method to create control groups in order to provide statistical estimation of causal effects. According to King and Nielsen (2016) the PSM technique is the most common method of matching used in the literature with over 70,600 scholarly articles using it. In this paper we use the package "MatchIt" (2017) in R to create our control group.

The PSM method consists of three steps. First we estimate a logit model where the dependent variable is whether the county received a MedExpress. Our independent variables were socio-demographic characteristics, industry composition, and health supply in each county. The socio-demographic characteristics control for health care demand in a county as similar groups of gender, age, race and income should have similar demand for health care. Industry composition plays two

roles. First, if MedExpress is targeting counties with certain types of industrial activity then we are capturing that selection process. Second, if there is some disease or health outcome systematically related to a particular industry-occupation, then we are accounting for this difference. The supply of health care controls for possible endogenous decision of MedExpress are based on health care competition. The second step of the PSM method is to predict the treatment from the logit regression performed in the first stage. Finally, we use this prediction to choose the observations closest to the treatment group in terms of predicted values.

Because our focus is on the Appalachian region, which was the region first targeted by MedExpress we restrict our sample to the counties in the Appalachian region. One possible concern is that each state has different certificate of need laws which could affect the entry of an Urgent Care Center. Every state in country has a UCC, which should alleviate such concerns. In the econometric model we control for state fixed effects that should capture these different laws to the extent they are largely time invariant.

Table 2 provides after matching statistics for the control and treatment groups. Panel A has the information on the variables used for matching purposes; the means suggest the control and treatment groups are similar, as expected. Panel B provides information on the outcome variables we analyze; the means suggest counties that have received MedExpress have higher levels of hospital utilization, even after PSM.

4.2 Econometric Analysis

Even though we use PSM to create our control group, we make use of econometric analysis to estimate the impact of the entry of MedExpress. Our estimated model is:

$$\log(HO_{cst}) = \beta_1 ME_{cst} + X_{cst}\gamma + \delta_t + \mu_s + \varepsilon_{cst}$$

where *HO* is the health outcome analyzed, *ME* is a dummy variable equal to one for counties with a MedExpress after the opening year, *X* is the control variables comprised by population, unemployment and snap enrollment; δ_t and μ_s are the year and state fixed effects, and ε_{cst} is the error term. Thus, our estimated impact is conditional on time varying characteristics such as socio-economic features, year trends and time invariant characteristics from each state in the sample. Because we have some observed zero values in our dependent variables we add unit to all observations to be able to properly take the logarithm of a health outcome. By taking the log of the dependent variable, the interpretation of our βs is semi-elasticity, in other words, the percent variation in the dependent variable from the entry of MedExpress.

Table 3 present some descriptive statistics on the controls and dependent variables used in our regression analysis. The estimated impacts are presented in Table 4. [2] We should note that our results also include additional controls not reported: population, SNAP recipients, the county unemployed population, and state and year fixed effects. The number of observations in the fourth column of Table 4 decreases because there are fewer observations in ARHF. Our results explain roughly a quarter of the observed variation in the dependent variables on our matched sample. Focusing just on the Appalachian sample, we find that MedExpress entry is negatively related to short-term admissions to hospitals, number of inpatient days, number of emergency room visits, and the number of outpatient visits. None of the coefficients on MedExpress entry are statistically significant at conventional levels, however. This may be due to our limited sample. Given that we are using an unbalanced panel focused on Appalachia and matched Appalachian counties, we are

[2] In this paper we focus on the extensive margin. Some counties, particularly in the last year of our analysis, have more than one MedExpress location. Our results here are focused on MedExpress entry. Over a longer time frame, however, the intensity of MedExpress treatment could be quite important and is an avenue for future research. To our knowledge, during our sample there are no other for-profit UCCs operating in Appalachia.

looking at fewer than 60 counties. At a minimum, however, we feel comfortable saying that MedExpress entry into Appalachian counties seems to not have *increased* demand for a number of hospital-based health care measures. For example, to the extent that emergency rooms were previously filled with a mixture of individuals requiring medical attention, MedExpress entry seems to have reduced ER visits in a manner consistent with some customers substituting UCCs for more costly (time and money) emergency room care.

4.3 Robustness Check

So far our analysis focused on a sample comprised only of Appalachian counties. As discussed in the Introduction and Section 2, the Appalachian region is different from the rest of the United States in many ways. Therefore, our results may be not really capturing the impact of MedExpress in Appalachia but of something else that is endogenous to this region, as hypothesized by Hartley (2004). Doing so, however, limits our sample in ways that may bias us against finding a statistically significant effect of MedExpress entry.

