Rural Primary Care Practices and Managed Care Organizations: Relationships and Risk Sharing

Michelle Brasure, Ph.D.
Ira Moscovice, Ph.D.
Barbara Yawn, M.D.

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

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EXECUTIVE SUMMARY

As managed care becomes more prominent in rural areas, contractual relationships between physicians and managed care organizations are becoming more complex. Many physician practices are now associated with organizations such as hospitals, physician-hospital organizations, and independent practice associations which act as intermediaries between managed care organizations and the physician practices. This study examines whether the type of contractual arrangement (direct or through an intermediary entity) has an effect on the extent to which rural physician practices assume risk. A survey of rural physician practices in nine states was conducted to analyze this question.

A sample of 1200 rural primary care physician practices was surveyed during the fall of 1997. The overall response rate was 80 percent. Practices in states with large rural populations and high managed care penetration rates were randomly selected to participate in the survey. Practice administrators responded to questions regarding their 1996 experience with managed care and risk sharing. Data collected in the rural physician practice survey is used to evaluate the effect of affiliations with intermediary entities on the practices' involvement in managed care and the degree to which the practices share financial risk. We define financial risk as contracts that include capitated payments, withhold provisions, or bonus/incentive payments.

Grouped logistic regression and logistic regression analysis are used to determine the effect of intermediary affiliations on four measures of risk, controlling for other practice and market area characteristics. Affiliations with intermediary entities do not appear to affect the degree of involvement in managed care among rural primary care physician practices when controlling for practice and market area characteristics. However, these affiliations are negatively associated with the probability that a practice has risk sharing arrangements involving either capitation, withhold provisions, bonus/incentive payments, or some combination. Affiliations with intermediary organizations are one method being used by rural primary care practices to decrease financial risk.

INTRODUCTION

As managed care becomes more prevalent across the United States, physicians are frequently being asked to enter managed care contracts and to accept risk. While managed care and risk are primarily urban phenomena, they have begun to spread into rural communities (Ricketts, Slifkin, and Johnson-Webb, 1995) and are expected to continue to do so (Moscovice, Casey, and Krein, 1998). Concurrently, and perhaps in response to the growth of managed care and risk contracts, the contractual relationships between physicians and managed care organizations are becoming more complex. The use of multi-tiered arrangements, where an intermediary entity is posed between the physician practice and the managed care organization, appears to be quite common (Hillman, Welch, and Pauly, 1992, Gold, et al., 1995), even in some rural areas (Moscovice, Brasure, and Yawn, 1998). This study is the first attempt to investigate the contractual arrangements between physicians and managed care organizations from the perspective of the rural physician practice.

The purpose of this study is to examine whether different organizational arrangements between rural primary care practices and managed care organizations affect the degree of risk borne by the practices. We chose to examine rural markets where managed care has established a foothold, because the occurrence of these multi-tiered arrangements is thought to be a response to managed care market penetration. The results provide insight into what may be expected in other rural areas as these and other managed care markets continue to mature.

BACKGROUND

Physician practices share risk financially with managed care organizations primarily through capitation, withhold provisions, or bonus/incentive payments. Nationally these risk mechanisms have not been widely used (Simon and Emmons, 1997), especially not in rural areas

(Christianson et al., 1997). Discounted fee-for-service remains the most common reimbursement method from managed care organizations to primary care physicians. However, there appears to be a trend toward more risk-based reimbursement.

Affiliations with intermediary entities are one way that physician practices may attempt to reduce their risk or potential risk. Common types of intermediary organizations include independent practice associations (IPAs) and physician-hospital organizations (PHOs) (PPRC, 1995). The research has found that hospitals, large group practices, management services organizations (MSOs), and practice management firms also often serve as intermediary entities. An analysis of these three-tiered arrangements using a survey of HMOs concluded that primary care physicians in three-tiered arrangements were sheltered from some of the financial risk contained in managed care contracts (Hillman, Welch, and Pauly, 1992). For instance, the managed care organization could pay the intermediary a capitated payment for each enrollee, and the intermediary could pay the practice a discounted fee-for-service payment for each service rendered to those enrollees.

The extent to which physician practices form affiliations with intermediary entities is unclear; however these arrangements appear to be fairly prevalent from the perspective of HMOs. Hillman, Welch, and Pauly (1992) found that over a third of the contractual arrangements between urban HMOs and primary care physicians involved an intermediary entity. Another survey of urban HMOs showed that as many as 67 percent of the HMOs contracted with intermediary entities (Gold et al., 1995).

