**Why Do Rural Primary-Care Physicians
Sell Their Practices?**

Working Paper Series

*Jeffrey Stensland, Ph.D.
Michelle Brasure, Ph.D.
Ira Moscovice, Ph.D.*

Rural Health Research Center
Division of Health Services Research and Policy
School of Public Health
University of Minnesota

June 2000

Working Paper #32

TABLE OF CONTENTS

EXECUTIVE SUMMARY

This study evaluates why rural primary care physicians sell their practices. A random sample of rural primary care practices in California, Utah, Ohio, Texas, and Virginia were surveyed to investigate changes in ownership of the practices during the period 1995-1998. These five states were selected because they represent areas with different experiences with physician-hospital integration and varied rates of managed care penetration. A series of logistic regressions were conducted to examine the factors that led independent physicians to sell their practices to either non-local buyers, local hospitals or local physicians. Findings suggest that sales to non-local buyers represent the majority of practice ownership changes. The motivations for ceding control to non-local buyers center on managed care concerns, recruitment concerns, and administrative burdens. Sellers were also concerned about their level of net income prior to being acquired. However, the pre-acquisition financial concerns of sellers were not significantly stronger than the financial concerns of practices that remained independent.   The environmental conditions that motivate rural physicians to sell their practices are not expected to improve. Therefore, additional sales of rural primary care practices to non-local buyers are expected. Further research is necessary to determine whether this shift in control will lead to changes in the quality or accessibility of care.

INTRODUCTION

Throughout the 1990s, physicians have been selling practices to larger organizations. This has caused a steady decline in the number of solo and two-person practices and an increase in the number of physician employees (White, 1998; AHA, 1990-1997). Researchers generally have viewed this phenomenon from the perspective of the buyers and have examined how acquisitions affect hospitals and health systems (Burns et al., 1997; Burns et al., 1998). Previous studies have found that acquisition of physician practices can increase hospital admissions (Wheeler, Wickizer, Shortell, 1986) and can help reduce inpatient Medicare costs (Mark et al., 1998). Other studies have examined how physician attitudes and physician-hospital relationships can become strained by integration (Burns, 1999). While buyers= successes and difficulties with integration have been examined in the literature, there is a lack of quantitative studies that measure the number of rural practices being sold and evaluate rural physician motivations for selling practices. Previous discussions of physicians= motivations for selling practices are usually limited to case studies in the trade press (Rice, 1998, 1999; Grandinetti, 1999).

The sale of physician practices is an important issue because the transfer of ownership may affect patient care and physician-patient relationships. In a series of case studies, Christianson et al. (1998) found that hospital systems frequently acquire rural practices with the objective of shifting or preserving referral patterns. Stensland (1999) studied five Minnesota hospital systems that acquired rural providers and found that tertiary-care hospitals can increase their market share of admissions by acquiring rural practices. This suggests that transfers of ownership can affect physician behavior. If patients believe that non-local ownership of physician practices affects a physicians referral patterns and patient care, patients may lose a degree of trust in their physicians. The effect of ownership changes on trust could be similar to

the effect that managed care contracting has had on patient-physician relationships (Mechanic and Schlesinger, 1996). While there are risks and challenges associated with non-local ownership, the acquisition of a rural primary care practice by a large urban organization may also yield some benefits for rural patients. Non-local owners may improve physician recruitment, physician peer review, and coordination of care between rural and urban providers. Given the potential affects of ownership on patient care, it is important to evaluate whether we can expect a significant and persistent shift in the ownership of rural practices.

This study=s survey of rural physician practices provides a rare opportunity to evaluate why rural primary care physicians are selling their practices. The survey data is used to examine the forces that increase the likelihood that a rural primary-care practice will be sold to a local physician, local hospital, or a non-local buyer. [1] In particular, this study highlights the practices= motivations for transferring ownership to buyers located outside of the community where the physician practices.

This study examines why physicians are selling their practices using the following three approaches:

1. First, we ask representatives from acquired practices to explain why their practice was sold.

2. Second, we use survey data to examine what specific concerns (e.g. managed care contracting and practice income) distinguished practices that were sold from those that remained independent.

---

[1] Rural is defined as being outside of a Metropolitan Statistical Area and a Anon-local@ owner is defined as an owner that is located outside of the community where the physician practice is located.

3.   Third, we evaluate whether practices with specific concerns or specific

environmental characteristics were more likely to be sold to non-local buyers.

The last question regarding non-local buyers becomes a primary focus of this paper

because, during the study=s 1995-1998 time frame, non-local buyers acquired more rural primary

care practices than local physicians and local hospitals combined. Once we understand the

factors that are driving the sale of physician practices, we can predict whether non-local

ownership of rural primary care practices will be a widespread and persistent phenomenon.

BACKGROUND ON BUYERS AND SELLERS OF RURAL PRACTICES

Traditionally, physician practices have been owned and operated by practicing

physicians. Physicians= motivations for selling a practice centered on organizational changes

that took place as individual physicians progressed through their careers (Starr, 1992). Older

physicians would sell interests to younger physicians when the older physician wanted to retire,

relocate, or felt a need to bring in additional partners. The initial recruitment of physicians into a

rural community may have been aided by income guarantees from the local hospital (Perry,

1991), but the recruited physicians were expected to eventually become a partner or form a

practice in the community.

The new buyers. During the past decade, a new type of buyer has entered the market for

physician practices. Subspecialists and their tertiary-care hospitals became concerned about

excess capacity due to an oversupply of subspecialists and a decline in hospital occupancy.

Excess capacity placed the tertiary-care providers in undesirable negotiating positions when

contracting with managed care companies (Danzon, 1994).

To secure patient flows from primary-care physicians, urban hospitals and subspecialty

groups began to acquire rural primary-care practices. Rural practices can be particularly

attractive since rural patients are less likely to be enrolled in HMOs allowing primary care physicians more influence over where the patient goes for subspecialty care. The desire to influence rural physicians= referral patterns has led to increased demand for rural primary care practices by tertiary-care providers. While some tertiary-care providers acquire practices to increase their market areas, many acquisitions are a part of defensive strategies to prevent competitors from diverting existing sources of refe rrals (Christianson et al., 1998; Stensland, 1999).

