



Fig. 1. Study framework.

- (2) Level of Competition (source: calculated value from combined database)

The Hirschman-Herfindahl Index (HHI), a frequently used measure of market concentration (the monopoly power) of a given industry (or region), can be used to measure the level of competition.^{41,a}

In this study, market areas were defined as metropolitan statistical areas (MSAs) for urban hospitals and the county for rural hospitals. A hospital's market share was defined as its percent of adjusted patient days for the market area.

- (3) Scope of High Technology Services (source: calculated value from AHA)

The definition of high technology services includes 7 specialized services monitored by the Prospective Payment Commission: CT scanner, MRI, cardiac catheterization lab, open heart surgery unit, organ transplant unit, megavoltage radiation therapy, and extracorporeal shock wave lithotripter (ESWL).⁴² The weighted index of high technology

services available (i.e., the scope of high technology services) was calculated based on the method developed by Kohn.⁴³ The number of services that a hospital offers each year will be the weighted sum of the 7 services. Since the impact of the acquisition of a high-tech service (e.g., MRI) in 1989 is different from that of its acquisition in 1990, the index will be weighted by the inverse of the proportion of hospitals nationally that have that technology in that year. This will provide a measure of how exclusive the technology is. The hospital's weighted scope of services was divided by the maximum possible score in a given year, to create the weighted index of high technology available, which is a value between 0 and 1. This index measures whether a hospital has a low or high proportion of high technology services.

- (4) Managed Care (HMO) Penetration (source: calculated value from ARF data)

The variable of HMO penetration was derived

^a The formula is $H = \sum S_i^2$, where S_i is the market share of the i^{th} firm. The term S_i here represents the market share of the i^{th} hospital. When a region is occupied by only 1 hospital (pure monopolist), the HHI attains its maximum value of 1.0. The value declines with increasing number of hospitals in a given region. Thus we may use the HHI as a measure of the degree of competition. The smaller the HHI, the higher the degree of competition.