LOCATION AS A FACTOR IN THE MARKETING OF PHYSICIANS' SERVICES

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Abstract

Given the importance of a locational strategy for physicians, this article provides findings on the demographic and economic determinants of physician office location within the Chicago Metropolitan area from 1950 to 1975. An important finding is that measures of market potential and competition have lost importance over time to the growing influence of medical facilities in determining physician office location.

Introduction

Recently there has been considerable interest in the marketing of health care services. Most of these studies have focused on the delivery of health care services by hospitals and have involved extensively the preventive care educational concept. This interest in the marketing of health care has primarily been by hospital administrators, but it is also important that marketers contribute their expertise to the 163 billion-dollar health service market. In this light, it is important to note that physicians and not hospitals are the key factor in delivering health care services. Indeed the non-physician health care market is estimated to be only 22 percent. Furthermore, it is the physician who directs most of the major decisions within hospitals. For example, he/she recommends admission, orders diagnostic and therapeutic measures, and determines when the patient is fit to leave the hospital.

Given the importance of the physician in providing health care services, the strategy of place or location appears as one of the important marketing mixes for these services. Specifically, this paper investigates the significance and importance of the factors determining physician office location over time.

Marketing Strategies for Physicians' Services

In addition to providing a key role in the delivery of health care services, physicians have considerable market power over these services. For example, inadequate consumer information gives physicians the ability to induce demand for their services. This situation could lead to too much health care or unnecessary surgery in some locations and inadequate health care at other locations. *

Providing the appropriate place or location for health care services is perhaps the most important marketing strategy used by physicians. By selecting locations aimed at target populations, physicians can maximize their profits or market share. This strategy appears to be more important than a pricing and promotional strategy since the American Medical Association's code of ethics does not favor published price lists or advertising. However, there is some evidence that physicians select office locations that permit them to charge higher unpublished prices, and schedule more visits (Kehrer, 1979). Also, in locations having excess demand, physicians have been known to schedule shorter and more frequent visits to curtail the waiting time for appointments and in offices (Kehrer, 1979).

These findings suggest that physicians have a price and service strategy but we view it as secondary to a locational strategy. The latter strategy appears to be aimed at maximizing profits or some combination of profits and leisure. Given the importance of location, this article provides marketers with a macro-view of the locational determinants of physician location within a large metropolitan area. The six-county Chicago Metropolitan region is the area for investigation. Using multiple regression analysis, the aim is to find the determinants of physician office location for various time periods since 1950. Within the Chicago area, the specific unit of observation are 192 health care areas. These health care areas include 75 homogeneous socioeconomic areas within the city (group of census tracks) and similar grouping of cities and urban places in the suburbs. Health care areas were constructed to approximate local trading or service areas for physicians.** Data for this study pertain to physician office locations and come from the American Medical Directory for 1950, 1960, 1970, and 1975.*** From these data, it was possible to trace a physician's office location over time and space.

Before presenting the empirical tests, we will briefly describe the variables used in this analysis.

Factors Determining Physician Office Location

Many of the factors determining physician location are likely to be similar to those for retail store location. For example, population size and growth, buying power, type of customers, competitive structure, as well as locational preference are general factors that would apply to any retail firm but also appear to influence the location of physician services. The following independent variables will be used in this study:

1. Median family income of residents in health care areas.
2. Population size of health care areas.
3. Number of hospital beds in health care areas.

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* Quality of health care is a major public concern. The infamous 'Medicaid Mills' have received national media coverage in 1977. Also, the rate of surgery increased 33 percent or 3.5 times faster than population growth according to unpublished data from the National Center for Health Statistics, Department of Health Education and Welfare.

** Health care areas are estimates of a physician's service or trading area and therefore should contain nearly all of a physician's patients.

*** Data for this paper were compiled and given permission for use in this paper by Donald R. Dewey, Department of Geography, DePaul University.

4. Absolute change in percent of black population in health care areas.
5. Locational preference of physicians (0 = city areas and 1 = suburbs).
6. Number of office-based physicians in health care areas.

Income is used to measure the buying power for physician services. Physicians may also seek higher income locations in order to charge higher fees, seek greater leisure or obtain some combination of these objectives. Also, as the trends toward specialization continues, physicians should be even more attracted toward higher income areas since the population there generally has more physician visits than lower income areas.