In this section, we expand our sample to include all MedExpress opening in the United States from 2001 to 2013, looking at all matched counties as the control with the exception of those in Alaska, Guam, Hawaii, Puerto Rico, and Virgin Island. The primary advantage of expanding our analysis is that now we can take advantage of extra variation in our variables - both dependent and independent - which provides more consistent estimates. Table 5 has descriptive statistics for the outcome and explanatory variables for the expanded sample. Because our focus is still the impact of MedExpress in the Appalachia region, we modify our earlier equation and estimate the following:

$$\log(HO_{cst}) = \beta_1 ME_{cst} + \beta_2 APP_{cst} + \beta_3 (ME * APP)_{cst} + X_{cst}\gamma + \delta_t + \mu_s + \varepsilon_{cst}$$

where *HO* is the health outcome analyzed, *ME* is a dummy variable equal to one for counties with a MedExpress after the opening year, *X* is the control variables comprised by population, unemployment and snap enrollment; δ_t and μ_s are the year and state fixed effects, and ε_{cst} is the error term. In this regression we include the *APP* dummy that identify counties in Appalachia and an interaction term between MedExpress and Appalachia; β_3 is the parameter we focus on. As in the first set of estimations, we add unit to all observations to take the logarithm of the health outcome, yielding semi-elasticity results.

The extensive margin results are presented on Table 6. Focusing on β_3, that is, in the interaction term, the results are similar for those in Table 4 in terms of sign and magnitude; however, the short term admissions, inpatient days, emergency and outpatient visits results are now statistical significant. MedExpress entry in an Appalachian county is associated with fewer short term admissions to hospitals, fewer inpatient days, fewer emergency room visits, and a reduction in outpatient visits at hospitals. Another interesting result that emerges from these results are that the Appalachian region is associated with more hospital utilization across all four health care outcomes. This finding suggests that for many Appalachian residents, hospital-based care might be the primary means of obtaining health care services absent UCC entry. It also suggests that the effects of UCC entry outside Appalachia (or rural areas more generally) is likely to be more muted. In addition, MedExpress entry outside of Appalachia is also associated with an increase in hospital utilization. This suggests two possible hypotheses that we are unable to disentangle. It could be that the effects of UCC entry on hospital utilization differ between Appalachia and the rest of the country. Alternatively, MedExpress expansion outside Appalachia could be in counties that are

experiencing an increase in hospital utilization in a manner that is not adequately being address through PSM.

5. Final Remarks

This paper tests the impact of MedExpress entry on different health outcomes in the Appalachia region. We focus on the Appalachia region because it received the first MedExpress, contains most of the company's centers, and is a known rural and poor area. Because of the non-random selection of where MedExpress chose to locate, we employed a propensity score matching method to create a better control group.

Ideally we would have had data on individual level to analyze health outcomes and behaviors (demand) as well as municipality level data to investigate the supply side and more explicitly looked at cost. This data is not available, therefor we use data from the Area Health Resource Files from 2001 and 2013 and select variables that should be affected by individuals utilizing UCCs. Our results suggest that MedExpress entry into Appalachia is associated with a reduction in a number of hospital based health care outcomes. We consistently find that MedExpress entry leads to a reduction in short-term hospital admits, inpatient days, outpatient visits, and trips to the emergency room. Given that UCCs do not deal with true medical emergencies, the decline in ER visits would clearly seem to reflect a substitution effect. To the extent that emergency rooms are overcrowded with non-emergency visits due to the lack of other options in rural areas, MedExpress entry would seem to be freeing up valuable resources for more serious medical situations.

Our results are statistically significant only for Appalachia and only in a larger sample that includes areas outside of Appalachia. This suggests that the effect of UCCs are heterogeneous and depend heavily on the communities in which they locate. Our results are consistent with the idea

that areas with fragile access to health care utilize hospitals for a wide variety of medical issues and that the entry of UCCs leads to a substitution to a lower cost option. Given the higher level of hospital utilization in “treated” counties in Appalachia, our results suggest MedExpress entry is freeing up resources for more appropriate hospital-based care.

An important caveat of our paper is the aggregate nature of the data, as we only have county level data. This does not allow us to disentangle demand side behavior (individual) from supply-side behavior (firms and government). Future work should focus on getting the most disaggregated and complete data possible to address concerns with control group and impact analysis.

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Table 1 - Urgent Care Centers Chains in the U.S. (100+ Centers)

Chain	# of Centers	# of States
Concentra	300+	38
MedExpress Urgent Care	180	16
U.S. HealthWorks	174	21
American Family Care and Doctors Express	163	25
NextCare Urgent Care	137	10
FastMed Urgent Care	109	3

Source: Urgent Care Association of America (2017).