Rural primary care practices may have greater incentives than urban practices to form these affiliations. They rarely have large enough patient bases to spread risk internally and often lack the experience of negotiating with managed care organizations. Additionally, many small

rural practices lack the administrative capability to handle many complex reimbursement schemes and other management and administrative resources that are often provided by intermediary organizations.

The study provides a first look from the perspective of the rural primary care practice at how these arrangements affect the degree of risk sharing by rural primary care practices. We hypothesize that rural primary care practices with intermediary affiliations performing their contracting and negotiating have lower degrees of financial risk than their counterparts that contract with managed care organizations directly. We also hypothesize that due to differing missions, infrastructures, and capacities to absorb risk, certain types of intermediary entities may be more effective than others in reducing risk to the physician practice.

STUDY DESIGN AND DATA

To gain information on rural physician risk sharing and affiliations with intermediary entities, we conducted a survey of rural primary care physician practices in nine states. These states were chosen based on the following criteria: (1) having a rural population of at least 500,000 individuals (based upon county designations of metropolitan statistical areas (MSA)) and (2) having a statewide HMO penetration rate of at least 20 percent during 1996 as indicated by InterStudy (1997). Eleven states met these criteria, but only nine C Colorado, Michigan, Minnesota, Missouri, New York, Oregon, Pennsylvania, Washington, and Wisconsin C were included in the study. Practices in the selected states were identified using provider directories collected from the major insurers in each state. Provider directories for California and Florida could not be obtained from the multitude of insurers in these two states. Within each state, primary care practices in rural counties were randomly selected to participate in the survey. The Survey Center at the University of Minnesota Division of Health Services Research and Policy

conducted the survey during the summer of 1997. Practice administrators were asked to respond to the survey. If the practice did not have a practice administrator, physicians or other knowledgeable staff persons were asked to respond. The telephone survey collected detailed background information about the practices, their involvement in managed care contracts, the contractual arrangement with the managed care organization or intermediary entity, and the extent to which they share risk. Table 1 shows the statewide managed care penetration rate, sample size, and response rate for each state. The overall response rate was 80 percent, yielding a total of 1,200 rural primary care practices in the study.

The empirical models predict the extent of risk undertaken by rural primary care practices based upon practice and market area characteristics. The models are divided into two parts. The first part predicts whether the practice has managed care contracts at all. Only observations with a positive response in the first part of the model are eligible for the second-part models. Three models compose the second part of the risk estimation; each predicts the degree of risk sharing using a distinct measure of risk as the dependent variable.

The four empirical models appear below:

<u>Part 1</u>:

$$\text{Prob(Managed Care Contracts)} = ß_0 + ß_1 \text{ (Practice Attributes)}_i + ß_2 \text{ (Market Characteristics)}_i + e_i \quad (1)$$

<u>Part 2</u>:

$$\text{Managed Care Revenue} = ß_0 + ß_1 \text{ IE}_i + ß_2 \text{ (Practice Attributes)}_i + ß_3 \text{ (Market Characteristics)}_i + e_i \quad (2)$$

$$\text{Prob(Risk)} = ß_0 + ß_1 \text{ IE}_i + ß_2 \text{ (Practice Attributes)}_i + ß_3 \text{ (Market Characteristics)}_i + e_i \quad (3)$$

$$\text{Capitated Revenue} = ß_0 + ß_1 \text{ IE}_i + ß_2 \text{ (Practice Attributes)}_i + ß_3 \text{ (Market Characteristics)}_i + e_i \quad (4)$$

Table 1

Statewide Managed Care Penetration Rate (1996), Number of Randomly Selected Rural Primary Care Practices, and Survey Response Rates, by State

State	Managed Care Penetration Rate (%)[a]	Sample Size	Response Rate (%)
Colorado	26	85	82
Michigan	22	218	75
Minnesota	29	93	94
Missouri	24	182	84
New York	29	157	75
Oregon	45	96	82
Pennsylvania	27	217	76
Washington	23	80	88
Wisconsin	28	72	85
Total		1,200	80

[a]InterStudy, 1996.