Population size is a measure of market potential and possibly minimum threshold sizes for certain physician specializations. Population size is also used in our analysis as a control variable for the size of a health care area. This control function allows for an accurate influence by the other independent variables.

The hospital beds variable measures the role of medical facilities and the referral function of hospitals as a determinant of physician locations. As technology and time become more important to physicians, hospital beds are expected to increase in importance as a determinant of physician location.

Locational preferences for physicians are measured by a dummy variable which records a physician's preference for the city or for the suburbs. That is, it is expected that physicians will prefer the suburbs compared with the city because of the status of servicing and living with higher-income suburbanites.

The number of physicians in an area is used as a measure of competitive supply. It is hypothesized that physicians will avoid locations with a relatively large supply of doctors given the above measures of market potential.

The racial change variable measures the problems associated with running a business in a racially changing community. This variable is also expected to repel physicians from locations where racial change adversely affects property values.

The dependent variable in this analysis is the absolute change in the number of office-based physicians by health care areas. Although this is a cross-sectional study, the focus here is on a dynamic response of physicians to the independent variables, therefore the change in physician offices is used. Since response by age groups is also of interest, the following additional dependent variables will be used:

1. Absolute change in office locations, younger physicians, age less than 45.
2. Absolute change in office location, prime age physicians, age 45 to 64.
3. Absolute change in office location, older physicians, age over 65.

Empirical results for the above variables by age groups for the 1950-60, 1960-70, and 1970-75 time periods will be analyzed. The purpose of this investigation is to determine the stability of the determinants of physician location from a macro-view.

Regression Analysis for Physician Office Locations. 1950-60

As shown in Table 1 (Appendix), the above independent variables provide a reasonably good explanation of factors determining the location of physician offices during the 1950-1960 period. All the regression coefficients have the expected sign and are significant according to the t-ratios except for the dummy variable measuring locational preferences. The coefficient of determination, $R^2 = .74$, for the regression of all doctors age groups, shows the importance of the independent variables in explaining the changing pattern of physician office locations. The results reported here pertain to those variables which best fit the data and were found after several stepwise regression runs. It is important to note that multicollinearity of the independent variables was not a problem in this study. None of the zero-order correlation coefficients were above .5.* Specifically, the results in Table 1 (Appendix), show that physicians during the 1950's were attracted to locations with higher incomes, growing populations, and larger population size. They tended to avoid or relocate from 1) locations experiencing racial change, 2) lower-income trading areas, and 3) areas having a larger number of physicians. Locational preferences for the suburbs versus the city was not significant during this period.

These results show that physicians appear to be good marketers because they were sensitive in their locational decisions to variables measuring market potential. In particular, they selected locations that exhibited greater population growth and larger population size. In addition, physicians were targeting their services to higher income groups. The locational decisions by young and prime-age physicians were similar as shown by the R^2's in Table 1 (Appendix). Older physicians, as expected, were not profit motivated as evidenced by the low R^2 for this group.

In addition to variables masuring market potential, physicians were particularly sensitive to trading areas having a larger number of physicians already practicing there. For example, the regression coefficient (for all ages in Table 1, Appendix) show that for every 10 additional physicians in a trading area, a decline of 2.8 occurred in the change of office-based physicians in that location. In addition to this locational barrier, racial change in a trading area was also found to be significant.

Regression Analysis for Changes in Physician Location, 1960-1970

In contrast to the 1950's, physicians increased their locational preferences in the 1960's for the suburbs of Chicago. Evidently, physicians followed their customers to suburbia during this period. This trend is reflected in the significant t-ratio for the locational preferences dummy coefficient (3.67) from Table 2 (Appendix). This significant coefficient for the 1960-70 period contrasts with the insignificance of locational preferences (as shown in Table 1, Appendix) in the 1950-60 period. During the latter period, the

*In previous regression runs, multicollinearity was a problem. However, we successfully avoided it in the reported results by specifying both level and change variables.

growth of population was a significant factor. But in the 1960's, population growth was no longer significant and was dropped from the variables appearing in Table 2 (Appendix). Instead, the growth of hospital facilities in the 1960's became an important influence upon physician location. As seen in Table 2 (Appendix), the t-ratios were highly significant for the hospital beds variable.

