Hospital Consolidation And Racial/Income Disparities In Health Insurance Coverage

Hospital consolidation has important consequences for health care access across racial, ethnic, and income groups.

by Robert J. Town, Douglas R. Wholey, Roger D. Feldman, and Lawton R. Burns

ABSTRACT: Non-Hispanic whites are significantly more likely to have health insurance coverage than most racial/ethnic minorities, and this differential grew during the 1990s. Similarly, wealthier Americans are more likely to have health insurance than the poor, and this difference also grew over the 1990s. This paper examines the role of provider competition in increasing these disparities in insurance coverage. Over the 1990s, the hospital industry consolidated; we analyze the impact of this consolidation on health insurance take-up for different racial/ethnic minorities and income groups. We found that the hospital consolidation wave increased health insurance disparities along racial and income dimensions. [*Health Affairs* 26, no. 4 (2007): 1170–1180; 10.1377/hlthaff.26.4.1170]

NON-HISPANIC WHITES IN THE UNITED STATES are much more likely than members of racial and ethnic minority groups to have health insurance.[1] These disparities in health insurance contribute to differences in access to health care.[2] Differences in socioeconomic status also are correlated with health insurance status; the poor are less likely than middle- and upper-class Americans to have health insurance. As we document in this paper, these health insurance disparities grew during the 1990s, and a sizable portion of this increase was caused by hospital consolidation.

This paper focuses on the role of hospital consolidation in increasing disparities in health insurance coverage from 1990 to 2003.[3] The link between hospital consolidation and health insurance primarily occurs through the cost of inpatient care. It is well documented that increases in hospital concentration raise the price of inpatient care.[4] These higher costs are potentially passed on to health insurance

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consumers in the form of higher premiums. Higher premiums, in turn, decrease health insurance coverage.[5] Insurance take-up among racial and ethnic minorities (controlling for income and other household characteristics) and lower-income households (controlling for race/ethnicity and other household characteristics) might be more sensitive to premium increases than is the case for whites and higher-income households.[6]

■ **Possible reasons for differences.** There are several possible reasons for these differences. Racial/ethnic minorities and lower-income households might be more likely than others to work for employers whose decisions to offer health insurance are more price-sensitive. Also, low-income people simply might not be able to afford health insurance. In addition, the tax subsidy for employer-sponsored health insurance is smaller the lower the income. Ethnic minorities might also be more sensitive to premium increases than whites because the gain in health care access from health insurance is smaller for nonwhites than for whites.

■ **Link to health care access.** If the insurance uptake decisions made by racial/ethnic minorities and lower-income households are more price-sensitive and if competition between providers (and health insurers) reduces the cost of health care, decreases in the vigor of provider competition might disproportionately affect those parties. The idea that the economically disadvantaged might have the most to gain from vigorous market competition has a long tradition in economics that dates back to the work of Alfred Marshall.[7]

Study Data And Methods

In previous work, we hypothesized that the impact of hospital mergers on health insurance premiums is a function of insurance-market competition.[8] We found that increases in hospital prices paid by insurers in less concentrated health insurance markets are passed along to consumers in the form of increased health insurance premiums and lower insurance uptake. However, in more concentrated health insurance markets, hospital mergers appear to shift profits from insurers to hospitals, leaving premiums and health insurance uptake unaffected.

This work follows a similar strategy. The unit of observation is an individual person in a year. We estimated the impact of hospital mergers on insurance take-up for different population subgroups, controlling for individual characteristics, observable time-varying metropolitan statistical area (MSA) characteristics, and unobservable time-invariant MSA characteristics. The dependent variable in the analysis is an indicator for whether the individual has any health insurance. Because the impact of hospital consolidation on health insurance premiums likely varies as a function of the competitiveness of the health maintenance organization (HMO) market structure, we divided MSAs into three roughly equal (population-weighted) categories based on the level of health insurance competition measured by the number of HMOs operating in 1995: 1–6, 7–9, and 10 or more. The insurance take-up models are estimated using linear probability models.[9]