Note: Rural HMO penetration for 1995 is known for Pennsylvania (12.5%), Minnesota (6%), Missouri (7%), and Wisconsin (17%) (Moscovice, Casey, and Krein, 1998).

where Prob(Managed Care Contracts) is the probability that the practice maintains managed care contracts; Managed Care Revenue is the proportion of the practice revenue generated from managed care contracts; Prob(Risk) is the probability that the practice maintains contracts with managed care organizations that include capitated payments, withhold provisions, or bonus/incentive payments; and Capitated Revenue is the proportion of the practice revenue in the form of capitated payments; IE represents a set of dummy variables indicating the type of organization performing the contracting and negotiating for the practice (such as IPA, PHO, or hospital). Practice attributes and market area characteristics are control variables that likely affect the participation in managed care and the degree of risk accepted by the practice.

Data

The rural primary care practices responding to the survey provide the unit of analysis. For purposes of this study, we defined a rural primary care practice as a practice located in a county not designated an MSA county, open at least 20 hours per week, and having at least half of its physicians practicing family or general medicine, general internal medicine, or general pediatrics. These data were supplemented with data describing the market area, obtained from the Area Resource File (Bureau of Health Professions, 1997), the American Hospital Association Annual Survey (American Hospital Association, 1997), and InterStudy (1997).

Dependent Variables

The dependent variable for the first part of the model, whether the practice had managed care contracts in 1996, denotes the potential for risk sharing. The majority of practices in the sample, 82 percent, had contracts with at least one managed care organization in 1996 (Table 2). Only the practices with managed care contracts (n=979) are used in the second-part estimations.

Table 2

Summary Statistics for Dependent Variables

Dependent Variable	N	Mean	Standard Deviation	Minimum	Maximum
Practice maintains at least one managed care contract	1,200	.82	.39	0	1
Among practice with managed care contracts:					
Proportion of revenue from managed care	900	30.63	21.33	0	100
Practice maintains risk contracts	977	0.70	.46	0	1
Proportion of practice revenue in the form of capitated payments	926	9.43	14.50	0	85

The second-part models measure the degree of risk sharing by the rural primary care practices. Summary statistics for these dependent variables also appear in Table 2. The first dependent variable is the proportion of practice revenue from managed care as reported by the survey respondent. This shows the practice's level of involvement with managed care and the maximum portion of revenues that could involve risk sharing. Among the practices reporting managed care contracts, the average proportion of revenue from those contracts was just over 30 percent; this proportion ranged from 0 to 100 percent. The second dependent variable in this part of the model is a binary response indicating whether the practice maintains contracts that contain risk in the form of capitation, withholds, or bonuses. While most practices had managed care contracts, only 70 percent of those with managed care contracts reported sharing risk in the form of capitation, bonuses, or withholds. The last variable, the proportion of practice revenue in the form of capitated payments, measures the magnitude of risk accepted by the practice. While capitated revenue is only one specific form of risk sharing, it is the best available source from this survey to quantify risk. The average proportion of income in the form of capitation was only 10 percent among practices with managed care contracts; this value ranged from 0 to 85 percent.

Independent Variables

The first-part model is a necessary condition for the second-part models, where we test the main study hypothesis. Practice and market area characteristics are expected to predict whether practices have managed care contracts or not. These variables are discussed as control variables in the second-part models below. Because different observations are used in the two parts of the model, descriptive statistics on the independent variables are presented separately in Table 3.

Table 3

Summary Statistics for Independent Variables

Independent Variable	All Practices*	Practices with Managed Care Revenue*
Percent with IPA affiliation		10.0%
Percent with PHO affiliation		8.9%
Percent with hospital affiliation		11.0%
Percent with other intermediary entity affiliation		18.0%
Mean practice age (years)	18 (15)	18 (14)
Percent that are group practices or satellite clinics	57.0%	60.0%
Proportion of physicians in practice that are specialists	2.8% (9.1)	3.1% (9.7)
Proportion of practice revenue from Medicare	39.6% (18.9)	39.2% (19.6)
Number of HMOs serving county	3.3 (2.3)	3.5 (2.4)
Physicians per 1,000 population in health service area	.67 (.22)	.68 (.22)
Herfindahl-Hirschman Index of HSA	3,442 (2,035)	3,456 (2,088)
Percent that are located in county adjacent to large metropolitan area	13.0%	15.0%
n	1,200	979

*Numbers in parentheses are standard deviations.

The primary goal in the second-part models is to test whether rural primary care practices' affiliations with intermediary entities affect their degree of risk sharing. We test this effect by including several variables in the model that describe the type of intermediary entity with whom the practice is affiliated. This allows us to determine whether affiliation with certain types of entities results in lower levels of risk sharing. It is important to distinguish between types of intermediaries. Affiliations are formed for different reasons. Some affiliations, such as those with IPAs and PHOs, are formed specifically so the intermediary entity can perform contracting responsibilities for the practice. Additionally, some types of intermediary entities (such as hospitals and PHOs) may be better equipped to accept risk because of larger revenue bases and risk pools.