Except for hospital beds, all of the variables appearing in Table 2 are similar to the independent variables used for the 1950's. Furthermore, nearly all of them have the expected signs and are significant. The independent variables in Table 2 (Appendix), also explain approximately 64 percent of the variation in the change of physician office location. For younger physicians, the regression equation improves to an explanation of 80 percent. This finding refutes the view that younger physicians are not profit motivated, but are more socially concerned than prime-age doctors. In fact, the R^2 is only .46 for prime-age physicians (age 45 to 64). Apparently, younger physicians are more mobile and thereby can better position themselves within a dynamic market than other physicians. This finding also dovetails with the result that younger physicians were not as sensitive to racial change as were their counterparts in the 1950's (Tables 1 and 2, Appendix). Prime-age physicians, however, were repelled by the racial change of blacks in health care areas for both the 1950's and 60's.

Regression Analysis for Changes in Physician Location, 1970-75

During the early 1970's, physicians were influenced primarily by the number of hospital beds and population growth in a trading area. Those findings show a continuation of the patterns found for the 1960's. Other variables, such as income or buying power, in Table 3 (Appendix), were not significant locational factors in this period. In addition, other insignificant variables such as racial change were dropped from the results reported in Table 3 (Appendix).

However, the regression results for the only two significant variables in Table 3 -- hospital beds and population growth -- accounted for 72 percent of the variation in the change of physician offices.*

During the early 1970's, physicians were not as concerned with a suburban preference as were physicians during the 1960's. The t-ratio for the dummy variable was not significant in Table 3, but was in Table 2 (Appendix). Also, in contrast to previous periods, physicians in the early 1970's were not influenced by the existing competitive structure in a trading area. Physicians were, however, significantly attracted to locations having medical facilities as measured by hospital beds (Table 3, Appendix).

The strong emergence in the influence of medical facilities upon physician office locations and the corresponding insignificance of market potential and competitive supply in the 1970's can perhaps best be explained by the statement of Wright Mills in White Collar where he noted that "the self-sufficiency of the entrepreneurial physician has been undermined in all but its economic and ideological aspects by his dependence, on one hand, upon technological equipment that is formally centralized and, on the other hand, upon informal organizations that secure and maintain his patients" (Mills, 1951). For Mills, and our findings, the bureaucratization of health care means a restriction of physicians to locations where there is sufficient medical hardware, an established informal referral system, and suportive personnel.

Discussion and Summary

The aim of this paper has been to provide marketers with a macro-view of the determinants of physician location. Given the constraint on published pricing and advertising within the medical profession, findings here indicate that physicians have primarily relied upon a locational marketing strategy to meet their objectives. In selecting sites for their offices, they have been influenced by measures of market potential such as population size and growth, and income or buying power. In addition, results show that physicians within the Chicago metropolitan area tended to avoid locations having a relatively larger number of possible competitors. More recently, regression findings show that market potential and competitive structure have lost significance to the growing importance of medical facilities in determining a physician's location.

As part of a locational strategy, physicians were also likely to have used price as a basis for segmenting their markets (Masson, 1974). In the future, price is expected to be used more often as a marketing strategy considering the growing supply of surgeons in some locations.

Although findings show that physicians have met their objectives in selecting office locations, consumers have been concerned about the quantity and quality of physicians' services in low-income locations. Results here show that physicians tended to avoid low-income areas and locations with racial change. This behavior has resulted in problems of accessibility of some consumers to physicians' services, and longer waiting times for appointments and in offices. In Chicago, for example, accessibility to physicians has declined from .99 physicians per 1,000 persons in 1950 to .23 in 1975 for the ten lowest income health care areas.** In contrast, the ten highest income areas increased their share of physicians from 1.78 to 2.70 over the same time period. In addition, Clarke has found a reluctance of physicians to accept Medicaid patients given the low reimbursement rates to physicians under this program (Clarke, 1979). These concerns have led some health care planners to favor a policy of providing incentives to physicians for locating in low-income markets.

*At this stage of the study, data have not been compiled by age group for 1975. Recent results also await the reporting of socioeconomic data from the 1980's census.

