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# Competition, information, and quality: Evidence from nursing homes

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ABSTRACT

Economic theory suggests that competition and information can both be important for product quality, and yet evidence on how they may interact to affect quality is sparse. This paper estimates the impact of competition between nursing homes on their quality, and how this impact varies when consumers have better access to information. The effect of competition is identified using exogenous variation in the geographical proximity of nursing homes to their potential consumers. The change in information transparency is captured by the launch of the Five-Star Quality Rating System in 2009, which improved access to the quality information of nursing homes. We find that while the effect of competition on nursing home quality is generally rather limited, this effect becomes significantly stronger with increased information transparency. The results suggest that regulations on public quality reporting and on market structure are policy complements, and should be considered jointly to best improve quality.



## 1. Introduction

To promote the quality of products and services, policy makers often rely on regulations to enhance competition. Basic microeconomic theory suggests that competition unambiguously leads to better quality when price is administratively set above marginal cost (Dranove and Satterthwaite, 1992; Gaynor and Town, 2011; Gravelle and Sivey, 2010).[1] When price is fixed, firms compete on quality to attract consumers. Additional competitors increase the elasticity of market shares with respect to quality, thus providing more incentives for investment in quality. Despite the clear prediction from economic theory, the empirical evidence is mixed in the literature of fixed-price health care markets. For example, by examining nursing home residents or Medicare patients with heart diseases, some studies establish a positive relationship between competition and quality (Castle et al., 2007; Cooper et al., 2011; Kessler and McClellan, 2000), whereas others draw the opposite conclusion (Bloom et al., 2010; Forder and Allan, 2014; Gowrisankaran and Town, 2003; Grabowski, 2004).

The effectiveness of competition in promoting quality can be limited by the lack of understandable information on provider quality. Transparent information is essential for raising consumers' sensitivity toward quality and providing firms with incentives to select higher quality in competition. Though promising, this interaction between competition and information to improve quality has not been systematically tested. In this paper, we estimate the effect of competition on nursing home quality, and explore how the effect varies when consumers have better access to quality information.[2]

The first challenge in studying how competition and information may interact to affect quality is to establish the causality between competition and quality. A major concern is the endogeneity arising from the simultaneity between competition and quality: when the market structure drives the choice of quality, the latter shapes the distribution of demand and thus affects the former as well. To address the endogeneity problem, we use an Instrumental Variable (IV) derived from the estimation of a partial demand function which is dependent on travel distances between nursing homes and their potential consumers. Travel distance is valid because it has an impact on individuals' choice of the provider and thus the market competitiveness, but depends neither on unobserved characteristics of patients nor on unobserved determinants of facility quality (Kessler

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[1] When price is not fixed, the relationship between competition and quality is ambiguous. See Gaynor and Town (2011) for detailed discussions.

[2] Note that throughout the paper, we use facility, nursing home, firm, and health care provider interchangeably to represent a nursing home.

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and McClellan, 2000; Mehta, 2007). The idea of this IV strategy is to identify the effect of market competitiveness using exogenous variation in nursing homes' geographical proximity to their potential consumers. In addition to the IV approach, We employ panel estimation with facility fixed effects to control for time-invariant unobservable factors that may affect both the nursing home performance and the market structure.

To study the role of information transparency, we exploit a recent change in quality reporting in nursing homes. Before 2009, the quality of a nursing home was known to the public as 18 distinctive clinical measures that were difficult to interpret. In 2009, Centers for Medicare and Medicaid Services (CMS) launched the Five-Star Quality Rating System to provide easy-to-understand quality information. The new rating system added overall star ratings to the existing multi-dimensional clinical measures, which reduced consumers' learning costs and encouraged the use of CMS's quality reporting.[3] The consistent availability of the clinical measures allows us to estimate the effects of competition on quality both before and after 2009. The pre-post difference in the effects is the primary interest and captures the interaction effect of competition and information on quality.

Analysis of this paper uses panel data from 2006 to 2010, spanning the introduction of the Five-Star Rating System. The data are pulled together from three main sources: Nursing Home Compare (NHC); the Health Care Information System (HCIS); and the American Community Survey (ACS). The NHC provides nursing home quality (both the clinical measures and the star ratings) and a rich set of nursing home characteristics at the facility level. The HCIS data include information on annual patient flows of nursing homes. From the ACS, we derive demographic and socioeconomics characteristics of potential consumers.