We categorize intermediary entities into four groups: IPAs, PHOs, hospitals, and other intermediaries. Separate categories were permitted for IPAs, PHOs, and hospital affiliations because of the relatively large numbers of practices with these types of affiliations. Smaller numbers of practices reported affiliations with universities, government agencies, tribal entities, management services organizations, or physician practice management organizations. Therefore, these entities were grouped into the "other" category. The affiliations of practices are reported on Table 3 along with summary statistics for the other independent variables discussed below.

While the affiliation variables are the independent variables of primary interest to this study, many other practice and market characteristics contribute to risk sharing and must be controlled for in the models. Practice characteristics thought to be associated with risk sharing include the age, size, composition, and revenue sources of the practice. Newer practices may be more likely to accept managed care contracts because they are building a patient base. We

measure practice age by the number of years since the practice was established. The mean age of practices in the sample was just over 18 years.

Larger practices may be more willing and administratively capable to contract with managed care organizations for several reasons. Because of their larger patient populations, they are more likely to have patients that switch into managed care plans, and the practice may participate to accommodate those patients. They also may be in better positions to handle the administrative responsibilities and risk often associated with managed care. To measure this, we include a dummy variable indicating whether the practice has three or more physicians at that particular location or reports being a satellite clinic of a larger practice. This definition of group practice is consistent with that of the American Medical Association (1996). Fifty-seven percent of the practices participating in the sample were group or satellite practices.

Because managed care organizations contract predominately with primary care physicians, we expect practices with larger proportions of specialists to be less involved in risk sharing. To control for this we include a variable measuring the proportion of the physicians in the practice that are specialists. The average proportion of specialists in the practices participating in the sample was less than 3 percent. The types of patients and the practice's distribution of payers may also influence the amount of risk borne by the rural physician practice. Practices with large proportions of Medicare revenue may be less likely to accept managed care contracts and share risk.

Market area characteristics are probably the most important determinant of the amount of risk borne by rural primary care practices. What types of contracts physician practices hold is likely to be largely dependent on the types of contracts prevalent in the particular market. An important predictor of managed care involvement is the number of managed care organizations

participating in the market. The opportunity to become involved in managed care contracts must be available to the practice for them to have risk contracts. We measure this opportunity by the number of HMOs listing the county in which the practice is located as being in their service area. Data for this measure were obtained from InterStudy (1997), which lists counties included in HMO service areas. The mean number of HMOs serving the counties where practices are located was approximately 3 and ranged from 0 to 11.

The degree of competition among physicians in the market area may also affect the practices' willingness to accept managed care contracts and risk. We expect practices located in more competitive physician markets to be more likely to accept managed care contracts and have higher degrees of risk due to competition for patients and contracts with insurers. We measure this using the number of physicians in the health service area (Makuc et al., 1991) per 1,000 population. Health service areas were identified using hierarchical cluster analysis on the basis of Medicare beneficiaries' travel patterns between counties for routine hospital care. Because the health service areas control for border crossing, which is expected to be somewhat similar for primary care, they are considered a relevant method for measuring physician supply. There was an average of less than one primary care physician per 1,000 individuals in the health service area in which respondents were located.

For similar reasons, the degree of concentration in the local hospital market is expected to be associated with rural physician risk sharing. Hospitals often have contracts with managed care organizations and relationships with local physicians. We expect hospitals with less market power (in less concentrated markets) to have more managed care contracts. This is expected to have a spillover effect on local physician practices because they have privileges at the hospital and can be expected to contract with the same insurers. Hospital market concentration is

measured using a Herfindahl-Hirschman Index (HHI) (Tirole, 1993). This index provides a market concentration value ranging from 0 to 10,000 where 10,000 represents a monopoly market. This was created using adjusted admissions to represent market share for each hospital with a unique AHA identification number in each health service area. The value of the HHI among the markets in the sample has a mean just under 3,500 and ranges from approximately 400 to 10,000.

The location of the practice is also likely to influence practice involvement in managed care and risk sharing. Proximity to the nearest urban area should be associated with risk sharing because managed care is primarily an urban phenomenon. Therefore, we expect physician practices located in counties adjacent to large urban centers to have more managed care and risk sharing than those farther removed from metropolitan areas. Approximately 15 percent of the practices in the sample were located in counties adjacent to counties designated large metropolitan areas. Lastly, because regulatory environments (Hellinger, 1998), political climates, and bandwagon responses largely influence the prevalence of managed care and risk contracts, dummy variables controlling for the state in which the practice is located are included in each of the models.