■ **Measures of market concentration.** A wave of hospital consolidations occurred in the 1990s. Exhibit 1 shows the number of hospital mergers, acquisitions, and system expansions within MSAs and the Herfindahl-Hirschman Index (HHI) for MSAs with more than 100,000 in population. The HHI is a measure of market concentration that takes into account both the number and the size distribution of hospitals. It is calculated by summing the square of the hospitals' market shares. Theoretically, the HHI is between 0 and 10,000—the higher the value, the more concentrated the market. An HHI of 10,000 corresponds to monopoly.[10]

The HHI is an important piece of information that antitrust enforcement agencies use to determine whether or not they will oppose a proposed merger. In the U.S. Department of Justice (DOJ)/Federal Trade Commission (FTC) *Horizontal Merger Guidelines*, markets with an HHI over 1,800 are considered "highly concentrated," and mergers that increase the HHI by more than 100 points in highly concentrated markets are viewed as likely to create or increase market power.[11]

Between 1990 and 2003, the population-weighted average HHI increased from 1,623 to 2,323. This is a large increase, roughly equivalent to moving from six equal-size organizations to four equal-size organizations. If MSAs approximate hospital markets well, these figures suggest that over this time frame, many hospital markets became "highly concentrated" according to the DOJ/FTC criteria. Although there were significant increases in average HHI, approximately one-third of MSAs experienced little or no hospital consolidation activity over this period. We took advantage of these differences between MSAs with and without significant changes in consolidation to measure the effect of hospital consolidation on disparities in health insurance take-up.

EXHIBIT 1

Herfindahl-Hirschman Index (HHI) And The Number Of Hospital Consolidations Within Populous Metropolitan Statistical Areas (MSAs), 1990–2003
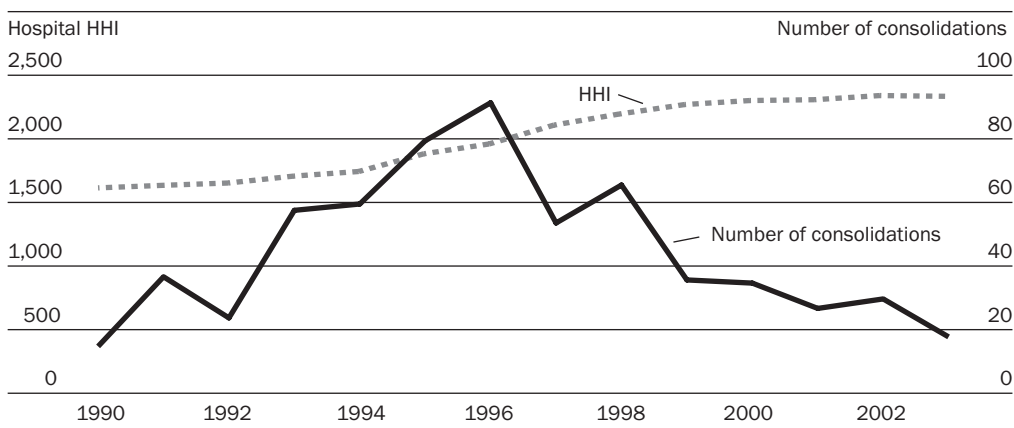
SOURCE: American Hospital Association data, and authors' calculations.
NOTES: Consolidations include horizontal mergers and acquisitions and system expansions; consolidations are denoted by the solid line and relate to the right-hand *y* axis. Hospital HHI is denoted by the dashed line and relates to the left-hand *y* axis.

■ **Data sources.** Our data come from three primary sources: the Current Population Survey (CPS) of households, the American Hospital Association (AHA) annual survey and AHA data on hospital mergers, and the InterStudy HMO census. These data are supplemented with information on MSA characteristics from the Census Bureau and the Area Resource File (ARF) from the Bureau of Health Professions, Health Resources and Services Administration.

