MEASURING ECONOMIC PERFORMANCE OF COLORADO COMMUNITY HOSPITALS USING THE MALMQUIST PRODUCTIVITY CHANGE INDEX*

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This study measures the productivity of 64 Colorado community hospitals by applying the DEA-based Malmquist productivity change index, decomposed into the technical efficiency change index and technical progressive change index. This study finds that the productivity of community hospitals in Colorado increased over the period 1993–2003, mainly as a result of technical progressive changes rather than technical efficiency improvement. The results suggest that to increase productivity, large community hospitals, rural hospitals, and nonprofit and public hospitals need to downsize their facilities, change their cost structure and facility operations, or adopt new management practices.

Key Words: performance measurement, DEA-Malmquist, community hospital

INTRODUCTION

In recent years, the healthcare industry, especially the hospital market, has been in a state of flux. Increasing competition among healthcare providers and the spread of
managed care have caused a striking reduction in healthcare services. Between 1985 and 2005, while the population was not only growing but also aging, the number of community hospitals in the United States fell by 13.9% and the number of total beds by 19.9%. In addition, the utilization capacity of community hospitals also declined. Average daily census1 fell from 649,000 in 1985 to 540,000 in 2005, a decline of 16.8%. The length of stay (LOS) shrank from 7.1 days in 1985 to 5.6 days in 2005, a decline of 21.1% (AHA 2007). These numbers indicate that the hospital market in the United States has suffered from increasing competition, declining utilization, a shortage of healthcare professionals, rising healthcare costs, and increasing barriers to accessing capital. Stakeholders in the hospital market—such as hospital governing boards, CEOs, creditors, health-care consultants, federal and state governments, politicians, and healthcare consumers (patients, insurance companies, and managed care organizations)—should take an interest in how hospitals’ economic performance indicates hospitals’ capacity.

The primary purpose of this paper is to investigate the economic performance of Colorado community hospitals that provided general and acute healthcare services from 1992 to 2003. Community hospitals hold a unique position in this turbulent era. Even though community hospitals are the hub of healthcare delivery in the U.S., competition has intensified among hospitals as well as between hospitals and physician-owned facilities. Advanced healthcare technology has enabled a large number of complex procedures to take place in an outpatient service setting. As a competitor of hospitals, physician groups have used these advanced healthcare technologies to enhance their capability in their medical practices as well as to increase their incomes. Therefore, healthcare stakeholders such as hospital administrators, creditors, healthcare consultants, and policy makers need to pay more attention to hospitals’ productivity in relation to their capacity to enhance their competitiveness and to find an alternative business model (Roh et al. 2010). Community hospitals in Colorado represent a wide variety of community hospital characteristics such as number of beds, location, and ownership. To analyze the productivity of these hospitals, this study employs Data Envelopment Analysis (DEA)-based Malmquist to estimate the productivity change index, which is a flexible, mathematical metric for the assessment of productivity.

This study comprises five parts: literature review, model specification (including the specification of factors accounting for hospitals’ economic performance), data and variables used, findings, and conclusions.

**LITERATURE REVIEW OF DEA-MALMQUIST.**

Table 1 summarizes the input and output variables used in each of the DEA-Malmquist studies that form the background of this research. Some studies (Sommersguter-Reichmann 2000; McCallion et al. 2000; Manoadakis et al. 1999;