The sellers. Concurrent with the rising demand for rural primary-care practices is an increase in physician incentives for selling their practices. Private insurance and Medicare regulations are intruding into the practice of medicine with referral regulations (Stark II), complex billing systems, and new reimbursement arrangements. In addition to facing pressure to discount fees, some physicians face pressure to accept withholds or capitated payment (Brasure, Moscovice, Yawn, 1999). As the risks and administrative burdens of practice management have expanded, physicians are increasingly attracted to the prospect of leaving the business side of medicine and focusing on providing patient care. This paper uses survey data to evaluate whether these changing concerns of physician practices have led to changes in practice ownership.

STUDY DESIGN

Survey Sample Selection

This study uses information collected during a survey of rural physician-owned primary care practices. The objective of the survey was to identify practices that were sold during 1995-1998 and evaluate why the physicians chose to sell those practices. A random sample of practices from five states was chosen to include practices with a wide distribution of

environmental characteristics. The environmental characteristics upon which states were selected include the degree of managed care penetration, physician-hospital integration, and geographic location. Because the expansion of managed care is often cited as a reason for physicians= increased willingness to sell their practices, the sample includes practices from states with high and low levels of managed care penetration. The sample was also designed to include states where hospital employment of physicians has been common and states where hospital employment of physicians has been rare. Regional differences in hospital ownership of practices are important since much of the demand for physician practices has come from hospitals and health systems.

As Table 1 illustrates, California and Utah represent states with higher than average HMO enrollment, and Texas and Virginia represent states with below average levels of HMO enrollment (Interstudy, 1995). Utah and Virginia represent states where higher proportions of rural hospitals employ physicians while California and Texas represent states where lower proportions of rural hospitals employ physicians (AHA, 1995). Ohio was deemed moderate by both criteria as is shown below in Table 1.

Practices in the selected states were identified using the American Medical Association=s 1994 data sets of physicians and group practices. The 1994 American Medical Association (AMA) list of physicians was used to obtain the names and addresses of solo and two person practices in the five states, and the 1994 AMA list of group practices was used to obtain names and addresses of practices with three or more physicians. The AMA data was cleaned to eliminate duplicate observations of physicians in two person practices where both physicians had the same address. The data sets were then combined to create a unique and comprehensive list of the primary care practices that existed in the five states at the beginning of 1995. Physicians

Table 1

Criteria for Selecting the Five States

State	HMO Penetration in January, 1995*	Percentage of Rural Hospitals Employing One or More Physicians**
California	36%	17%
Utah	25%	55%
Ohio	16%	33%
Texas	12%	9%
Virginia	8%	50%
National Average	19%	38%

* InterStudy, Competitive Edge: Industry Report 5.2
** AHA Annual Survey Database, 1994

and employees that worked at the practices in January 1995 were then located using a combination of resources that included the 1998 AMA addresses of physician practices. In this study, primary care is defined as a practice where at least 50% of the physicians are generalists, family practitioners, general internists or general pediatricians.

Since Utah, California and Virginia all had less than 300 independent rural primary care practices, all of these three states= rural primary care practices were included in the sample. Texas and Ohio had a larger number of rural primary care practices, and therefore, a random sample of practices was drawn from the population of practices in these states. The size of the random sample was chosen so that hypotheses regarding the percentage of practices acquired could be tested with a power of .80 given tolerance for error of plus or minus 5%.

The survey only examines practices that were owned by physicians in January 1995. Respondents from these practices were asked a series of questions regarding conditions at their practice during 1995-1998. The survey was completed in January 1999. Practices that were acquired prior to 1995 were screened out of the sample due to a lack of physician ownership. After screening out clinics that were not physician-owned primary care practices, 1,057 practices remained in the sample. A total of 890 telephone surveys were completed yielding a response rate of 84%. Of the respondents, 62% were solo practices, 18% were two person practices and 19% had three or more physicians in 1995.

In each case, we attempted to speak with a person that was well aware of the managerial concerns at the practice during 1994-1998.[2] A majority of the practices had practice managers that were knowledgeable about the administrative aspects of the practices and were willing

---

[2] The study did not evaluate changes of ownership or the motivations for changes of ownership that took place prior to January 1995 due to a belief that the quality of survey information would decline if we asked respondents to recall practice activities and concerns from more than four years into the past.

survey respondents. If a knowledgeable practice manager was not available, we asked to speak

to a physician. Of the 890 respondents, 74% were practice managers, 10% were physicians, and

16% were nurses or other employees of the clinics. The practice managers, physicians, and other

respondents were evenly distributed across organizations that sold and those that remained

independent.

What can we learn from the sample selection process?

As Table 2 indicates, over 20% of the practices in California, Utah and Texas were

eliminated from the potential sample because they were already subsidiaries of larger

organizations.   Sales of practices in California and Utah may have taken place prior to 1995 due

to the early entrance of managed care into these states.   Texas had a low level of managed care

penetration, but the large number of hospital-owned practices could reflect the growth of

hospital-owned rural health clinics during the early 1990s.   In 1990 through 1994, 116 rural

health clinics were formed by Texas hospitals (HCFA, 1999). This trend toward forming rural

health clinics in the early 1990s may explain why many of the Texas practices were already

subsidiaries of larger organizations. Ohio and Virginia appear to have entered 1995 without

experiencing an earlier wave of practice acquisitions. In general, the five states represent a

variety of environmental characteristics and a variety of historical experiences with the sale of

physician practices.

DESCRIPTIVE STATISTICS

In the survey of rural primary-care practices, the respondents from acquired practices were

first asked: AWhat are the primary reasons that your practice was sold?@ Second, these respondents

respondents were asked how concerned their practice was about certain issues (e.g. managed

Table 2

Creating a Sample of Independent Physician-Owned Practices

	CA	UT	OH	VA	TX	Total
Rural physician clinics from the AMA database that could be categorized as physician-owned primary-care practices*	219	77	409	290	572	2,249
Initial random sample	219	77	301	290	436	1,323
Practices that were not eligible for the survey due to a lack of physician ownership in January, 1995	41 (22%)	16 (23%)	25 (9%)	37 (14%)	98 (27%)	217 (19%)
Practices that were not eligible for the survey due to being primarily a specialty practice**	10	0	13	11	15	49
Remaining number of practices in the sample	168	61	63	242	323	1,057
Number of physician-owned practices surveyed	136	54	234	215	251	890
Response rate	81%	89%	89%	89%	8%	84%

*The initial sample from the AMA database includes group practices that are not coded as specialty practices plus the number of solo and two person practices that were categorized as being owned by one or two general practitioners, family practitioners, general internists, or general pediatricians.