CPS. We analyzed data from the 1990–2003 March Supplement of the CPS. We limited our analysis to civilians ages 22–62 because the inclusion of a younger population would introduce the possibility that Medicaid expansions might confound our estimates.[12] The CPS provides information on whether a person had health insurance from any source and from a nongovernment source, age, race, ethnicity, education, family size, household income, employment status, employer size, and occupation and industry of employment. We used a large set of demographic variables as controls in the analysis.[13]

In 2000, the Census Bureau implemented major changes in the CPS. The most important for our purposes was a change in the health insurance questions. Prior to 2000, the Census Bureau asked several yes/no questions about the types of health insurance coverage held by the respondent (a "residual" approach).[14] If respondents answered "no" to all of the questions, they were assumed not to have health insurance. In 2000, the survey was modified to verify whether respondents who answered "no" to all questions did, in fact, lack health insurance. Approximately 8.1 percent of the 2001 respondents who did not answer "yes" to the standard health insurance questions reported actually being insured when asked. We recoded the 2000–2003 data so that they are consistent with earlier surveys.[15]

AHA data. The AHA annual survey collects information on location, characteristics, and ownership of more than 95 percent of U.S. hospitals with 300 or more beds. We used annual AHA data from 1990 to 2003, from which we defined a sample of private, short-term, acute care, general medical or surgical hospitals. Psychiatric and rehabilitation hospitals are excluded. Of particular interest is the AHA's list of hospital mergers, which we used, along with the information on system change, to formulate our measures of ownership structure. The AHA tracks hospital system affiliation and records a consolidation between hospitals if one hospital joins the system in which the other hospital is a member. A consolidation can also occur if a hospital is deleted from the AHA data and is listed as having merged with another hospital.[16] The AHA data are used to construct measures of hospital concentration. Since the HHI can change for a number of reasons that are unrelated to consolidations (for example, changes in the distribution of market shares), we constructed the variable "Merger HHI" that measures only changes in HHI resulting from changes in ownership structure. This measure of hospital concentration uses the initial 1990 market shares (measured by staffed bed size) as the measure of market share for all years. Thus, changes in Merger HHI are driven only by changes in ownership structure. This was our primary independent variable.

We treated the relevant market for hospital services as the MSA because this is the smallest geographic unit in the CPS that we could merge with the hospital consolidation data. We used MSA codes to match person-level data to information on hospitals and Merger HHI from the AHA and InterStudy. All AHA and Inter-Study data were aggregated to the MSA level. The MSA is not the ideal geographic market definition for our analysis because MSAs' geopolitical boundaries are not necessarily related to hospital market boundaries. To address this, we limited our sample to MSAs between 100,000 and 4.5 million in 1990 population.[17] The lower size bound was chosen because smaller MSAs might be too narrow to define hospital markets. Practically speaking, we also found few CPS observations from MSAs with fewer than 100,000 people. An upper bound was selected because the MSA likely overstates the boundaries of hospital markets in large cities, potentially introducing major measurement error in Merger HHI.[18]

InterStudy. We specified the population of HMOs using data from the InterStudy census for 1985–1987 and 1988–2001 and the Group Health Association of America HMO Directories. InterStudy tracks the counties where the HMO operates; we used this information to calculate the number of HMOs operating in an MSA.

Other sources. We also merged county-level market measures from the ARF with state-level wage data from the Bureau of Labor Statistics.[19]

■ **Race/ethnicity and income categories.** We estimated the impact of Merger HHI on health insurance take-up separately for two race/ethnicity categories and three income categories. The two racial categories are (1) non-Hispanic whites and (2) Hispanics plus nonwhites (hereafter "white" and "nonwhite"). This grouping is very coarse and lumps several different racial and ethnic groups into one category. We explored the possibility of using finer category definitions; however, this resulted in some very small cell sizes for a given MSA/year/race category. Because we grouped several heterogeneous groups into one category, measurement error should bias our analysis against finding a consolidation impact on insurance status.

The three annual household income categories are $15,000–$45,000 (in 2000 dollars); $45,001–$75,000; and over $75,000. We excluded very low-income households from our analysis because they are much more likely to be enrolled in Medicaid or other public health insurance programs and therefore less likely to be affected by increases in private-sector health insurance premiums.[20] The income thresholds were chosen to divide the sample into roughly equal thirds.

■ **Summary statistics.** Several patterns in the summary statistics are noteworthy. The lowest-income and nonwhite categories had lower rates of health insurance enrollment, and their rates of insurance coverage declined greatly during our sample period, while the highest-income households and whites saw an increase in their insurance take-up (Exhibit 2). Interestingly, while initial hospital concentration differs across our categories, all groups saw similar increases in hospital consolidation. Nonwhites, on average, live in larger MSAs, which implies that average hospital concentration and HMO concentration are lower.

