Regional Science and Urban Economics xxx (2014) xxx–xxx

Contents lists available at ScienceDirect

Regional Science and Urban Economics

journal homepage: www.elsevier.com/locate/regec

Hospital treatment rates and spillover effects: Does ownership matter?

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ARTICLE INFO

Article history:
Received 16 April 2013
Received in revised form 19 November 2013
Accepted 22 January 2014
Available online xxxx

Keywords:
Spatial lag
Hospital ownership
Spillover effects
Panel data

ABSTRACT

This paper studies the effect of hospital ownership on treatment rates allowing for spatial correlation among hospitals. Competition among hospitals and knowledge spillovers generate significant externalities which we try to capture using the spatial Durbin model. Using a panel of 2342 hospitals in the 48 continental states observed over the period 2005 to 2008, we find significant spatial correlation of medical service treatment rates among hospitals. We also get mixed results on the effect of hospital ownership on treatment rates that depends upon the market structure where the hospital is located and which varies by treatment type.

1. Introduction

The quality and cost effectiveness of the health care system in the U.S. are two of the major concerns of the Affordable Care Act (ACA). According to World Health Organization (WHO), the total health expenditure of the U.S. accounted for 17.9% of the national GDP in 2010, which was the highest in the world. Despite spending this high expenditure on health, the health outcomes were not significantly better than those of other countries. In this paper we focus on ownership of the hospitals and their treatment rates. We distinguish between three types of hospital ownership: For-profit, not-for-profit, and government owned hospitals. There is an extensive literature focusing on hospital ownership, see for example Sloan (2000), McClellan and Staiger (2000), Sloan et al. (2001), Kessler and McClellan (2002), Horwitz and Nichols (2009), Bayindir (2012), to mention a few. A brief review of the different ownership theories and the empirical evidence is given in Section 2. The empirical studies have mixed results. Both not-for-profit and government hospitals enjoy tax exemptions and financial advantages. They may have the luxury of using their profits to finance less profitable services. Sloan (2000) finds that not-for-profit hospitals provide better overall quality to the community. Bayindir (2012) suggests that not-for-profit hospitals are more likely to treat uninsured patients and patients with public health insurance than for-profits hospitals. Some studies indicate that for-profits are profit-seeking and have more financial incentives to provide better treatment and attract patients, while other studies suggest that there is no difference in quality between not-for-profits and for-profits hospitals. On the demand side, Jung et al. (2011) find that hospitals with better reputation and higher quality of health care tend to increase patients' willingness to revisit. Moscone et al. (2012) suggest that information from neighbors along with patients' previous experience and hospital characteristics play important roles in their choice of hospitals in Italy. Porell and Adams (1995) survey the literature and report that patients are more likely to choose hospitals with better health outcomes. The health care market is based on the interactions between hospitals and patients. We explore how this market generates externalities among hospitals. In particular, we study how the treatment rates of one hospital may be affected by the treatment rates and competition from other neighboring hospitals.

The competition level of the market may be affected by the distance between hospitals, the hospital's reputation and the quality of hospitals.[1] Tay (2003) suggests that patients have a tradeoff between the quality of the hospital and the distance to other hospitals.[2] Hospitals improve their quality to attract patients from other neighborhoods.[3] Horwitz and Nichols (2009) find that not-for-profit hospitals are more likely to provide relatively profitable services in a market with a higher proportion of for-profit admissions. Government hospitals are the least likely to offer profitable services and the most likely to offer unprofitable services.

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[1] We do not argue that price of medical services is negligible, but most patients have insurance (Tay, 2003). Insurance companies cover a major part of medical expense. Moreover, patients who are aged 65 and above are most likely covered by Medicare. The out-of-pocket payments from patients are relatively low (Sloan, 2000). Porell and Adams (1995) indicate that studies do not find significant price effects when they use gross charges as the price measure.

[2] While almost half of acute myocardial infarction (AMI, or heart attack) patients are admitted to the closest hospital from home, more than 50% of the patients are willing to travel four to five miles further on average for better quality health care.

[3] However, using mortality rates, other empirical studies show mixed results of the effects of the competition on quality (see Gaynor, 2006).

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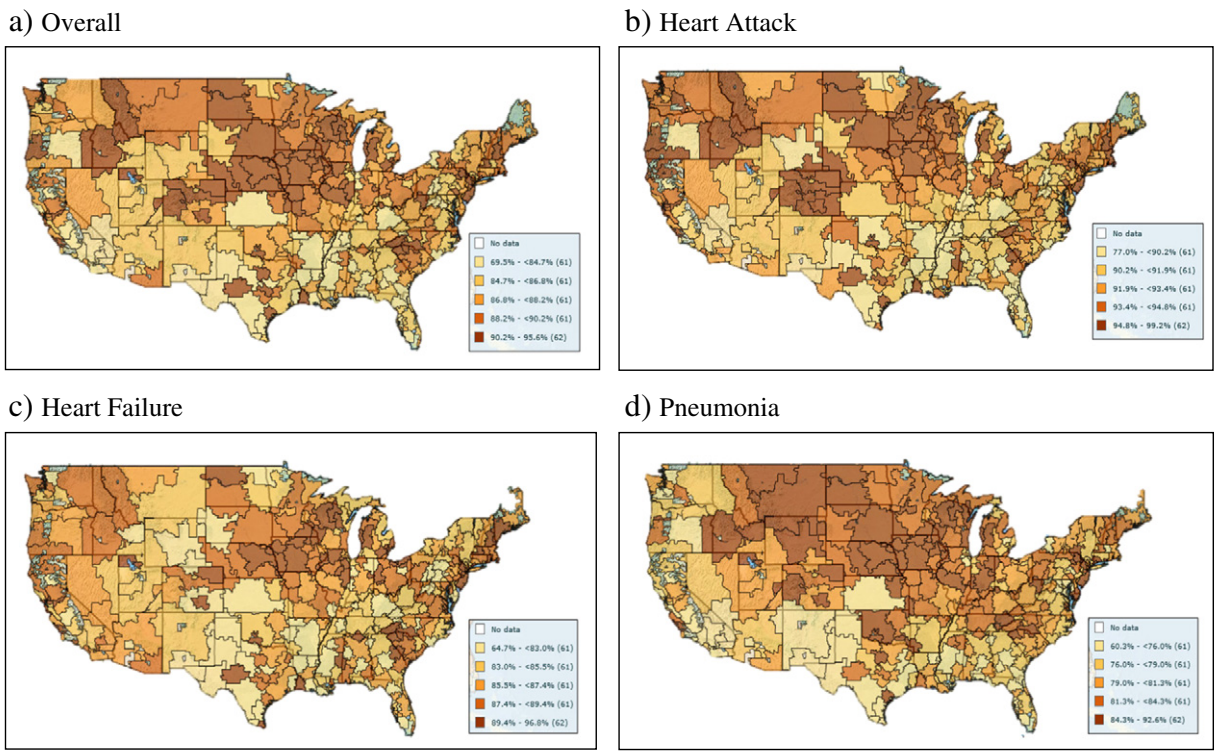
http://dx.doi.org/10.1016/j.regsciurbeco.2014.01.005