Statistical Methodology

A logistic regression model (Aldrich and Nelson, 1984) is used to estimate the equation in Part 1 of the model predicting the probability of having managed care contracts. In Part 2 of the model, weighted least squares regressions (Greene, 1993) are used to estimate the proportion of revenue from managed care and the proportion of revenue in the form of capitated payments. Because the proportion-of-income variables are not continuous, but restricted between the values of 0 and 100, the dependent variables were transformed into linear variables, the logit value of

the proportion. Weighted least squares regressions were used to correct for the heteroscadasticity created by that transformation. Logistic regression is used to estimate the probability that the practice maintains risk contracts.

RESULTS

Table 4 shows the regression results for the four equations. The model used in Part 1 of the estimation is statistically significant (F=149) and explains nearly 15 percent of the variation in the probability that a rural primary care practice has managed care contracts. While market area characteristics are expected to be most important in predicting whether practices have managed care contracts one practice characteristic has a statistically and substantively significant result. Group practices and satellite clinics are more than twice as likely to have managed care contracts as are solo physicians and two-person physician practices.

Market area characteristics that are statistically significantly associated with whether the practice had managed care contracts include (1) the number of HMOs listing the county in which the practice was located as being in their service area and (2) adjacency to a large MSA. Each additional HMO listing the practice's county in their service area increases the probability of having a managed care contract by 1.33 times, holding other variables constant. Practices in counties adjacent to large metropolitan areas are twice as likely to have managed care contracts as are practices in nonadjacent counties. About half of the state dummy variables are both statistically and substantively significant in the model. Practices in Colorado and Oregon are ten times and twelve times more likely to have managed care contracts than are practices in the state of Pennsylvania. Practices in Michigan and New York are less likely to have managed care contracts than are those in Pennsylvania.

Table 4

Regression Results Predicting Degree of Risk-Sharing

	Dependent Variable			
	Odds Ratios with Standard Errors in ( )		Weighted Least Squares Coefficients with Standard Errors in ( )	
Independent Variables	Practice Maintains Managed Care Contracts (1)	Practice Maintains Risk Contracts (3)	Proportion of Revenue from Managed Care (2)	Proportion of Practice Revenue in Form of Capitated Payments (4)
Affiliation with IPA[a]		.73 (.21)	.01 (.11)	.17 (.12)
Affiliation with PHO[a]		.36** (.10)	.01 (.12)	.052 (.157)
Affiliation with hospital[a]		.61 (.16)	.14 (.11)	.097 (.118)
Affiliation with other intermediary entity[a]		.68 (.16)	-.009 (.094)	.53** (.10)
Practice age	.9906 (.0056)	.9979 (.0053)	.0057** (.0022)	.0040 (.0026)
Practice in a group practice or satellite clinic	2.05** (.37)	1.45* (.27)	.024 (.074)	-.136 (.082)
Proportion of physicians in practice that are specialists	1.02 (.013)	.9854 (.0077)	-.0024 (.0034)	-.0102* (.0040)
Proportion of practice revenue from Medicare	1.003 (.0047)	1.0066 (.0044)	-.0073** (.0018)	-.0040* (.0019)

Table 4 (continued)

	Dependent Variable			
	Odds Ratios with Standard Errors in ( )		Weighted Least Squares Coefficients with Standard Errors in ( )	
Independent Variables	Practice Maintains Managed Care Contracts (1)	Practice Maintains Risk Contracts (3)	Proportion of Revenue from Managed Care (2)	Proportion of Practice Revenue in Form of Capitated Payments (4)
Number of HMOs serving county	1.33** (.079)	1.262** (.059)	.075** (.017)	.045* (.019)
Physicians for 1,000 population in health service area	.81 (.38)	1.44 (.59)	-.13 (.16)	-.30 (.18)
Herfindahl-Hirschman Index of health service area	1.000076 (.000052)	.999936 (.000041)	.000001 (.000018)	-.000109** (.000022)
Practice located in county adjacent to large metropolitan area	2.08* (.73)	1.22 (.32)	.144 (.091)	.007 (.10)
State dummies	Most are significant**	Most are significant**	Most are significant**	Most are significant**
Proportion of physicians in practice that are specialists	1.02 (.013)	.9854 (.0077)	-.0024 (.0034)	-.0102* (.0040)
N	1,128	936	865	888
Chi-squared/F statistic	148.78**	111.34**	7.44**	10.20**
Pseudo R^2/Adj R^2	.15	.098	.13	.17

*p<.05 **p<.01

[a]Reference category is no intermediary affiliation.