**Some physicians that were coded primary care physicians in the AMA database were actually members of practices where a majority of the physicians were specialists. If the surveyor determined that a majority of the practice=s physicians were not primary-care physicians, the practice was removed from the sample.

care contracting, practice income) when they were independent. [3]   The concerns and

characteristics of the acquired clinics are compared to concerns at practices that remained

independent to identify the motivations and environmental factors that led physicians to sell their

practices.

Why Was Your Practice Sold?

Table 3 summarizes the self-reported motivations behind the sale of rural physician

practices. The results suggest that the motivations for sales to local physicians generally reflect

personal decisions such as retirement, relocation, and a decision to dissolve an existing

partnership of physicians. Sales to the local hospital and sales to organizations outside of the

local community are primarily driven by managed care, financial and administrative concerns.

Since Table 3 is based on an open-ended question, a sample of responses to this question

are provided to gain a better understanding of the sentiments behind the responses presented in

Table 3.   A series of quotes from respondents are shown below and provide flavor for the

attitudes of respondents at practices that had been acquired during 1995-1998.

What are the primary reasons that your practice was sold?

$ To have a A better contractual position with HMOs and less management duties placed upon
    physicians@ (Two-physician practice in Virginia)

$ AThey offered us big bucks and they told us they would be able to run our practice more
    efficiently.@ (Solo practice in Texas

---

[*] If a practice was not acquired during the period 1995-1998, we asked the respondents to comment on how
concerned the practice was about certain issues during 1995-1998. If the practice had been acquired prior to 1998,
the respondent was asked to comment on how concerned the practice was about certain issues prior to being
acquired. Because the objective is to have comparable data on concerns of the practices when they were
independent, both groups were asked to rate their level of concern regarding identical issues.

Table 3

Primary Reasons for Selling Rural Physician Practices

Response	Ownership Interests Sold to a Local Physician*	Ownership Sold to the Local Hospital	Ownership Sold to a Non-Local Buyer	Total Number of Transactions
Physician's Personal Issues				
Retirement or death of a physician	13 (46%)	10 (26%)	9 (13%)	32 (24%)
Relocation of physician	3 (11%)	1 (3%)	2 (3%)	6 (5%)
Differences in two physicians' practice philosophies	2 (7%)	0	1 (1%)	3 (2%)
Subtotal	18 (64%)	11 (29%)	12 (18%)	41 (31%)
Environmental/Organizational Issues				
Gain negotiating power/prepare for HMOs	3 (11%)	9 (21%)	20 (29%)	31 (23%)
Financial concerns or incentives	2 (7%)	10 (24%)	15 (22%)	27 (20%)
Gain managerial assistance	1 (4%)	6 (14%)	9 (13%)	16 (12%)
Decrease physicians' workload	3 (11%)	0	3 (4%)	6 (5%)
Recruitment concerns	0	1 (2%)	4 (6%)	5 (4%)
Improve fringe benefits	0	0	4 (6%)	4 (3%)
Fear of competition	0	1 (2%)	1 (1%)	2 (1%)
Other reasons	1 (4%)	0	0	1 (1%)
Subtotal	10 (36%)	27 (71%)	56 (82%)	93 (69%)
Total Number of Responses	28 (100%)	38 (100%)	68 (100%)	134 (100%)
Don't Know	2	3	11	16
Refused	1	1	6	8
Total Ownership Changes	31	42	85	158

*Sales to local physicians include sales of part of the practice to new partners.

$ **A**We were unable to meet expenses without a larger partner.**@** (Five-physician practice in Virginia)

$ **A**A desire to have someone manage the insurance end, especially managed care.**@** (Two-physician practice in Virginia)

$ **A**We needed help with the business side of the practice.**@** (Solo practice in Ohio)

The quotes from respondents reflect a desire for the type of contracting and managerial assistance that can be provided by larger organizations. Large group practices or hospital systems have experience contracting with managed care companies and have personnel to assist with practice management. It may be difficult for a group of rural physicians to address these contracting and management concerns on their own.

To gain a richer understanding of how practices that are sold differ from practices that remain independent, respondents were asked to evaluate the level of concern at their practice regarding several issues such as the recruitment of physicians, administrative burdens, clinic income, and the need for new equipment. The objective is to develop data for a multivariate regression model that can predict changes in ownership.

Descriptive Statistics for Multivariate Analysis

We have created a list of variables that may influence whether physicians sell their practices. We will test whether a high level of concern over issues such as managed care contracting, practice income, and compliance with insurance regulations induce physicians to sell their practices. We will also test whether certain operational characteristics (e.g. size, lab ownership) or environmental characteristics induce physicians to sell their practices.

A description of the practice concerns, practice characteristics, and environmental variables that are believed to affect the probability of a sale occurring are shown in Table 4. The table provides a comparison of physician practices that were sold to non-local buyers with

practices that remained independent.   Respondents rated concerns at their practice on a scale of

one to five where one is not at all concerned and five is extremely concerned. Sources and

construction of each variable as well as a description of each concern are provided in Appendix

A.

The descriptive statistics on Table 4 indicate that 40% of all of the primary care practices

in the five states were approached by a potential purchaser, and 12% of all practices approached

a potential buyer in that four-year period. This suggests that the buyers were more likely to

initiate sale negotiations. In the case of practices that were sold to local physicians, it is possible

that a buy/sell agreement or other preexisting agreement between partners triggered a sale. In

that case, there would not be any need for one party or another to approach a clinic with a new

offer to buy or sell the practice. Another interesting finding is that 103 of the 327 practices that

were approached by potential buyers were sold. This suggests that approximately one third of

physicians receiving offers for their practices chose to sell their practice. It is important to note

that non-local buyers acquired more practices than local physicians and local hospitals

combined.

