Competitive Behavior In The HMO Marketplace

HMOs do not appear to extract more profits from consumers in markets dominated by for-profit firms than in markets where their share is smaller.

by Mark V. Pauly, Alan L. Hillman, Myoung S. Kim, and Darryl R. Brown

ABSTRACT: Are health maintenance organizations (HMOs) less profitable in more competitive markets, and does competition erode unusually high profits over time? To answer these questions, we examined profit rates (as a proportion of revenues) in 1994 and 1997 for all HMOs in 259 metropolitan areas. We found that profits were significantly lower on average in 1994 in markets with more competition, measured alternatively by the number of HMOs or their market concentration. We also found that there was no relationship between a market’s relative profit ranking in 1994 and its ranking in 1997; highly profitable markets were not able to preserve their relative standing. Neither the proportion of HMO enrollees in for-profit HMOs nor HMO market penetration was significantly related to profit rates.

Private health insurance in the United States has undergone unprecedented change; the for-profit form has come to predominate, and the market has become more like other economic markets. Such change raises important questions: How competitive is this new “health insurance marketplace”? Will aberrations in competition correct themselves over time? Can largely for-profit health maintenance organizations (HMOs) earn and protect high profits through the use of market power? Should policymakers and regulators intervene or restrain themselves as the marketplace matures?

The rapid and continuing buyouts and consolidation of HMOs raise fears of a non-competitive health care market dominated by for-profit giants. Consolidation of HMOs (both nonprofit and for-profit) in local markets has not obviously benefited consumers in the form of lower premiums. Yet overall growth in managed care market share has been associated with lower growth in medical spending and insurance premiums.1 To what extent does competition affect the translation of cost savings into higher profits for insurers or lower total premiums?

Data And Methods

In this study we use nationwide HMO data covering 1994–1997 to examine the competitiveness of profit levels and market behavior among HMOs. Decisionmakers and patients alike need to know whether the new health care marketplace follows traditional marketplace rules over time, before they either suggest regulation or advocate competition. We chose this period for two reasons: First, before
then the managed care market was relatively small and geographically specialized. By about 1994, however, the “golden age” of U.S. managed care had begun, with discernible effects on use of care and nationwide cost growth in the following five years. Second, the period since about 1997 has seen providers make major changes to deal with the inroads of managed care. Hospitals consolidated to achieve bargaining strength relative to the multiple managed care plans in their areas.

We therefore concluded that 1994–1997, a period of mature markets with relatively little countervailing provider power, was the best empirical example of potentially competitive managed care markets. This research on market profitability complements earlier work by Douglas Wholey and colleagues, who found competitive effects on premiums (rather than profits) for an earlier period. In contrast to that research, we specifically analyzed profit rates and, importantly, treated the level of market competition as endogenous, as potentially affected by profit prospects.

By the end of 1999 more than eighty-three million persons were enrolled in HMOs, representing 30 percent of the U.S. population; 61 percent of all HMOs were for-profit plans. Moreover, between 1993 and 1998 the rate of increase in for-profit HMO enrollment was nearly three times that of not-for-profit HMOs (126 percent versus 45 percent).

The ideal way to evaluate the competitiveness of any market would be to compare its actual performance with the gold standard of perfectly competitive equilibrium. That standard would imply that (1) the average or expected rate of return on capital equals the expected (before-the-fact) risk-adjusted, economywide, competitive market rate of return, and (2) any deviations between the actual (after-the-fact) return to a given firm and the expected rate would be temporary and would disappear over time.

Note that in this benchmark case some firms and markets can end up earning above-average profit rates and others below-average rates if there are some temporary shocks to the system. The defining characteristic of a competitive market is that expected, average, or long-run profits are at the competitive level. This description also implies that there will be regression to the (competitive) mean in actual profit rates.

It is nearly impossible to implement the strongest test for competition—to test the proposition that expected profit rates are at the competitive level. We observe neither expected profits nor long-run equilibrium, we do not know what the competitive benchmark is, and imperfections in measurement of real capital stock lead to biased estimates.

