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## The U.S. Medicare Disproportionate Share Hospital program and capacity planning

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## ABSTRACT

U.S. Medicare's Disproportionate Share Hospital (DSH) program provides financial assistance to hospitals that serve low-income populations. Statutory formulas determine the DSH payments made to hospitals; however, the formulas applied to “large” urban hospitals (at least 100 beds) are more generous than those used for “small” urban hospitals (less than 100 beds). The purpose of this study is to determine if the DSH program's 100-bed threshold influences bed capacity planning. We find that the threshold drives a significant discontinuity in the distribution of urban hospital bed capacities, with hospitals tending to maintain just enough beds to qualify for higher DSH payments. The magnitude of the discontinuity is greatest in hospitals with strong incentives to manage bed capacity; and, compared to government and not-for-profit hospitals, for-profit hospitals are more likely to manage capacity to meet the 100-bed threshold. Our findings highlight the potential for regulatory institutions to have unintended influence on capacity planning decisions.

## 1. Introduction

U.S. Medicare reimburses hospitals for inpatient services using a prospective payment system. In contrast to the cost-based reimbursement system used prior to 1983, the prospective payment system allows hospitals to make profits (incur losses) when the cost of treating Medicare patients is less than (more than) the fixed fees paid by the program. The primary goal of the system is to motivate hospitals to control costs and make capital investment decisions just as they would in a price-competitive market (Lynch, 2003). However, Medicare regulations often employ bed-capacity thresholds to categorize hospitals for payment purposes. In the current study, we examine whether a specific regulation containing bed-capacity thresholds unintentionally encourages hospitals to make capital investment decisions that are contrary to Medicare's underlying goal. Specifically, we examine hospital capacity planning decisions made under Medicare's Disproportionate Share Hospital (DSH) program, which uses a 100-bed threshold to classify urban hospitals as “large” or “small” for payment purposes.<sup>1</sup>

DSH program payment formulas favor “large” hospitals over “small” hospitals and create an implicit financial incentive for urban hospitals to maintain at least 100 beds. In our sample, gaining a “large” hospital classification has a typical/median annual revenue impact of about \$900,000, which frequently increases hospital profits despite significant costs of maintaining additional beds.

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<sup>1</sup> It is important to note that this paper investigates the Medicare DSH program and not the Medicaid DSH program. Both programs aim to provide funding for hospitals that provide care to low-income patients; however, Medicare DSH qualification is determined at the federal level, while Medicaid DSH qualification criteria differ by state.

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Accordingly, we predict that DSH program incentives influence hospitals to manage bed capacities to at least 100 beds. We find empirical support for this expectation using public data available from the Centers for Medicare and Medicaid website (cms.gov), including Medicare Cost Reports and Medicare-compiled hospital descriptive statistics. Specifically, hospitals with bed capacities just above 100 are over-represented in the distribution of urban hospital bed capacities. Additionally, we estimate the incentive structure faced by hospitals under DSH program regulations and find that hospitals with high financial incentives to meet the threshold are driving the discontinuity in the distribution. Finally, we find that the 100-bed threshold is more salient in for-profit hospitals than it is in not-for-profit and government hospitals, with for-profit hospitals being more likely than not-for-profit and government hospitals to manage bed capacities to meet the 100-bed threshold. This is consistent with the idea that the threshold creates an opportunity for hospitals to increase profits, but that the value of increased profits varies depending on hospitals' objectives and institutional environments (e.g., Leone and Van Horn, 2005).

Most broadly, this paper contributes to the literature examining real activities management. As noted in Soderstrom and Chen's (2016) recent commentary, a growing stream of real activities management literature provides important insights using a more micro-level analysis of specific activities used to manipulate earnings and other targets (e.g., Balakrishnan et al., 2007; Cohen et al., 2010; Eldenburg et al., 2011; Brown et al., 2015). Our findings identify a specific type of real activities management that is driven by regulatory incentives and depends on the hospital's institutional setting. Thus, the paper highlights the interplay between earnings management through real activities and regulatory institutions.

Our study also extends the literature on the capacity planning problem, which involves balancing the expected cost of excess capacity with the cost of insufficient capacity. This tradeoff has been analytically modeled under various assumptions regarding the degree to which capacity resources support multiple services, the flexibility available with regard to pricing and capacity augmentation, and the certainty with which demand can be estimated (Banker and Hansen, 2002; Banker et al., 2002; Göx, 2002). However, analytic models employ restrictive assumptions and often ignore industry-specific environmental factors that can influence capacity-related decisions. Therefore, empirical studies (e.g., Bai et al., 2014) on capacity planning can provide rich complements to generalized analytic models. By examining the effect of the Disproportionate Share Hospital Program's incentives on hospital bed capacities, our empirical analysis highlights the influential and potentially unintended effect that regulatory institutions can have on capacity planning.

More specifically, this study contributes to the literature that documents the influence of regulations on hospital behavior. Medicare's change from cost-based to fixed-fee payment models has received considerable attention in the literature, with researchers documenting a variety of hospital responses to the change, including reductions in capital expenditures and shifts to more variable cost structures (Barniv et al., 2000; Lynch, 2003; Kallapur and Eldenburg, 2005; Holzhacker et al., 2015). However, the current study is the first to examine the effect of bed-capacity thresholds embedded in Medicare reimbursement contracts. Our findings suggest that bed-capacity regulations can influence capacity-related decisions contrary to Medicare's goal of establishing "the same kind of economic relationship for capital investment decisions as generally exist in a price competitive marketplace" (Federal Register, 1991, p. 43363-43364; Lynch, 2003).

Finally, consistent with this special issue, our paper provides public policy insights and contributes to the diverse stream of literature examining interactions between accounting and regulatory institutions (e.g., Westfall and Omer, 2017, this issue). Given that tax-funded health expenditures make up two-thirds of health spending (Himmelstein and Woolhandler, 2016) and the public bears both the social and financial consequences of hospital capacity planning decisions, our results should be useful to policy makers who may be unaware of the impact that bed-capacity thresholds have on capacity planning decisions. Policy makers may also find the reported regression results interesting because they suggest that, in some settings, state-level Certificate of Need programs, which are specifically designed to influence hospital capacity decisions, are *less influential* in directing capacity decisions than the seemingly unrelated and relatively obscure bed-capacity thresholds embedded in DSH regulations.

The remainder of the paper is organized as follows. Section 2 reviews the regulatory background, related academic research, and develops the hypotheses. Section 3 describes the sample selection. Section 4 presents analysis and results, and Section 5 presents sensitivity tests and additional analysis. Section 6 concludes the paper with a discussion of our results.

## 2. Background and hypotheses

### 2.1. Regulatory background

Medicare reimburses hospitals for inpatient services using the Inpatient Prospective Payment System ("the prospective payment system"). Medicare payments made to hospitals are determined with the underlying goal of promoting efficiency by covering only the operating and capital costs that efficiently run hospitals should expect to incur for treating Medicare patients (OIG, 2001). However, a purely fixed-fee payment scheme also leaves some hospitals at a systematic disadvantage. For example, urban hospitals, which operate in more competitive labor markets, tend to have higher labor costs per Medicare patient. Higher costs are also linked to hospitals that provide care to large proportions of low-income patients.<sup>2</sup> Under the prospective payment system, Medicare provides adjusting payments, or "add-ons," to compensate hospitals that face these challenges. The payment adjustment for serving high

<sup>2</sup> Low-income patients are more likely to require costly treatment patterns when they arrive at the hospital because they generally wait longer to seek treatment. Low-income patients also experience longer stays at hospitals due to the lack of adequate alternatives for discharge locations (Thorpe, 1988).

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