EXHIBIT 2
Summary Statistics: Analysis Of Insurance Status, Income, Race/Ethnicity, And Hospital Consolidation In The Study Metropolitan Statistical Areas, 1990–2003

Variable	Income category			Race/ethnicity category	
	$15,000–$45,000	$45,001–$75,000	>$75,000	White	Nonwhite
Percent with health insurance in 2003	71.1%	85.9%	90.5%	87.0%	69.7%
Percent with health insurance in 1990	75.6%	88.0%	91.3%	86.6%	72.5%
Merger HHI in 2003	2,169	2,171	1,930	2,201	1,872
Merger HHI in 1990	1,504	1,431	1,216	1,492	1,074
Number of HMOs in 1995	9.9	10.0	10.6	9.7	11.5
Age (mean, years)	38.1	39.3	41.8	40.4	37.9
Percent female	49.6%	46.1%	45.4%	46.7%	49.6%
Percent married	44.6	64.8	76.0	64.2	54.0
Percent unemployed	5.1	2.9	2.0	3.0	5.9
Percent high school graduate	65.2	64.0	46.8	58.2	57.0
Percent college graduate	13.4	20.4	31.6	24.4	15.1
MSA population	2,584,873	2,525,966	2,762,155	2,324,958	3,461,080
Number of observations	188,380	191,710	210,481	439,417	186,626

SOURCES: U.S. Bureau of the Census, Current Population Survey, various years; InterStudy; American Hospital Association data; and authors' calculations.
NOTES: The list of variables includes only a subset of the control variables. See Note 13 in text. HHI is Herfindahl-Hirschmann Index. HMO is health maintenance organization. MSA is metropolitan statistical area.

Study Results

We performed our analysis on MSAs with ten or more HMOs in 1995 because our previous study showed that hospital consolidation had an impact only in such MSAs. This also holds for our race/ethnic and income categories (Exhibit 3).

■ **Insurance take-up of whites versus nonwhites.** The parameter estimates comparing the impact of consolidation on whites and nonwhites show that hospital consolidation has disproportionately affected nonwhites. While hospital consolida-

EXHIBIT 3
Impact Of Hospital Consolidation On Health Insurance Take-Up By Race/Ethnicity And Household Income Categories In Metropolitan Statistical Areas (MSAs) With Ten Or More Health Maintenance Organizations In 1995

Variable	Race/ethnicity category		Income category		
	White	Nonwhite	$15,000–$45,000	$45,001–$75,000	>$75,000
Merger HHI	−0.092**	−0.35***	−0.23***	−0.11*	−0.089
	(2.33)	(2.75)	(2.60)	(1.85)	(1.58)
R^2	0.13	0.19	0.15	0.13	0.11
Number of observations	162,559	62,708	61,857	68,518	84,014
Number of MSAs	57	57	57	57	57

SOURCES: U.S. Bureau of the Census, Current Population Survey, various years; InterStudy; American Hospital Association data; and authors' calculations.
NOTES: Absolute value of t-statistics is in parentheses. HHI is Herfindahl-Hirschmann Index.
*$p < 0.10$ **$p < 0.05$ ***$p < 0.01$

tions in "competitive" HMO markets reduced health insurance take-up for both whites and nonwhites, the impact of a consolidation on health insurance take-up was about four times larger for nonwhites than for whites ($p < 0.05$).

■ **Insurance take-up, by household income.** Hospital consolidation has had a significant negative effect on health insurance take-up in lower and, perhaps, middle-income households (Exhibit 3). The coefficient estimate on Merger HHI was large and significant at the 5 percent level for people whose household incomes were $15,000–$45,000. The same coefficient was half as large for households in the $45,001–$75,000 category but significant only at the 10 percent level of confidence. The coefficient was insignificant at traditional levels of confidence for households in the upper-income category. Furthermore, the difference in the coefficients for the lowest and highest income categories was significant at the 10 percent level of confidence. In sum, the estimates suggest that hospital mergers have primarily affected health insurance take-up in the lower third of the income distribution.