For these reasons, we tested instead the second, “impersistence” or regression-to-the-mean, hypothesis, along with the hypothesis that profit rates should be closer to competitive levels where more sellers are competing. In this sense, we tested some necessary (but not sufficient) conditions for a market to be competitive. For example, if we were to find that high profits persisted in some markets over time, we would be able to conclude that those markets were not competitive. If we find that high profits eroded and low profits increased in almost all markets, that finding would certainly be consistent with the hypothesis that those markets were competitive. However, it also could be consistent with alternative hypotheses—for example, that those markets were monopolies and subject to random shocks. It is rarely the case that one can conclusively test a hypothesis against all possible alternatives; in this case, we can produce circumstantial but not conclusive evidence for the hypothesis of competition. But finding evidence consistent with competition is by no means a sure thing, and discovery of it increases the likelihood that the hypothesis of competition is valid.

We therefore focus on two primary questions: Will profit levels tend to be lower in more competitive markets than in less competitive ones; and will markets with relatively high initial profits achieve profits over time similar to those in markets with relatively low initial profits? That is, we want to know whether high profits for HMOs in some markets in one period persist over time, or whether
markets and plans tend to move toward similar average profits in subsequent periods.

Thus, our study addresses important gaps in the health care knowledge base; it undertakes market-level analyses that explain (and predict) the impact of market forces on the emerging for-profit-dominated managed care industry. Here we undertake the following: (1) We explain how HMOs (for-profit and nonprofit) behave in different markets; (2) we determine whether evidence is consistent with the hypothesis that markets are moving toward relative competitive stability (that is, equilibrium) or toward states in which firms retain market (monopoly) power; (3) we identify market characteristics strongly associated with high levels of entry by managed care plans, in general; and (4) we see whether behavior differs between markets dominated by for-profit HMOs and markets with larger nonprofit shares.

Data sources. We assembled data from InterStudy for all 262 U.S. metropolitan statistical areas (MSAs) that had operational HMOs in 1994 and 1997. InterStudy provides metropolitan-area HMO data in its Regional Market Analysis Database. Other explanatory variables taken from the Area Resource File for the years closest to 1994 control for demand or costs at the MSA level.

Regression analyses. To determine whether competition affects profit rates, we specified three sets of variables: a measure of profits, the dependent variable; a measure of competition, the primary explanatory variable of interest; and a list of control variables (or “influences”) other than competition that also might affect profits. We defined the profit variable as the ratio of 1994 MSA area-wide HMO profits to MSA area-wide HMO premium revenue: It measures the (weighted average) percentage by which HMOs in the MSA marked up their premiums over their benefits and administration costs. (We measured profits at the market level rather than at the level of the individual firm, because the competitive influences whose impact we wished to test occurred at the level of the market, and because economic theory predicts that average or expected profits will be constrained by competition but not necessarily the profitability of each individual firm.)

We explored the use of two alternative measures of competition: a simple measure—the number of HMOs operating in a market area—and a more complex measure, which takes into account the relative size of different firms as well as their numbers—the Herfindahl Index. This index is defined as the sum of the squares of each firm’s market share (defined in this case by share of enrollment), meaning that it takes on a value of unity if there is only one firm in a market and approaches zero if a market has a large number of firms, all with small market shares. Since state regulations compel consumers living in an MSA to buy from HMOs licensed to operate there, virtually no purchase occurs outside the relevant geographic market. In addition to controlling for demographic characteristics within the MSAs, we also included binary variables for the region. Since HMOs have historically dominated some regions, it seems appropriate to control for regional effects on profits.

Examining the relationship between the extent of competition and profit rates raises a potentially serious problem: The number of competitors is not likely to be independent of profit rates. Rather, the number of firms is determined in part by the attraction of high profits. Serious bias therefore could arise because unusually high profits, caused by some external influence such as strong demand, might be positively associated with the number of firms. Any negative influence of competition on profits might then disappear or even be reversed in sign. At a minimum, measurement of the profit-reducing effect of competition might be biased downward by such “reverse causation.”