Source: The Dartmouth Atlas of Health Care (The Dartmouth Institute for Health Policy and Clinical Practice).

Fig. 1. Geographic distribution of the summary hospital compare quality score in hospital referral regions.

Knowledge spillovers may also contribute to externalities of health care. "A large medical literature has documented the important role of social networks in physician adoption of new technologies, suggesting that knowledge externalities are the source of the productivity spillovers." See Chandra and Staiger (2007, p.133). Physicians may learn from each other and possibly transfer to another hospital, especially when a new technology or equipment is introduced. Agglomeration economies also suggest that firms (hospitals) have stronger technology spillovers or faster learning process of a new innovation in a high firm density area (Breschi and Lissoni, 2001; Cohen and Paul, 2008; Baicker and Chandra, 2010). Hence, it is important to take into account the possible spillovers from one hospital to its neighboring hospitals.

These spillovers create a spatial correlation of quality, which is presented in Fig. 1. The maps present the geographic distribution of the summary Hospital Compare quality scores by hospital referral region[4] (HRR) in the United States in 2005 (The Dartmouth Atlas of Health Care, 2013). The scores indicate the average percentages of heart attack, heart failure, and pneumonia clinical processes that are given to patients in the HRR. Fig. 1a shows the spatial patterns of the overall score. The treatment rates are above 90% in many HRRs in the middle and north eastern United States. One may argue that these HRRs are wealthier urban areas. Therefore, their overall medical quality is higher than the national average. The geographic clusters suggest heterogeneity of health care across the country. However, we also find geographic clusters of high treatment rates in some less wealthy HRRs, such as those in North Carolina. This confirms the results by Skinner (2012) that demographic variables cannot fully explain the geographic variations in health care. The clusters may also indicate that the medical quality of one HRR is correlated with that of its neighboring HRRs. Focusing on the treatment rates by illness condition, we find the geographic patterns of heart attack and heart failure treatments in Fig. 1b and c to be similar to that of the overall treatments. The geographic pattern of pneumonia treatments in Fig. 1d is slightly different from heart disease treatments, but a spatial correlation persists.

When examining the interaction among hospitals, most studies utilize the Herfindahl–Hirschman Index (HHI) or similar market share variables as measures of competition level or market structure. While these indices are good measures of the aggregate competition level of the market, they do not take distances between hospitals into consideration. A market with three hospitals close to each other is considered to have the same competition as one with three hospitals spread out.

In this paper, we utilize a spatial Durbin model of hospital treatment rates. This spatial model is able to identify the intensity of geographic correlations. Other studies using spatial analysis in health care include Mobley et al. (2006) who studied elderly access to primary care services. They use the spatial lag model, which includes the spatial lagged dependent variable to model spillovers. They find a strong and positive spatial correlation for hospital treatments. However, they do not consider hospital ownership as an aspect of quality disparity.

In addition to spillover effects, the spatial Durbin model allows us to examine whether the market structure affects the treatment rates. The market of medical services is composed of hospitals with different characteristics, such as ownership and size. As suggested by Horwitz and Nichols (2009), hospitals have different treatment decisions based on the market structure they are facing. We cannot assume the spillover effects are the same for all types of markets. Operational strategies of hospitals may not only differ by the type of ownership but may also respond to the type of ownership of neighbors.

We use clinical process treatment rates from Hospital Compare as our dependent variable. Compared to other measures, like the mortality rate or the length of hospital stays, the process treatment rates are less noisy and reflect real hospital medical services. Our study finds strong and positive spillover effects among hospitals for heart attack patients. The spillover effects are even stronger for less acute illness conditions like heart failure and pneumonia. We find some evidence that not-for-

[4] Dartmouth Atlas defines the hospital referral regions by the regional market of health care. Patients are able to transfer or be referred to another hospital for major cardiovascular surgical procedures and for neurosurgery in the same HRR. One HRR can cross different counties and states.

Please cite this article as: Baltagi, B.H., Yen, Y.-F., Hospital treatment rates and spillover effects: Does ownership matter?, Reg. Sci. Urban Econ. (2014), http://dx.doi.org/10.1016/j.regsciurbeco.2014.01.005