■ **Impact on uninsurance rates.** We used the parameters shown in Exhibit 3 to estimate the impact of hospital consolidation on uninsurance rates for different segments of the U.S. population. We focused on people ages 22–62 in this analysis to reduce the influence of Medicaid and changes in the State Children's Health Insurance Program (SCHIP) on our results. We set Merger HHI to its 1990 value in each MSA and calculated the change in Merger HHI for each MSA in each year for each individual. Given the change in the Merger HHI, we calculated the change in the probability of health insurance take-up for each individual in our CPS sample.

Exhibit 4 graphs the realized uninsurance rate (with hospital consolidation) and the predicted uninsurance rate if there were no hospital consolidations for each year from 1990 to 2003 for the two race/ethnicity categories. The exhibit shows that hospital consolidation had a much larger impact on health insurance take-up for nonwhites than for whites. Also, the recession of the early 1990s ap-

EXHIBIT 4
Impact Of Hospital Consolidation On Uninsurance Rates, By Racial/Ethnic Group, 1990–2003
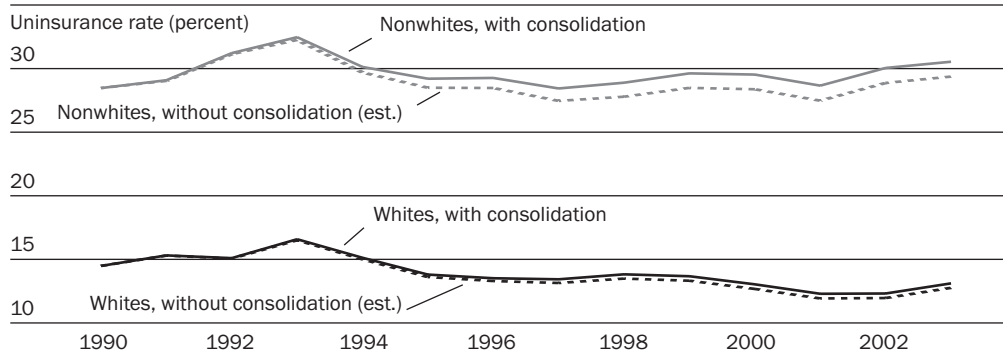
SOURCES: U.S. Bureau of the Census, Current Population Survey, various years; InterStudy; American Hospital Association data; and authors' calculations.

pears to have affected take-up for nonwhites more than for whites. Since the mid-1990s, there has been a steady downward trend in uninsurance rates for whites, while the trend for nonwhites has been flat with a recent uptick.

■ **Uninsurance rates for whites versus nonwhites.** During the period 1990–2003, whites experienced a decline of 1.4 percentage points in their uninsurance rate (Exhibit 5). If no consolidation had occurred during this period, the uninsurance rate for this group would have decreased 1.7 percentage points—a modest difference (standard error [SE], 0.13 percentage points). In contrast, nonwhites, who already began the decade of the 1990s with a much higher uninsured rate, saw their insurance rate decrease 2.0 percentage points over this time period. However, our estimates indicate that if no hospital consolidation had occurred, the decrease in the insurance rate would have been only 0.9 percentage points (SE, 0.32 percentage points). That is, more than half of the increase in the uninsurance rate for nonwhites is a consequence of hospital consolidation.

■ **Uninsurance rates, by income group.** For this analysis, we set the insignificant coefficient on Merger HHI to 0 for the highest income category. Poorer households experienced a greater increase in their rates of uninsurance than middle- and upper-income households (Exhibit 6).
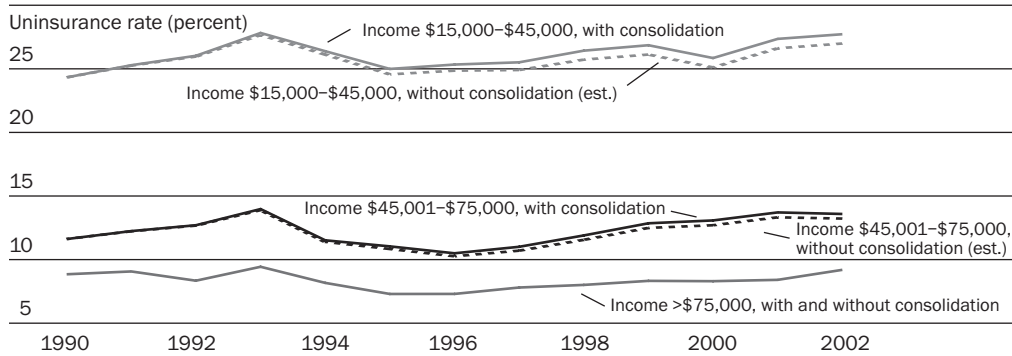
The rate of uninsurance for those with incomes between $15,000 and $45,000 increased five percentage points during 1990–2003, and approximately 0.8 percentage points (SE, 0.31 percentage points) of that increase can be accounted for by hospital consolidation (Exhibit 7). The uninsurance rate in our middle income group increased approximately 2.5 percentage points, and hospital consolidation accounted for 0.3 percentage points (SE, 0.11 percentage points). The wealthiest experienced a very small increase in uninsurance, and our estimates indicate that the increase was unrelated to hospital consolidation.