To avoid such bias, we specified first the processes that determine the number of firms or the extent of concentration. While some of the same demand influences that determine the number of competitors also determine the level of profits per firm, other variables influence only the number of firms. The most plausible such “identifying” variable is the poten-
tial size of the market, as measured by the area’s population: Bigger cities will accommodate more HMOs and less concentration than smaller ones. We also used as identifying variables the per capita level of physicians and hospitals in 1980, a period well before the growth of HMOs. Other variables such as per capita income may influence both the number of HMOs and their profitability. These variables are included in the regression that predicts the extent of competition, but they are also included in the profitability analyses. We examined the relationship between competition and profitability using both actual competition, and predicted measures of competition purged of reverse causation.

Multistate insurers allocate their resources and costs to their operations in each state in their filings with state regulators. InterStudy uses these filings to estimate revenues, costs, and profits in each local market by prorating an HMO’s financial values in a state to local markets based on relative enrollment shares. The need to impute profits of statewide HMOs in this fashion probably results in some additional error in measurement in the dependent variable. However, as long as the error is random, and therefore independent of the explanatory variables, the estimated impacts of those variables will not be biased. Errors in measurement of the dependent variable will, however, affect the efficiency of estimation (although the sample is rather large) and therefore the estimates of statistical significance of estimated effects. Results therefore are biased toward more conservative (no effects) conclusions. Relationships that are found to be statistically significant will be robust, but one should be cautious in interpreting statistically insignificant relationships.

Study Results

The impact of competition on HMO profit rates estimated from these regressions is described in Exhibit 1. Both measures of competition are significantly ($p < .05$) related to profit rates in both specifications. Greater competition tends to be associated with lower profit rates. A larger number of HMOs is associated with lower profits. Higher levels of the HMO concentration index (which represents greater concentration among sellers) are associated with higher profit rates as well.

As might be expected, significance levels of the competition measures tend to be greater in the regressions using actual, rather than predicted, measures of competition. But the magnitudes of the impacts of concentration measures tend in the case of the Herfindahl measure to be somewhat higher using the predicted measures, suggesting some possible downward bias due to reverse causation.

The second line of Exhibit 1 quantifies the impact, using each of the specifications, of adding one additional HMO in a market with the average profit rate of 2.7 percent (of premiums); it shows the percentage reduction in that profit rate. The change in the concentration (Herfindahl) index from adding an additional firm depends on the size and market shares of the initial firms as well as the market share of the additional firm; the example assumes that there were initially two equal-size firms in the market (consistent with the sample average value of the concentration index) and the new firm garners a 10 percent share. The results indicate that the entry of one more firm in these conditions would reduce profits by 11.6–30.1 percent.

The regression finds significant regional differences in profit rates. The East (regions 1 and 2), the Deep South (region 5), and the West (regions 8 and 9) showed significantly higher profits compared with region 7 (the upper Midwest, where profits were lowest) and with other regions; the high-profit regions showed approximately similar differentials.

Some variables were noteworthy for not displaying a significant relationship to profit rates. (Recall, however, our earlier caution associated with dependent-variable measurement error.) The proportion of HMO enrollment in for-profit plans is not significantly related to the measured profit ratio (and the estimated coefficient is small). These results indicate that if the level of competition is the same, average profit rates are no higher in markets heavily dominated by for-profit firms.
than in those where the nonprofit share is larger. We also explored adding the overall market share of HMOs (in the private insurance market) as a variable to the regression; it was not statistically significant, although its addition does reduce the statistical significance of the competition variables. This almost surely results from correlation or collinearity (that is, when there are relatively many HMOs, the level of penetration also tends to be high). We also interacted this measure with the level of HMO concentration; little explanatory power was added. While profits were not measurably affected by a larger share of non-HMO competitors in the private insurance market, some of those plans (such as preferred provider organizations, or PPOs) might be more direct competitors with HMOs than others are. Unfortunately, no source furnishes market-level data on PPO enrollment for the full sample of cities for this time period.