Characteristics of Practices Sold to Non-local Buyers

Table 4 indicates that practices that were acquired by non-local buyers were concerned

about relieving physicians of their administrative burdens, recruiting more physicians, and

obtaining more managed care contracts. A series of t-tests on the mean level of these concerns

found the mean value for practices that were sold to non-local buyers were significantly different

($p=.01$) from practices that were not sold. The other concerns of practices that were sold to non-

local buyers were not found to be statistically different from independent practices using a $p = .05$ criterion.   This finding suggests that a need for recruitment, managerial assistance, and

Table 4

Descriptive Statistics of Independent Variables for Four Categories of Practices

	Practices that were SOLD to local physicians during 95-98 (n=31)	Practices that were SOLD to local hospitals during 95-98 (n-42)	Practices that were SOLD to non-local buyers during 95-98 (n=85)	Practices where NO transaction occurred during 95-98 (n=731)	Full Sample Mean and (Std. Dev.) (n=899)
Indicators of Demand and Supply (mean values, where yes=1 and no=0)					
Potential buyer approached the clinic with a bid to buy	0.48	0.83	0.84	0.32	0.40 (0.49)
Clinic approached potential buyer with an offer to sell	0.31	0.49	0.41	0.06	0.12 (0.33)
Physician Concerns (mean values, where extremely concerned=5 and not at all concerned=1)					
Raising capital	2.23	2.66	2.35	2.05	2.11 (1.39)
Administrative burdens	2.79	3.44	3.48	2.58	2.71 (1.49)
Improving computer systems	2.90	3.03	2.86	3.19	2.15 (1.43)
Retirement of a physician	2.77	2.90	2.16	2.21	2.25 (1.47)
Compliance with regulations	3.63	3.29	3.51	4.03	3.93 (1.36)
Obtaining more managed care contracts	2.07	2.85	2.85	2.23	2.30 (1.45)
Income concerns	3.07	3.15	3.05	3.28	3.24 (1.45)
Concerns of Potential Buyers (mean values)					
Mean occupancy of hospitals in the health services area	0.44	0.43	0.45	0.42	0.42 (0.10)
Practice Characteristics (mean values)					
Number of physicians	2.10	1.80	2.60	2.00	2.20 (3.20)
Percentage solo practitioners	0.42	0.56	0.46	0.65	0.62 (0.49)
Percentage of physicians female	0.07	0.08	0.12	0.12	0.12 (0.28)
IPA member	0.18	0.31	0.14	0.11	0.13 (0.33)

Table 4 (continued)

	Practices that were SOLD to local physicians during 95-98 (n=31)	Practices that were SOLD to local hospitals during 95-98 (n-42)	Practices that were SOLD to non-local buyers during 95-98 (n=85)	Practices where NO transaction occurred during 95-98 (n=731)	Full Sample Mean and (Std. Dev.) (n=899)
Practice Characteristics (mean values) (continued)					
PHO member	0.18	0.09	0.06	0.09	0.10 (0.29)
The practice primarily uses their own lab	0.35	0.33	0.40	0.29	0.30 (0.46)
The practice primarily uses their own x-ray	0.23	0.26	0.37	0.29	0.28 (0.45)
Environmental Characteristics (mean values)					
HPSA county	0.10	0.10	0.16	0.14	0.14 (0.34)
Percent of the county population over 65	0.15	0.16	0.15	0.15	0.15 (0.04)
Number of HMOs serving the county	3.42	4.12	3.75	3.95	3.91 (2.74)
The county is adjacent to an MSA (1=yes)	0.55	0.76	0.80	0.66	0.68 (0.47)
County population growth rate (1985-1995)	0.09	0.08	0.09	0.08	0.08 (0.17)
Income per capita in the county, 1995	17,249	16,918	17,028	17,043	17,042 (2,355)
Herfindahl index for hospital systems, 1995	4,162	3,631	4,453	3,983	4,017 (2,027)

contracting assistance are three factors that separate physicians that stay independent from those that sell their practices to non-local buyers.

Practices that were sold to non-local buyers also had certain environmental characteristics that tended to differ from the independent practices. Practices that were sold to non-local buyers were more likely to be located next to a metropolitan area and operate their own lab. The t-tests on these two characteristics were found to be significant at the $p = .05$ level. The first finding suggests that buyers in MSAs may be more interested in purchasing practices close to MSAs. The second finding suggests that the opportunity for buyers to consolidate a physician practice=s lab activities with their own activities may make a rural practice more desirable to acquirers.
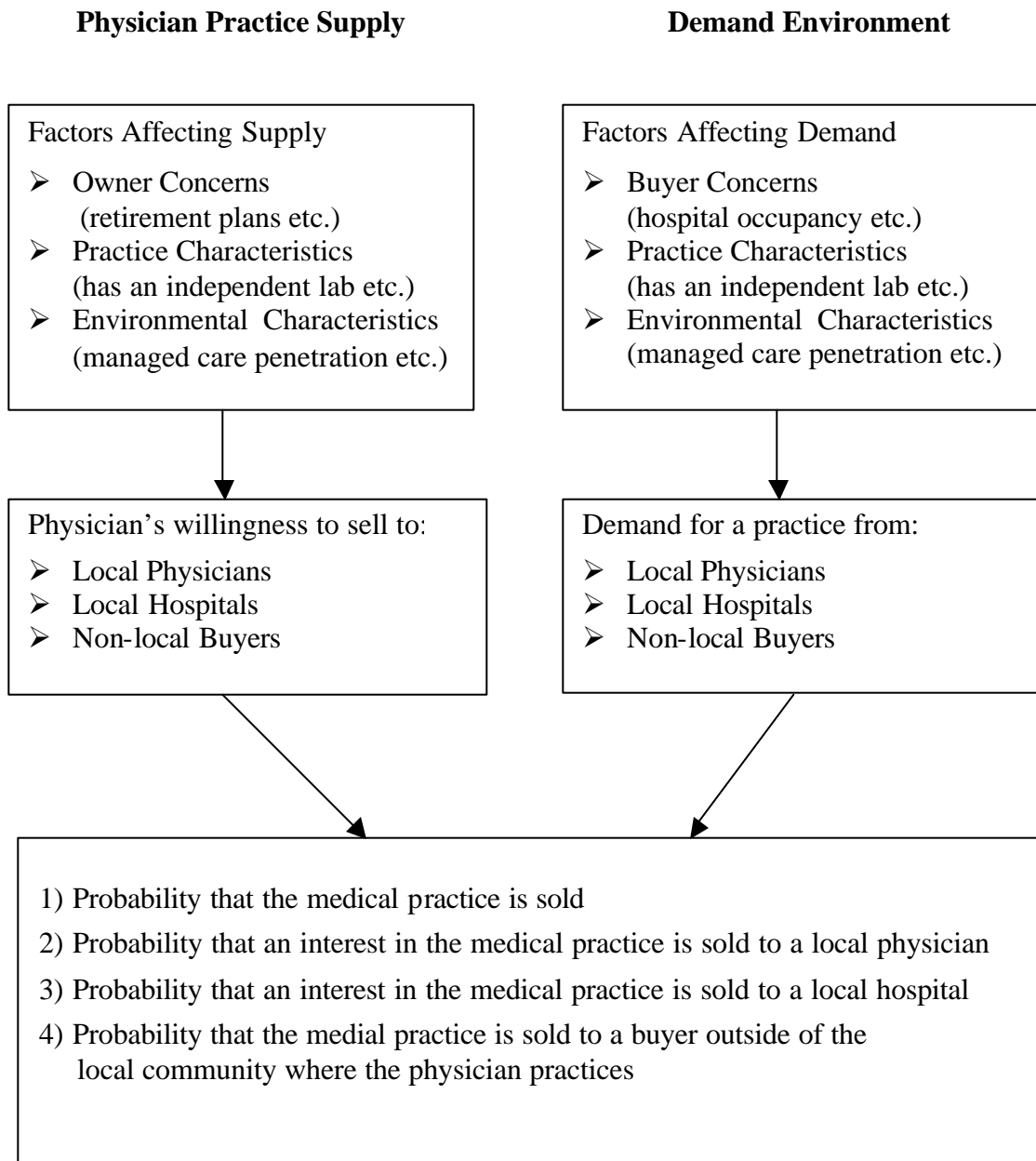
THEORETICAL FRAMEWORK FOR MULTIVARIATE ANALYSIS