EXHIBIT 5
Impact Of Hospital Consolidation On The Change In Uninsurance Rates, By Racial And Ethnic Group, 1990–2003
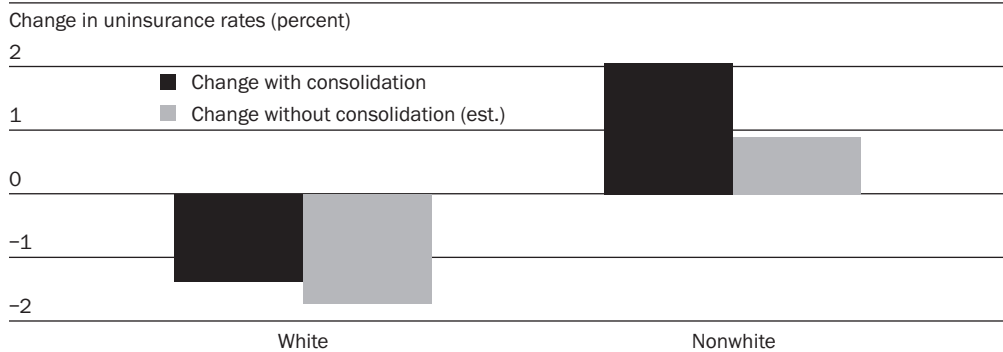
Change in uninsurance rates (percent)

■ Change with consolidation
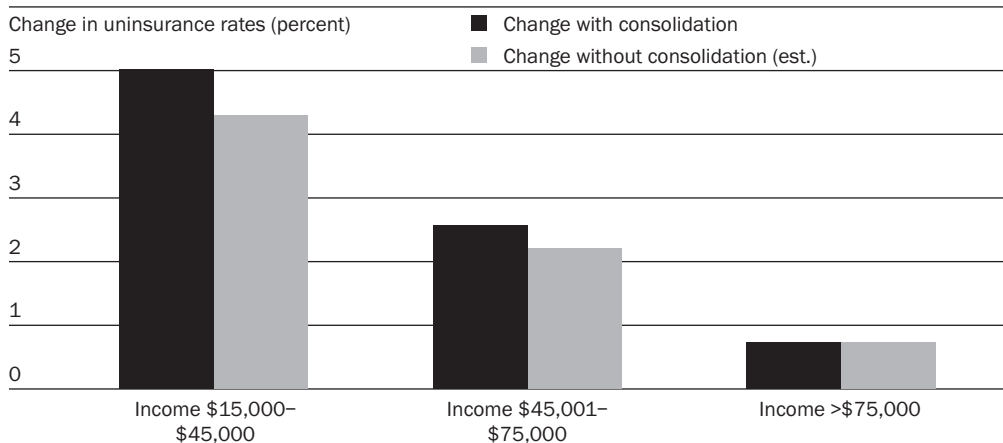▨ Change without consolidation (est.)

SOURCES: U.S. Bureau of the Census, Current Population Survey, various years; InterStudy; American Hospital Association data; and authors' calculations.

EXHIBIT 6
Impact Of Hospital Consolidation On Uninsurance Rates, By Income Group, 1990–2002

Uninsurance rate (percent)

- Income $15,000–$45,000, with consolidation
- Income $15,000–$45,000, without consolidation (est.)
- Income $45,001–$75,000, with consolidation
- Income $45,001–$75,000, without consolidation (est.)
- Income >$75,000, with and without consolidation

25
20
15
10
5

1990   1992   1994   1996   1998   2000   2002

SOURCES: U.S. Bureau of the Census, Current Population Survey, various years; InterStudy; American Hospital Association data; and authors' calculations.