Exhibit 2 shows the results of two “first-stage” regressions, strongly confirming a positive relationship between MSA size and competition. (It also shows the estimated impact of each variable on the measures of competition.) These regressions have good explanatory power as well. Markets with large populations, with more urban populations, and with lower proportions of the population below the federal poverty level tend to have sig-

<table>
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<tr>
<th>Competition measure as explanatory variable</th>
<th>Model 1 (actual values of competition measures entered in the regression model)</th>
<th>Model 2 (predicted values of competition measures entered in the regression model)</th>
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<tr>
<td>Predicted change in the profit rate caused by a one-unit change in a competition measure (regression coefficient)</td>
<td>-0.004*** 0.037***</td>
<td>-0.004* 0.096**</td>
</tr>
<tr>
<td>Predicted percent change in the profit rate caused by adding one more HMO with 10% market share to a market of two HMOs with equal market share</td>
<td>-14.8% -11.6%</td>
<td>-14.8% -30.1%</td>
</tr>
<tr>
<td>Explanatory power of the model (adjusted R²)</td>
<td>.11 .10</td>
<td>-.05 -.05</td>
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<td>Statistical significance of the model (p value of F statistic)</td>
<td>.0001 .0004</td>
<td>.0012 .0011</td>
</tr>
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**NOTES:** The number of metropolitan statistical areas (MSAs) included in these models is 262. Complete models include, in addition to one of the competition measures (that is, number of HMOs or HMO Herfindahl Index), Medicare, AAPCC, Pct for-profit HMOs, Pct_Urban, Income per capita, Pct_Poverty, Pct_No High School, Pct_College, and eight regional binary variables (New Eng, Mid Atl, S Atl, E N Cent, E S Cent, W N Cent, Mount, Pac, and W S Cent as the omitted group). Significance tests on regression coefficients were two-tailed tests. HMO is health maintenance organization.

* Not applicable.

** The F statistic for each of these models, which indicates whether the model as a whole significantly explains the variation in the dependent variable, was highly significant (p < .01).

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nificantly more HMOs (the effect of population size being by far the most important). Markets in which Medicare paid less per beneficiary and in which larger proportions of the population have a high school but not college education have more HMOs (but not a lower Herfindahl Index). There are more competitive HMOs in the Pacific region, probably for historical reasons.

We did explore including some regulatory and political variables but could not identify significant political or policy factors that encourage larger numbers of HMOs or lower levels of concentration. Even the dominance of larger employers in a market, which others have found to be significant, disappeared when we included regional variables.

**The Persistence Of Profits**

One of the reasons why HMO profits were above average in some MSAs in 1994 appears to be a lack of competition (as we measured it). However, there probably were some markets in which profits were high for other reasons. High profits sometimes exist in competitive markets when there is an unforeseen surge in demand or drop in cost. If producers cannot immediately expand volume, prices and profits may rise temporarily. But the hallmark of competition is that these aberrations do not last: Cutting of price to achieve market share eventually erodes them. A second key test of the extent of competition in HMO markets is, therefore, whether high profits tend to persist over time. In generally competitive markets, high profit rates regress to the mean; in markets with some monopoly, they need not do so. Persistence of profits in most high-profit markets would be inconsistent with the hypothesis of competition.

To explore whether profits generally tend to persist, we adapted the methods developed and implemented in the industrial organization literature by Dennis Mueller for investigation of the persistence of profits among firms and industries. Although this method is used elsewhere in economics, its application in medical economics is novel. We have data for only a relatively brief period of time, so we cannot estimate long-term trends to see
whether profits approach the economywide competitive level. Nevertheless, we can see whether profits tended to be stable (consistent with noncompetitive markets) or unstable (consistent with competitive markets) during this period.

To evaluate persistence, we first ordered the 259 market areas with HMOs in both years by their profit levels in 1994, identifying those at various decile ranks of the distribution of profits. Market behavior would be inconsistent with competition if firms in those markets with profits in the higher deciles in 1994 were generally able to protect those profits, at least in a relative sense, into 1997. In contrast, if a market located at the top of the distribution in 1994 were no more likely than any other market to be in the same part of the distribution in 1997, the hypothesis of market power would be rejected.