**Computed from data compiled from American Medical Directory, Selected Years.

APPENDIX

TABLE 1

LOCATIONAL CHANGE OF OFFICE-BASED DOCTORS, 1950-1960
BY AGE, CHICAGO METROPOLITAN HEALTH CARE COMMUNITIES

	Independent Variables							
Dependent Variables	Constant	Number of Doctors 1950	Population 1950	Income 1950	Absolute Change, Population 1950-60	Absolute Change, Percent Black	Location Preference	Adjusted R^2
Absolute change in number of physicians 1950-60, all ages	-14.47	-0.2884[a] (-19.61)[b]	0.0003 (2.96)	0.0028 (6.55)	-0.0013 (6.55)	-0.6278 (4.88)	1.291 (0.301)	R^2 =.743 F = (93.17)
Change in number of physicians, less than age 45, 1950-60	-8.62	-0.3657 (-18.48)	0.0001 (3.31)	0.0013 (3.00)	0.0007 (7.95)	-0.1816 (-3.01)	2.913 (1.45)	R^2 =.745 F =(94.17)
Change in number of physicians, age 45-64, 1950-60	-5.42	-0.2900 (-19.59)	0.0002 (5.05)	0.1103 (2.68)	0.0005 (5.20)	-0.3976 (-6.05)	-1.156 (-0.52)	R^2 =.728 F =(86.43)
Change in number of physicians, age over 64, 1950-60	-0.45	-0.134 (-7.22)	0.0001 (1.64)	0.0003 (1.74)	0.0001 (1.53)	-0.0731 (-2.96)	-0.752 (0.919)	R^2 =.273 F =(12.97)

a = regression coefficients
b = t-ratios

TABLE 2

LOCATIONAL CHANGE OF OFFICE-BASED DOCTORS, 1960-1970
BY AGE, CHICAGO METROPOLITAN AREA

	Independent Variables							
Dependent Variables	Constant	Number of Doctors 1960	Population 1960	Median Family Income 1960	Absolute Change, Hospital Beds 1960-70	Absolute Change, Percent Black 1960-70	City/ Suburb Dummy Variable	Adjusted R^2
Absolute change in number of physicians, 1960-70	-20.028	-0.2196[a] (-13.90)[b]	0.0001 (1.73)	0.0026 (5.811)	0.0143 (4.78)	-0.3310 (-3.86)	10.993 (3.67)	R^2 =.635 F = (56.49)
Absolute change in number of physicians, less than age 45 1960-70	-43.06	-0.134 (-25.28)	0.0001 (.660)	0.0005 (3.27)	0.0057 (5.71)	-0.0312 (-1.08)	2.991 (2.96)	R^2 =.802 F = (130.03)
Absolute change in number of physicians, age 45-64, 1960-70	-11.754	-0.096 (-8.80)	0.0001 (2.22)	0.0015 (4.87)	0.0067 (3.22)	-0.2291 (-3.84)	6.681 (3.20)	R^2 =.466 F = (28.79)
Absolute change in number of physicians, over age 64, 1960-70	-3.388	2.0123 (2.46)	0.0001 (0.379)	0.0005 (3.77)	0.0019 (2.05)	-0.0819 (-3.03)	0.2199 (.233)	R^2 = .144 F = (6.35)

a = regression coefficients
b = t-ratios

APPENDIX (Cont'd)

TABLE 3

LOCATIONAL CHANGE OF OFFICE-BASED DOCTORS, 1970-1975
CHICAGO METROPOLITAN AREA

	Independent Variables							
Dependent Variables	Constant	Number of Doctors 1970	Population 1970	Hospital Beds 1970	Median Family Income 1970	Absolute Change Population 1970-75	City/ Suburbs Dummy	Adjusted R^2
Absolute change in number of physicians' offices, 1970-75	2.279	-0.0165[a] (0.223)[b]	-0.0003 (-1.24)	0.235 (20.47)	0.0007 (0.689)	0.0022 (2.92)	-8.864 (-0.789)	R^2 = .731 F = 105.1
Absolute change in number of physicians' offices, 1970-75				0.228 (22.41)	0.0006 (0.588)	0.0019 (2.69)	-7.489 (-.706)	R^2 = .728 F = 128.9

a = regression coefficients
b = t-ratios

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