Discussion And Conclusions

This paper is the first to examine the relationship between hospital consolidation and insurance take-up. The most closely related literature studies the relationship between market concentration, organizational form, and the provision of charity and uncompensated care. Hospitals rely on insured patients to cross-subsidize provision of indigent care. Changes in hospital market conditions that reduce profits might reduce the amount of charity care that hospitals are willing to render. The organizational form and ownership structure of the hospital and its competitors can also affect the impact of competition on charity care. The empiri-

EXHIBIT 7
Impact Of Hospital Consolidation On The Change In Uninsurance Rates, By Income Group, Between 1990 And 2003

Change in uninsurance rates (percent)

■ Change with consolidation
▨ Change without consolidation (est.)

5
4
3
2
1
0

Income $15,000–$45,000   Income $45,001–$75,000   Income >$75,000

SOURCES: U.S. Bureau of the Census, Current Population Survey, various years; InterStudy; American Hospital Association data; and authors' calculations.

cal evidence on the role of hospital competition on the provision of charity care is exactly split. Half of the studies find a positive relationship between charity care and hospital concentration, while the other half dissents.[21]

In contrast, a large literature shows that concentration in health care markets is related to prices, and our paper builds on that literature.[22] The evidence for the relationship (at least since the 1990s) is consistent: As competition (measured by lower market concentration) increases, prices decrease. The mechanism that links hospital competition to insurance disparities is the passing through of inpatient costs to premiums. If health insurance take-up among traditionally underserved populations is more price-sensitive, then provider competition that leads to lower premiums should reduce disparities.

There are two important messages from our work. First, hospital consolidation, through its impact on health insurance take-up, has important consequences for health care access across racial, ethnic, and income groups. This link has not been previously made in the literature and adds to the list of unfortunate consequences of hospital consolidation. This leads to our second related message. Antitrust policy in health care markets has a role to play in stopping (or at least reducing) the growth of disparities in health care access.

Although our analysis indicates that there are links between market competition and health care access disparities, we do not provide any direct evidence on the mechanisms through which market competition affects access. Furthermore, there is little existing research that can provide guidance in understanding these underlying mechanisms. We mentioned two obvious possibilities in our opening section, and they deserve reiteration. First, the health insurance take-up decisions among racial and ethnic minorities might be more sensitive to a given increase in health insurance premiums than is the case among whites. Second, the distribution of racial and ethnic minorities across occupations and industries is different from that of whites. If the decision to offer health insurance by employers that are more likely to employ racial and ethnic minorities is more sensitive to health insurance costs, then that mechanism might also account for our findings. Clearly, the mechanisms underlying our results are worthy of future research.

NOTES

1. See B.D. Smedley, A.Y. Stith, and A.R. Nelson, eds., *Unequal Treatment: Confronting Racial and Ethnic Disparities in Health Care* (Washington: National Academies Press, 2003); and A.C. Monheit and J.P. Vistnes, "Race/Ethnicity and Health Insurance Status: 1987 and 1996," *Medical Care Research and Review* 57, no. 1 Supp. (2000): 11–35.
2. See, for example, S.H. Zuvekas and G.S. Taliaferro, "Pathways to Access: Health Insurance, the Health Care Delivery System, and Racial/Ethnic Disparities, 1996–1999," *Health Affairs* 22, no. 2 (2003): 139–153; and Smedley et al., eds., *Unequal Treatment.*
3. Differences in union status, age, health status, and occupation all likely contribute to racial and income differences in coverage. See Monheit and Vistnes, "Race/Ethnicity and Health Insurance Status."

4. See M. Gaynor and W. Vogt, "Antitrust and Competition in Health Care Markets," in *Handbook of Health Economics*, ed. A.J. Culyer and J.P. Newhouse (Amsterdam: North Holland, 2000), 1405–1488; D. Dranove and M. Satterthwaite, "Industrial Organization of Health Care Markets," in *Handbook of Health Economics*, ed. Culyer and Newhouse, 1093–1140; and W.B. Vogt and R. Town, "How Has Hospital Consolidation Affected the Price and Quality of Hospital Care?" Research Synthesis Report no. 9, February 2006, http://www.rwjf.org/publications/synthesis/reports_and_briefs/issue9.html (accessed 3 May 2007).