We tested the hypothesis that decile profit rankings in 1994 were related to those in 1997, and we soundly reject the hypothesis of persistent market power. (We undertook similar tests with quartile and quintile ranks, with similar results.) There is no statistically significant relationship between a market’s relative profit rank in 1994 and its rank in 1997. (The Pearson chi square test \(\chi^2 = 9.2326\), degrees of freedom = 9] was not statistically significant \(p = .416\).) More concretely, of the twenty-five markets that were in the top 10 percent in 1994, most fell from that rank, and 60 percent even ended up in the bottom 50 percent by 1997. Moreover, the proportion of markets that remained in the top two deciles was only 25 percent, very close to (and not statistically significantly different from) the 20 percent figure that would be expected based on chance alone.

An implication of this striking result is that in the midst of an overall profit decline between 1994 and 1997, profits declined much more for firms in MSAs in which profits were initially high than in those in which they were low. For MSAs in the top quartile of profits in 1994, the average profit rate fell from 9 percent to –3 percent, while for those in the bottom quartile, the average profit rate only fell from –4 percent to –5 percent. Results are even more dramatic (although with greater variance) for the top and bottom deciles. In the top decile profits fell from 11 percent to –3 percent, whereas in the bottom decile profits rose from –8 percent to –5 percent. The results of these univariate tests were confirmed by multivariate regressions.

**What Does Impersistence Mean?**

What might have caused these patterns of profit change? In economic theory, the erosion of unusually high profits in a market in a given year can occur in either of two ways: New firms may enter, or existing firms may expand output. If it is relatively easy for existing firms to expand output (low costs of output adjustment), and if cost levels do not increase as output expands (constant returns to scale) above some minimum size, much if not all of the effect of response (temporarily high profits in competitive markets) would be exhibited as growth in the size of existing firms. Low adjustment costs (especially for the dominant independent practice association, or IPA, and network-model plans) and constant returns to scale beyond a relatively small size appear to characterize HMOs.

Because there are at least two alternative ways of eroding profits, and because we have only a single period of time in our data, we are limited in our ability to explain the complete process behind this apparently competitive behavior. In the previous analysis we found instruments to predict the level of competition, but we have no variables for predicting exogenous changes in competition. Not surprisingly, therefore, the changes in profit rates in these data turn out to display no significant relationship to either the level or the rate of change in competition (or to nearly all of the other census-based explanatory variables, which, of course, do not change over this time period).

Since we do not know whether changes between 1994 and 1997 represent movement from one long-run equilibrium position to another or just a lagged adjustment to a strong but short-run demand surge, we cannot dis-
entangle the channels of change. A longer time series of data could help solve this puzzle.

**Concluding Comments**

In a period of substantial change, the HMO markets we studied displayed some of the key characteristics of competitive markets when competitive preconditions were present. In addition, they generally exhibited behavior consistent with competition. The HMOs in these data covered a minority of the privately insured in both 1994 and 1997, although the share was growing. Competition within the HMO market alone is significantly associated with lower HMO profits, a surprising result since there were and are alternative sources of insurance, both from non-HMO insurers and in the form of self-insurance. HMO competition did have a stronger effect on HMO profits the higher the overall HMO market share. Our results are consistent with the hypothesis that HMO health insurance is a distinctive and somewhat separate market from other health insurance, but “competitive,” nonetheless.

Why do HMO markets generally seem to become and remain competitive? First, the HMO enrollment at which administrative costs per enrollee are minimized appears to be small relative to the overall potential market in MSAs; there is little chance of natural monopoly for health insurers in many of them. Second, the presence of such close (according to some) substitutes as indemnity and PPO plans in every market puts competitive pressures on HMO prices and profits. Third, large employers are perfectly capable of making managed care-type arrangements directly with health care delivery systems if local HMOs try to raise profits by increasing prices, relative to the competitive level.

**Qualifications.** We show evidence that U.S. managed care markets behave in a competitive fashion. But we cannot prove that the outcome is either desirable (in the social sense) or efficient (in the economic sense). Our evidence is circumstantial, consistent with the pressure of competition but not absolutely ruling out profit rates at monopoly levels that nevertheless recede to the mean over time and vary inversely with the number of firms. The level of buyer information, the extent of competition in markets in which insurers buy medical services, and the absence of distortions from the tax system are all also relevant for efficiency but beyond the scope of our study.