A theoretical framework was developed to explain how physician concerns, practice characteristics, and environmental characteristics influence whether physicians sell their practices. As Figure 1 illustrates, certain factors make physicians more willing to sell their practices to local physicians while other factors make physicians more willing to sell their practices to local hospitals or non-local buyers. Certain factors may also affect the prices that buyers are willing to pay for physician practices. Physicians= willingness to sell and buyer=s offering prices are latent variables that are not observed. We are therefore limited to directly testing how certain practice concerns, practice characteristics, and environmental factors affect the odds that a practice will be sold.

Sales to local physicians are expected to be driven by retirement concerns of physicians. Sales to the local hospital may increase when physicians own their own lab and x-ray facilities or when physicians have financial and recruitment concerns. A physicians lab and x-ray facilities will be attractive to rural hospitals that want to consolidate ancillary services.

Figure 1

A Framework for Viewing Physician's Willingness to Sell and the Odds of a Sale Occurring

Physician Practice Supply   **Demand Environment**

Factors Affecting Supply

➢ Owner Concerns
   (retirement plans etc.)
➢ Practice Characteristics
   (has an independent lab etc.)
➢ Environmental Characteristics
   (managed care penetration etc.)

Factors Affecting Demand

➢ Buyer Concerns
   (hospital occupancy etc.)
➢ Practice Characteristics
   (has an independent lab etc.)
➢ Environmental Characteristics
   (managed care penetration etc.)

Physician's willingness to sell to:

➢ Local Physicians
➢ Local Hospitals
➢ Non-local Buyers

Demand for a practice from:

➢ Local Physicians
➢ Local Hospitals
➢ Non-local Buyers

1) Probability that the medical practice is sold

2) Probability that an interest in the medical practice is sold to a local physician

3) Probability that an interest in the medical practice is sold to a local hospital

4) Probability that the medial practice is sold to a buyer outside of the
   local community where the physician practices

Rural hospitals may also be willing to promise attractive fixed salaries to attract physicians into their rural communities.

Sales to non-local buyers may be driven by a somewhat different set of concerns. Our hypothesis is that physicians will be more willing and more likely to sell their practice to non-local buyers when they are concerned about the remaining issues listed in Table 4 (i.e. raisin capital, administrative burdens, computer systems, compliance with regulations, managed care contracting, and practice income). We also expect to find that certain environmental factors will increase the demand for practices and the odds that a practice will be sold to a non-local buyer. For example, rural practices that are near urban areas (and hence urban hospitals and subspecialists) are expected to be in higher demand and have a higher probability of being sold. The second environmental variable that could affect demand for practices is the average occupancy of hospitals in the Health Service Area (Makuc, 1991). When occupancy is low, we expect that hospitals will be more concerned about referral flows and be more likely to acquire practices. For a similar reason, practices may be in greater demand in areas where there is a higher level of competition among hospitals. To measure competition, we use the Herfindahl index. In this paper, we define the Herfindahl index as the sum of the squares of each hospital system=s market share of inpatient admissions in the Health Service Area. Our expectation is that hospitals in areas with low herfindahl indexes (i.e. a high level of competition) will have higher levels of physician acquisitions.

While the model includes some environmental variables that reflect aspects of the demand environment, the model focuses on the physician willingness to sell their practices. We have not focused on the demand side of the equation largely due to a lack of information on the demand for practices. We do not have data on the needs of specific buyers in each market area,

therefore the statistical testing of our model focuses on how certain practice concerns and characteristics affect the odds that a practice will be sold.

Statistical Testing with Two Logistic Models

First a dichotomous logistic model is used to examine factors that distinguish practices without ownership changes from practices that experienced some type of ownership change. Second, the factors that influence the odds of selling an interest in the practice to a local physician, a local hospital, and a non-local buyer are estimated simultaneously using a multinomial logistic equation. The dichotomous logistic model and the multinomial logistic model are both assumed to be functions of the concerns of physicians, practice characteristics, and a series of environmental variables as is shown below.