Table 2 – Comparison of Means between Treated and Control Counties

Variable	Control	Treated
Panel A: Matching Variables		
Labor Force	39,061	69,312
Unemployment rate	4.71	4.69
Cons. Employment LQ	1.03	1.03
Edu. Employment LQ	1.11	1.21
Fin. Employment LQ	0.63	0.79
Goods. Employment LQ	1.13	1.11
Info. Employment LQ	0.55	0.68
Leis. Employment LQ	1.13	1.03
Manu. Employment LQ	1.13	1.16
Mini. Employment LQ	1.32	1.03
Other. Employment LQ	1.08	1.05
Prof. Employment LQ	0.42	0.61
Serv. Employment LQ	1.00	1.00
Fed. Gov. Employment LQ	0.97	0.97
Loc. Gov. Employment LQ	0.92	0.97
Sta. Gov. Employment LQ	1.24	1.08
Trade. Employment LQ	1.03	1.03
Male \%	0.49	0.49
White	0.94	0.95
Black	0.04	0.04
\# of beds	350	712
Active MDs	157	398
Median Income	34,980	35,070
Population	82,265	142,979
Poor Pop	9,531	14,862
Panel B: Outcome Variables		
Short Term Admission	12,404	23,418
Inpatient days	70,423	129,845
ER Visits	49,762	76,919
Other Outvisit	223,638	434,079

Table 3 – Summary Statistics for Treated and Control Counties

Statistic	N	Mean	St. Dev.	Min	Max
# of Centers	988	0.92	1.83	0	14
Inpatient days	760	100,134	176,146	0	1,666,144
ER Hospital Based MD	684	2.51	5.97	0	62
ER Office Based MD	684	6.20	14.35	0	137
ER Visits	760	63,341	74,750	0	704,127
Gen. Hospital Based MD	684	0.44	1.48	0	16
Gen. Office Based MD	684	2.71	4.45	0	58
Outpatient Visits	608	328,859	453,929	0	4,125,922
Short Term Adm.	760	17,911	29,948	0	269,236
MedExpress Dummy	912	0.67	0.47	0	1
Population	912	113,394	149,002	0	1,334,906
SNAP Recipients	836	13,024	15,988	95	161,144
Unemployed Pop.	988	3,566	4,711	36	48,202

Table 4 – Empirical Results for Appalachian Sample

	Dependent Variable:			
	ST Adm.	In. Days	ER Vis.	Out. Vis.
MedExpress	-0.399	-0.410	-0.424	-0.365
	(0.249)	(0.293)	(0.289)	(0.369)
Observations	760	760	760	608
R^2	0.274	0.265	0.237	0.247

Note: *p<0.1; **p<0.05;***p<0.01. Standard errors in parentheses.
Controls: population, snap recipients, unemployment, state and year FE

Table 5 – Descriptive Statistics for Robustness Results

Statistic	N	Mean	St. Dev.	Min	Max
# of Centers	1,794	0.81	1.48	0	14
Inpatient days	1,380	155,052	285,692	0	2,026,196
ER Hospital Based MD	1,242	4.02	7.56	0	68
ER Office Based MD	1,242	14.59	30.36	0	316
ER Visits	1,380	95,061	156,227	0	1,286,148
Gen. Hospital Based MD	1,242	0.67	1.54	0	16
Gen. Office Based MD	1,242	5.35	10.93	0	83
Outpatient Visits	1,104	416,221	589,558	0	4,240,193
Short Term Adm.	1,380	29,667	56,348	0	458,801
MedExpress Dummy	1,794	0.63	0.48	0	1
Appalachia Region	1,794	0.34	0.47	0	1
Population	1,656	232,781	434,540	0	4,009,412
SNAP Recipients	1,518	22,095	47,644	55	609,476
Unemployed Pop.	1,794	7,576	15,503	22	182,826

Table 6 - Empirical Results for Full Sample

	Dependent Variable			
	ST Adm.	In. Days	ER Vis.	Out. Vis.
MedExpress	0.872***	0.995***	1.042***	0.896**
	(0.265)	(0.314)	(0.308)	(0.387)
Appalachia	1.078***	1.228***	1.258***	1.064**
	(0.308)	(0.364)	(0.358)	(0.456)
App*MedExpress	-0.961***	-1.130***	-1.213***	-0.916*
	(0.347)	(0.410)	(0.403)	(0.501)
Observations	1,380	1,380	1,380	1,104
R^2	0.505	0.471	0.455	0.455

Note: *p<0.1; **p<0.05;***p<0.01. Standard errors in parentheses.
Controls: population, snap recipients, unemployment, state and year FE