Average HMO profits have rebounded somewhat since 1997 (although some large firms are still earning low returns), and there has been some consolidation in the industry. Our results suggest that these trends bear serious watching. While large employers’ ability to self-insure and to contract directly with

Strictly speaking, however, our findings on competition are comparative: We show that HMOs in more competitive markets mark up their premiums less than those in less competitive markets, but we cannot show that the markup is equal to the competitive level that the economywide rate of return on equity or assets “should” yield.**

**Implications for policy.** This study investigated both the impact of for-profit HMOs and that of competition among all HMOs. Our primary finding on for-profit ownership is a negative one: HMOs do not appear to extract more profits from consumers in markets in which for-profit firms are dominant than in markets in which their share is smaller. Our primary finding on competition is a positive one: Competition works to hold down average profits and to erode occasional surges in profits. These findings should ease fears among those whose paramount concern is that corporate-based managed care has diverted resources from the goal of patient and consumer welfare. We could not, however, evaluate the quality provided in for-profit plans or in markets dominated by such plans.

The apparent presence of competitive influences on profitability alone is not sufficient to prove that the outcome is either desirable (in the social sense) or efficient (in the economic sense). Our evidence is circumstantial, consistent with the pressure of competition but not absolutely ruling out profit rates at monopoly levels that nevertheless recede to the mean over time and vary inversely with the number of firms. The level of buyer information, the extent of competition in markets in which insurers buy medical services, and the absence of distortions from the tax system are all also relevant for efficiency but beyond the scope of our study.

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providers shields them from large HMO premium increases, small firms and individuals may be vulnerable.

The authors thank Julian Husbands, Danita Joell, Michael Furukawa, Jamie Lipford, and especially Christopher Gingerich for their administrative and research assistance throughout the study.

NOTES
2. It is possible that managed care could lower total premiums and yet increase insurers’ profits.
6. Some individual HMOs occasionally did not provide profit data, but their fraction of total enrollment was always very small.
7. The following variables are included in multivariate regressions to explain variations in profit rates across geographic market areas: HMO Herfindahl Index, and Number of HMOs (from InterStudy data); Population, Number of Physicians, and Number of Hospitals (from Area Resource Files); Pct_HMOs and Pct_Foreign HMOs (from InterStudy); Medicare AAPCC (adjusted average per capita cost) (from the Centers for Medicare and Medicaid Services, formerly HCFA); Pct_Urban, Income per capita, Pct_Poverty, Pct_No High School, Pct_College, and Pct_Uneomp (from Area Resource Files); and New Eng, Mid Atl, S Atl, E N Cent, E S Cent, W N Cent, W S Cent, Moun, and Pac (no specific source). For variable definitions and means, contact the author, <pauly@wharton.upenn.edu>.
9. Ibid.
11. To avoid possible problems associated with heteroskedasticity, we also estimated these regressions using “robust regressions” methods and obtained virtually identical results.
12. When the competition variables were replaced by the HMO penetration measure, the overall explanatory power of the regression fell; competition is a better predictor of profit rates than HMO penetration.
15. Mueller did apply his method to pharmaceutical firms and found noncompetitive levels of profit persistence there. Mueller, Profits in the Long Run.
17. As noted previously, we did find that the change in profits is inversely related to the 1994 level of profits, a finding confirmed in logit regressions. Although there was no statistically significant relationship between the 1994 level of change in profit rates and changes in either of the two measures of competition in multiple regressions that control for other factors, it does turn out that the changes in the average number and the average Herfindahl Index of HMOs were larger for cities in the most profitable 1994 quintile than in the least profitable quintile. The number of HMOs increased 88 percent in the most profitable quintile of markets versus an increase of 57 percent in the least profitable; the Herfindahl Index (of monopoly) fell by 36 percent in the most profitable area versus 24 percent in the least profitable area. The absolute changes displayed similar patterns. These differences in means do, however, hide substantial inconsistency in the pattern on a city-by-city level.
19. We suspect that part of the problem in specifying correct models of HMO return on investment is wide variation across plans, both within and between ownership categories, in how they measure capital or assets. Our own screening of the InterStudy data suggested substantial and implausible variation in measures of assets.