1) The odds of a sale occurring $= f(O, P, E)$
2) The odds of a sale to:
   a local physician
   a local hospital $\Big\} \quad = f(O, P, E)$
   a non-local buyer

where:

O = Owner concerns (e.g. practice income, recruitment concerns, etc.)
P = Practice characteristics (e.g. number of physicians)
E = Environmental characteristics (e.g. population growth, proximity to urban areas)

Some of the most interesting independent variables are the practice concerns that were elicited during the survey of rural practices. While most respondents could fully answer the survey, approximately one fourth of the survey respondents could not recall or were not willing to provide the answers to at least one survey question. Missing data was handled in two ways. First, the regressions were run using only the observations with complete responses (n=655). Second, imputation procedures (STATA, 1999) were used to estimate the missing data and test the equations on a data set of 884 observations. Linear regression models were used to impute

the missing data. The available data from the survey were used as the independent variables in the regressions.   The results with the imputed data were similar to the results from regressions using the 655 observations, but the model that only used complete surveys had greater explanatory power as measured by the Pseudo R^2 statistic.[4] Therefore, only the regression results from the smaller data set of complete observations are presented in this paper.

RESULTS OF LOGISTIC REGRESSIONS

The results from the two logistic regressions are shown in Table 5. The first column of Table 5 presents the relationship between the independent variables and the odds of a sale occurring. The last three columns present the results from a multinomial logistic regression that examines how each independent variable influences the odds that the practice will be sold to a particular type of buyer.

Logistic regressions use Aodds ratios@ to estimate how independent variables affect the probability of an event occurring. In the case of the first logistic regression shown in Table 5, the odds ratio is the probability that a practice is sold divided by the probability that the practice is retained. The coefficients in the second column of Table 5 are estimates of the relationship between a rate of change in the independent variable and the rate of change in the logarithm of the odds ratio. A positive coefficient indicates that there is a direct relationship between the independent variable and the odds that a practice will be sold. In the case of the multinomial logistic regressions, we estimate how changes in the independent variables affect the odds of sale to a specific type of buyer.   In the multinomial logistic results, a positive coefficient indicates

---

[4]The Pseudo R^2 refers to $(1-(L/L_0))$ where L is the log likelihood of the logistic regression and L_0 is the log likelihood of the logistic regression that uses only a constant term.

Table 5

Logit Results: Motivations for Buying and Selling Practices

Independent Variable Names	Odds that an interest in the practice IS SOLD (n=665) Pseudo R^2-.28	Multinominal logit results comparing the odds of selling to local physicians, the local hospital, or a non-local group relative to the odds that the practice is not sold (n=655) Pseudo R^2=.28		
		Sold to a Local Physician	Sold to the Local Hospital	Sold to a Non-local buyer
Concerns of the Practice *(Concerns are rated on a five point scale where 5 is highly concerned and 1 is not at all concerned)*				
Physicians' administrative burdens	0.43** (4.31)	0.11 (0.66)	0.46* (2.34)	0.59** (4.50)
Concerned about raising capital	0.29** (2.79)	0.18 (0.95)	0.63** (2.99)	0.25 (1.89)
Recruitment concerns	0.23* (2.51)	0.19 (1.32)	0.34* (2.07)	0.28* (2.44)
A desire for more managed care contracts	0.22* (2.18)	0.00 (0.00)	0.22 (1.09)	0.31* (2.34)
Price negotiation concerns	0.14 (1.25)	0.18 (0.89)	0.17 (0.75)	0.11 (0.74)
Retirement concerns	0.11 (1.25)	0.19 (1.17)	0.32* (2.07)	0.06 (-0.54)
Net income concerns	-0.17 (-1.53)	0.07 (0.34)	0.11 (-0.56)	0.27 (-1.84)
A need for improved computer systems	-0.28** (-2.61)	-0.22 (1.15)	-0.34 (-1.63)	-0.31* (-2.26)
Regulatory compliance concerns	-0.71** (-6.34)	-0.58** (-0.31)	-1.03** (-4.70)	-0.63** (-4.33)
Concerns of Potential Buyers				
Average occupancy of hospitals in the HAS	-0.90 (-0.56)	0.32 (0.11)	-6.02 (-1.86)	-0.13 (-0.06)
Practice is in a county adjacent to an MSA	0.64* (2.02)	-0.48 (0.89)	1.17 (1.82)	1.17** (2.70)
Practice Characteristics of concern to buyers and sellers				
Number of physicians in 1995	0.0004 (0.11)	.003 (0.29)	-0.005 (-0.41)	.001 (0.25)
Percentage of physicians who are female	-0.34 (-0.74)	-0.62 (-0.71)	-4.31 (-1.48)	0.15 (0.28)
The practice was in an IPA in January 1995	1.01** (2.82)	0.37 (0.50)	1.95** (2.98)	0.89 (1.82)

Table 5 (continued)

Independent Variable Names	Odds that an interest in the practice IS SOLD (n=665) Pseudo R²=.28	Multinominal logit results comparing the odds of selling to local physicians, the local hospital, or a non-local group relative to the odds that the practice is not sold (n=655) Pseudo R²=.28		
		Sold to a Local Physician	Sold to the Local Hospital	Sold to a Non-local buyer
Practice Characteristics of concern to buyers and sellers (continued)				
The practice was in a PHO in January 1995	-0.53 (-1.12)	0.11 (0.15)	0.56 (-0.61)	-0.97 (-1.44)
The practice used its own x-ray equipment	-0.31 (-1.01)	-0.88 (-1.42)	-0.03 (-0.06)	-0.19 (0.51)
The practice used its own lab	0.66* (2.29)	0.65 (1.21)	0.44 (0.74)	0.82* (2.28
Environmental Characteristics				
County is a primary care HPSA (1=yes)	-0.26 (-0.65)	0.13 (0.18)	0.00 (0.00)	-0.63 (-1.16)
Population growth in the county 1985-1995	0.57 (0.64)	0.59 (0.39)	-0.77 (-0.31)	0.63 (0.55)
Percent of population in the county over 65	8.44* (2.11)	6.21 (0.93)	16.86 (1.94)	5.45 (0.98)
County income per capita in 1995	2e-5 (0.86)	.00005 (0.47)	0.00 (0.17)	-4e-6 (-0.05)
Herfindahl index for hospital systems	.0002** (2.68)	.0002 (1.30)	.0002 (1.30)	.0002* (2.23)
Log of HMOs serving the county in 1995	-0.11 (-0.48)	-0.40 (0.99)	0.14 (0.29)	0.02 (0.06)
Utah	0.57 (0.87)	0.38 (0.38)	-31.38 (0.00	1.00 (1.14)
California	-0.60 (-1.11)	-1.03 (1.09)	-0.08 (-0.07)	-0.57 (-0.71)
Texas	0.28 (0.64	-0.45 (-0.61)	0.20 (0.22)	0.73 (1.22)
Virginia	1.19** (2.77)	-0.20 (-0.27)	1.66 (1.89)	1.88** (3.28)
Constant	-4.33** (-2.92)	-3.93 (-1.53)	-6.40** (3.21)	-5.81** (-2.97)