We find that while the effect of competition on nursing home quality is generally rather limited, this effect becomes significantly stronger as consumers have better access to quality information. One possible mechanism is that the new rating system simplifies the format of quality information, raises consumers' sensitivity to quality, and thus fosters effective quality competition. This mechanism has been supported by the following evidence. First, the positive interaction effects disappear once the outcome variables are replaced with the non-simplified quality measures,[4] suggesting an important role played by the information simplification. Second, demand shifts toward the high-quality nursing homes after the release of star ratings, which suggests that consumers are actually aware of the new rating system and are taking advantage of it. We subject the analysis to extensive robustness tests over different covariates and on various subsamples. All results support the hypothesis that the improvement in information delivery is driving a more positive effect of competition on quality.

This paper relates to three strands of literature. The first is the rich literature that has investigated the impacts of quality reporting on quality and patient choice (Bundorf et al., 2009; Cutler et al., 2004; Dafny and Dranove, 2008; Dranove et al., 1992, 2002; Grabowski and Town, 2011; Jin and Leslie, 2003; Mukamel et al., 2008; Werner et al., 2009, 2012). Results in this paper echo the recent finding that consumers respond to quality report cards. Werner et al. (2012) examine how consumers respond to publicly reported quality information of nursing homes in 2002 and find a positive yet minimal consumer response to information. One unique contribution of this article is a more rigorous design of identification, which allows us to provide direct and solid evidence that public reporting improves quality through inducing informed choices and rewarding high-quality services. Our findings also emphasize that the understandability of the information is important in quality reporting. This confirms the conjecture that confusing information leads to ineffective public reporting of quality (Marshall et al., 2000), and helps to explain why only minimal consumer response is found in the public reporting of the multi-dimensional nursing home quality in 2002 (Grabowski and Town, 2011; Werner et al., 2012).

Second, this paper adds to the literature on the relationship between market concentration and quality in the health care markets. Previous research has studied how the relationship is influenced by other factors such as managed care penetration (Kessler and McClellan, 2000) and patient valuation (Kessler and Geppert, 2005). We bring attention to information transparency. Knowing that information disclosure and competition are policy complements is important, because it suggests that these two widely-used tools should be considered jointly to promote quality efficiently. Grabowski and Town (2011) also looked at the interactions among information, competition, and quality in nursing homes. We differ from them by using more recent data. In addition, our focus and main identification strategy are different. They focus on the effect of information disclosure on quality and identify the effect by the rollout of nursing home report cards across states, whereas we identify the main effect of competition on quality by the geographic proximity of nursing homes to their potential consumers.

Lastly, this study pertains to demand estimation in the nursing home industry. To our best knowledge, Mehta (2007) is the only work that explicitly estimates how nursing home demand is determined by travel distance and other characteristics. While she restricts her study sample to private pay patients in Wisconsin in 2002 alone, we offer an extension by targeting the majority of nursing home residents, the Medicaid/Medicare beneficiaries nationwide for a longer period of time. The scope of our data enables us to test whether consumer preference differs based on regulatory environment, i.e., the difference across states in Medicaid regulations or the change over time in information regimes.

The paper proceeds as follows. Section 2 provides the background information of the nursing home industry and the reform in information disclosure. Section 3 describes the data and the construction of key variables. Section 4 proposes the estimation methodology. Section 5 presents the results. Section 6 shows the extensions, and Section 7 discusses the limitations and the future work.

## 2. Background

### 2.1. The nursing home industry

Nursing homes remain the largest and the most expensive component of long-term care in the United States, despite the rapid growth in other long-term care services (Kaye et al., 2010). More than 16,000 nursing homes are providing services to over 1.5 million residents, with an annual expenditure of over $100 billion (Jones et al., 2009). The services include skilled nursing and rehabilitation that involve a high level of medical care and have a wide impact on populations especially the adults aged 65 years and older. The health, function, and quality life of senior citizens are important and are listed as one of the major objectives of Healthy People 2020.[5]

The industry is characterized by strict price regulations. Nursing homes receive the majority of their revenues from Medicaid and Medicare enrollees, whose coverage and payment are administrated at the federal or state levels. Medicaid pays for nursing

[3] Design for Nursing Home Compare Five-Star Quality Rating System: Technical Users' Guide by CMS, February 2015.

[4] Only a subset of the clinical quality measures is selected to form star ratings. The unselected ones are defined as non-simplified quality measures.

[5] http://www.healthypeople.gov/2020/topics-objectives.