5. M. Chernew, D.M. Cutler, and P.S. Keenan, "Increasing Health Insurance Costs and the Decline in Insurance Coverage," *Health Services Research* 40, no. 4 (2005): 1021–1039.

6. Although it is plausible and perhaps even likely that health insurance premium elasticities differ by ethnic group, we have not found any research specifically estimating these.

7. See A. Marshall, *Principles of Economics*, 8th ed. (London: Macmillan and Co., 1920). We thank Ted Frech for pointing out this observation to us.

8. R. Town et al., "The Welfare Consequences of Hospital Mergers," NBER Working Paper no. 12244 (Cambridge, Mass.: National Bureau of Economic Research, February 2006).

9. Standard errors were calculated using a bootstrap method with MSA-level clustering.

10. Empirically, the lower bound for the HHI is 10,000 divided by N, where N is the number of independent organizations operating in the market.

11. See U.S. Department of Justice and Federal Trade Commission, *Horizontal Merger Guidelines* (Washington: DOJ/FTC, 1997).

12. Of course, many adults in our sample might qualify for Medicaid coverage.

13. The control variables are logarithm of number of HMOs, age, household income, household income squared, household income cubed, family size, household income per family member, indicators for race, Hispanic status, employment status, union status, marital status, high school graduate, college graduate, post-baccalaureate education, veteran status, household income interacted with martial status, household income interacted with female, time trend interacted with bottom decile of income distribution, time trend interacted with second decile of income distribution, time trend interacted with full-time work status, time trend interacted with household income, employer size indicators, occupational indicators, industry indicators, MSA per capita income, MSA population, percentage in MSA with college degree, MSA hospital beds per capita, percentage in MSA over age sixty-four, MDs per capita in MSA, MSA unemployment rate, MSA hospital beds per capita, and annual dummies.

14. M. Davern et al., "Recent Changes to the Current Population Survey: Sample Expansion, Health Insurance Verification, and State Health Insurance Coverage Estimates," *Public Opinion Quarterly* 67, no. 4 (2003): 603–626.

15. This correction affects the magnitudes and precision of our estimates but not the qualitative conclusions. See http://www.shadac.umn.edu/img/assets/18528/CPSTimeSeries.pdf for an algorithm to implement this correction.

16. We used a "corrected" AHA system ID constructed by Kristin Madison that has been updated by researchers at Carnegie-Mellon University. We thank Madison, Marty Gaynor, and colleagues for providing these data. For more information, see K. Madison, "Multihospital System Membership and Patient Treatments, Expenditures, and Outcomes," *Health Services Research* 39, no. 4, Part 1 (2004): 749–769.

17. Our qualitative findings were robust to every different cut-off we tried (including no cut-off), which yielded a sufficient number of nonwhite observations.

18. Again, our results are robust to a number of different thresholds and the exclusion of any thresholds.

19. See R. Town, D. Wholey, and R. Feldman, "The Impact of Ownership Conversions on HMO Performance," *International Journal of Health Care Finance and Economics* 4, no. 4 (2004): 327–342.

20. Consistent with this assertion, our analysis suggests that health insurance take-up in the lowest part of the household income distribution is insensitive to changes in hospital competition.

21. See J. Gruber, "The Effect of Competitive Pressure on Charity: Hospital Responses to Price Shopping in California," *Journal of Health Economics* 13, no. 2 (1994): 183–212; J. Mann et al., "Uncompensated Care: Hospitals' Responses to Financial Pressures," *Health Affairs* 14, no. 1 (1995): 263–270; R. Frank and D. Salkever, "The Supply of Charity Services by Not-for-Profit Hospitals: Motives and Market Structures," *RAND Journal of Economics* 22, no. 3 (1991): 430–445; and C. Garmon, "Hospital Competition and Charity Care," FTC Working Paper no. 285 (Washington: FTC, 2006).

22. See discussion in papers cited in Note 4.