*Significant at the .05 level of a two-tailed test
**Significant at the .01 level of a two-tailed test
Z scores are in parentheses

that the independent variable acts to increase the odds of selling the practice to a specific type of buyer relative to the odds of not selling the practice.[5]

Non-local buyers.   Practices with greater concerns about physicians= administrative burdens, obtaining more managed care contracts, and recruitment of physicians were more likely to sell their practice to non-local buyers.   Practices located in counties adjacent to metropolitan areas or in health service areas with a high Herfindahl Index were also more likely to be acquired by a non-local purchaser.   The desire for urban hospitals and specialists to secure referrals from rural areas explains why practices near MSAs were more likely to be bought by non-local buyers.   The statistical significance of a high Herfindahl index, counter to our expectations, indicates that hospital systems in less competitive markets are more likely to acquire physician practices.   In other words, hospital systems that control a large share of a market appear to be more active purchasers of rural practices.   For example, rural Virginia saw a large number of acquisitions due to an aggressive practice acquisition strategy by the Carilion Health System. Carilion has developed a system of hospitals and physician practices in western Virginia and is now the largest health system in the area.   The Carilion story demonstrates how the activities of one large integrated health care system can change the market for physician practices in a state or region.

Sales to the local hospital.   In general, practices that were sold to the local hospital were concerned about raising capital, obtaining administrative assistance, recruitment, and the retirement of one or more physicians than were practices that remained independent.   Practices that are members of IPAs are also more likely to sell to the local hospital.   Practices in IPAs may have accepted transferring some of their contracting powers to another entity and may be more comfortable transferring control of the practice to the local hospital.

---

[5] For a detailed explanation of the logistic and multinomial logistic regressions, see Tim Futing Liao (1999).

Overall sales. Table 5 indicates that practices with their own lab are more likely to be sold; this could reflect potential gains from consolidating diagnostic facilities. Sales are also more likely in counties with a high proportion of senior citizens; this could reflect local hospitals= desire to obtain physicians cooperation controlling Medicare costs or rural physicians= desire to be relieved of the burdens associated with Medicare reimbursement.

There are two surprising results. While several of the practices that were sold mentioned that they were very concerned about the practice=s profitability, there is no evidence to suggest that practices that remained independent were any less concerned about their level of net income. This suggests financial concerns are not the key factor that separates practices that are sold from those that remain independent.

The second surprising result is that concerns over compliance with governmental and insurance regulations were higher in practices that were not sold.   This could reflect an omitted variable problem, namely the omission of a measure of physicians desire for independence and autonomy.   Physicians who are fiercely independent may have a negative reaction to regulation by the government, regulation by insurers, or regulation by an acquiring entity. It appears that the practices most concerned about governmental and insurance regulations are not willing to cede control over their practice to an acquirer in order to obtain help with the burden of governmental and insurance regulations.

LIMITATIONS

A majority of the respondents are practice managers as opposed to physicians. Though the regression equation only included observations where the respondent indicated that they knew the physicians motivations for selling the practice, there is a potential for differences in perceptions between physicians and practice managers. To test for differences in perspectives

across categories of respondents, the responses of physicians and non-physicians were compared.

In general, the responses of physicians and non-physicians were very similar. Physicians and non-physicians both rated Acompliance with governmental and insurance regulations@ as the top concern at their practice. In addition, physicians and non-physicians both rated Anegotiating better prices with insurers@, Athe practice=s level of net income@, and Aexcessive hours worked by physicians@ in their practice=s top five concerns. The one difference was that that physician respondents rated Aalleviating physicians= administrative burdens@ in the practice=s top five concerns while non-physicians rated Aimproving computerization@ as being a greater concern in their practices. This difference in responses could reflect the fact that physicians may be more likely to be the practice=s respondent if they owned a practice that did not have a practice administrator. Physicians at these practices without administrators are expected to spend more time on administrative tasks.

DISCUSSION

The results of our study provide guidance on whether we can expect to see a persistent shift in the ownership of rural primary-care physician practices. We have found that the recent shift in ownership of rural physician practices was not simply driven by financial concerns. The sales were driven by concerns over recruitment, management, and increasingly complex insurance relationships. Therefore, we expect to see a persistent shift in the ownership of rural physician practices.   We may see a large proportion of rural primary-care practices being owned by provider organizations that are based in urban areas.

Our belief that rural physicians will continue to sell their practices appears to be at odds with reports in the popular press that hospitals are selling their practices back to physicians. In their year 2000 survey of hospital executives, Deloitte and Touche found that 23% of hospitals

plan acquisitions of physician practices in the next two years while 33% plan to divest practices over the next two years (Bellandi, 2000). We expect that divestitures will be more common in urban areas where physicians can be a part of large group practices. In rural areas, large locally owned group practices are rarely an option. To obtain managerial, recruitment and contracting assistance, rural physicians will continue to transfer ownership to hospitals, urban group practices, and other health care systems.

Given the findings of this paper, hospitals and urban group practices should focus their practice acquisition strategies on rural practitioners that need managerial, recruitment, and contracting assistance. Physicians with these concerns are more likely to sell their practices. Potential acquirers should be relieved to find that selling physicians are not simply the physicians that are most concerned about their level of income.

Our finding that the ownership of rural practices is changing also sends a signal to policy makers and researchers. There is a need to evaluate whether ownership affects patient care. While this paper has shown that physicians are ceding control over their practice to non-local buyers, we do not know how often the new owners influence patient care or restrict physicians= sense of clinical autonomy. There is some evidence that referral patterns do change (Stensland, 1999), but there is no evidence that acquisitions hurt or improve the quality of the care in rural areas. There is a need for future research that examines whether non-local ownership of rural physician practices affects the quality of rural primary care, recruitment to rural facilities, physicians loyalty to the local hospital, or the quality and convenience of patients= tertiary care.

REFERENCES

American Hospital Association. Various Years. *Annual Survey of Hospitals Data Base*, 1987-1996. Chicago, IL: AHA, various years.

Bellandi, D. AHospital CEOs More Optimistic. ,@ *Modern Healthcare* 30:60-64, 2000

Brasure, M., Moscovice, I., and Yawn, B. 1999. *Rural Primary Care Practices and Managed Care Organizations: Relationships and Risk Sharing,* Working Paper #28, Minneapolis, MN: Rural Health Research Center, Division of Health Services Research and Policy, University of Minnesota, 1999.

Burns, L. APolarity Management: The Key Challenge for Integrated Health Systems,@ *Journal of Healthcare Management* 44:14-33, 1999.

Burns, L., Bazzoli, G., Dynan, L., and Wholey, D. AManaged Care, Market Stages, and Integrated Delivery Systems: Is There a Relationship?@ *Health Affairs* 16:204-218, 1997.

Burns, L., Shortell, S., and Anderson, R. ADoes Familiarity Breed Contentment? Attitudes and Behaviors of Integrated Physicians,@ *Research in the Sociology of Healthcare* 15:85-110, 1998.

Christianson, J., Wellever, A., Radcliff, T., and Knutson, D.   *Implications for Rural Health Care of Linkages with Urban Health Care Services Delivery Systems*, Working Paper #24. Minneapolis, MN: Rural Health Research Center, Division of Health Services Research and Policy, University of Minnesota, 1998.

Danzon, P.   AMerger Mania: An Analysis,@ *Health Systems Review* 27:18-20, 22-28, 1994.

Grandinetti, D. AUndoing the Damage: How to Reclaim the Practice You Sold.@ *Medical Economics* 76:83-84, 87-88, 90, 93, 1999

Health Care Financing Administration. A List of all rural health clinics and their parent organizations was obtained from the Health Care Financing Administration.

InterStudy. *The InterStudy Competitive Edge 5.2.* Minneapolis, MN: InterStudy, 1995.

Liao, T. *Interpreting Probability Models: Logit, Probit, and Other Generalized Linear Models.* Thousand Oaks, CA: Sage Press, 1994.

Makuc, D., Haglund, B., Ingram, D., Kleinman, J., and Feldman, J. *Health Service Areas for the United States*. National Center for Health Statistics Vital and Health Statistics, 2, 1991.

Mark, T., Evans, W., Schur, C., and Guterman, S. 1998. "Hospital-Physician Arrangements and Hospital Financial Performance," *Medical Care* 36: 67-78, 1998.

Mechanic, D. and Schlesinger, M. "Managed Care as a Target of Distrust," *Journal of the American Medical Association*, 275:1693-1697, 1996.

Perry, L. "Income Guarantee Is Hospitals= Lure of Choice," *Modern Healthcare* 21:39, 1991.

Rice, B. "Solo Practice for Sale (Someday): Any Buyers?" *Medical Economics* 75:144-146, 151, 1998.

Rice, B. "A Practice Sold, a Practice Ruined," *Medical Economics* 76:64-66, 71-72, 75-78, 1999.

Starr, P. *The Social Transformation of American Medicine.* New York: Basic Books, 1992.

STATA Press. *Stata Reference Manual Release 6*. College Station, TX: STATA Press, 1999.

Stensland, J. "Vertical Integration of Rural Health Care Delivery Systems," Ph.D. dissertation, University of Minnesota, 1999.

Wheeler, J., Wickizer, T., and Shortell, S. "Hospital-Physician Vertical Integration," *Hospital & Health Services Administration* 31:67-80, 1986.

White, B. "Readers Speak Out on Solo Practice," *Family Practice Management* 5:58-60, 65-68, 71-74, 1998.

APPENDIX A

Definitions of Variables

Variable	Measure	Source
Dependent Variables		
Bid Received	Another organization approached the practice with an offer to merge or purchase the clinic	Survey
Offer Made	The practice approached another organization with an offer to merge or sell the clinic	Survey
Sold Locally	An ownership interest in the practice was sold to a local physician(s) or the local hospital during the four year period 1995-1998	Survey
Sold Non-Locally	The practice was sold to an organization that is located outside of the practice=s community	Survey
Independent Variables		
Concern	The respondents ranked the practice=s level of concern on the following issues on a scale of	
Capital Concerns	Concerned about obtaining funding for new equipment or a new building (1 to 5 scale)	Survey
Administrative Burdens	Concerned about alleviating physicians= administrative burdens (1 to 5 scale)	Survey
Computer Concerns	Concerned about improving computerization and management information systems	Survey
Retirement Concerns	Concerned about the pending retirement of one of more physicians (1 to 5 scale)	Survey
Recruitment Concerns	Concerned about the recruitment of new physicians (1 to 5 scale)	Survey
Compliance Concerns	Concerned about compliance with governmental and insurance regulations	Survey
Managed Care Contracting	Concerned about obtaining more managed care contracts (1 to 5 scale)	Survey

Definitions of Variables (continued)

Variable	Measure	Source
Independent Variables (continued)		
Market Power Concerns	Concerned about negotiating better prices with insurers (1 to 5 scale)	Survey
Income Concerns	Concerned about the clinic=s level of net income (1 to 5 scale)	Survey
Practice Characteristics		
Number of Physicians	The number of full time equivalent physicians at the practice as of January, 1995	Survey
Percentage Female	Percentage of the practice=s physicians that were female in January, 1995	Survey
IPA Member	The clinic was a member of an IPA in January, 1995	Survey
PHO Member	The clinic was a member of a PHO in January, 1995	Survey
Used Own Lab	In 1995, the patients= lab work was primarily done at the practice	Survey
Used Own X-ray	in 1995, the patients= x-rays were primarily done at the practice	Survey
Environmental Characteristics		
HPSA	The county that the practice is located was designated as having a shortage of primary-care physicians by the Health Care Financing Administration	Area Resource File
Percent Seniors	Percentage of the county population that was over 65 years of age in 1995	Area Resource File
Number of HMOs	Natural log of one plus the number of HMOs listing the county as being in their service area	InterStudy