The second-part models (Equations 2-4) test the affiliation variables for their effect on risk sharing by rural primary care practices. The results of the model predicting the proportion of revenue from managed care (Equation 2) do not support the hypothesis that affiliations with intermediary entities decrease risk to rural primary care practices. While the model works reasonably well in predicting the proportion of revenue from managed care (F=7.44, Adjusted R^2=.13), there is not a statistically significant relationship between either of the affiliation variables and the proportion of the practice revenue generated through managed care.

The third equation does support the hypothesis that affiliations with intermediary organizations are associated with lower risk borne by rural physician practices. Practices with PHOs serving as intermediaries are less than half as likely as practices without intermediaries to have contracts that involve risk (capitation, withhold provisions, and/or bonus payments). Practices affiliated with hospitals and other intermediary entities have marginally statistically significant associations with the probability of having risk contracts, with p-values between .05 and .10. Both are less than 70 percent as likely to have risk contracts as are practices without intermediaries.

The last equation shows evidence contrary to the hypothesized relationship between intermediary affiliations and risk. Practices with “other” intermediaries have nearly 8 percent more capitated revenue, on average, than practices without intermediary affiliations.

In general, the control variables in the Part 2 equations entered the models as expected. One unexpected result is a positive correlation between practice age and the proportion of practice revenue from managed care. Interpreting odds ratios for continuous variables is not straightforward; therefore marginal probabilities were calculated at the mean predicted probability. The calculation is [prob(y=1)] [1-prob(y=1)]ß (Kennedy, 1992). Each additional

five years the practice has been established is associated with a 0.5 percent increase in the proportion of revenue from managed care. The only other significant practice characteristic in the first part of the model is the proportion of revenue from Medicare. As expected, the proportion of practice revenue from Medicare is negatively associated with the proportion of revenue from managed care.

Market area characteristics statistically significant in predicting the proportion of managed care revenue are identical to those significantly associated with whether the practice maintained managed care contracts: the number of HMOs listing the practice county as being in their service area and adjacency to a large metropolitan area. Each additional HMO listing the practice's county as being in its service area is associated with a more than 1.5 percent increase in the proportion of revenue from managed care; adjacency to a large metropolitan area is associated with another 3 percent increase. State dummy variables are generally statistically significant, some with large magnitudes. Practices in Colorado, Minnesota, and Oregon have much larger proportions of revenue from managed care contracts than do Pennsylvania practices. Only practices in Michigan have significantly lower proportions of revenue from managed care than those in Pennsylvania. Practices in Missouri, New York, and Wisconsin are not significantly different from Pennsylvania in terms of the proportion of revenue from managed care.

Practice characteristics significantly associated with whether the practice maintained risk contracts (Equation 3) are different from those significantly associated with the proportion of revenue from managed care. Practice age and the proportion of revenue from Medicare are not statistically significant, but being a group or satellite practice and the proportion of the physicians that are specialists are significantly related to the probability that the practice

maintained risk contracts. Group practices or satellite clinics are nearly 1.5 times more likely to have risk contracts than solo or two-person practices. Practices with larger proportions of specialists are less likely to share risk.

The market area variables associated with whether the practices shared risk include the number of HMOs serving the county and the concentration of the local hospital market. An additional HMO serving the county in which the practice is located increases the odds of having risk contracts by 1.2 times. And, as expected, practices in more concentrated hospital markets are less likely to have risk.

Market area characteristics and location appear to be much more important than practice characteristics in predicting the proportion of capitated revenue received by rural primary care practices. The proportion of physicians that are specialists and the proportion of revenue from Medicare are the only practice characteristics statistically associated with the proportion of revenue in the form of capitation. A 10 percent increase in the proportion of physicians in the practice that are specialists is associated with a 1.5 percent decrease in the proportion of capitated revenue. Larger proportions of Medicare revenue are associated with smaller proportions of capitated revenue. The majority of the market area variables included in this model were statistically significant in the model. The number of HMO service areas in which the practice is located is associated with higher proportions of capitated revenue. As found in the previous model estimating the probability of having risk contracts, a concentrated hospital market is associated with lower risk. A 1000-point increase in the HHI is associated with a 1.6 percent decrease in the proportion of revenue that is capitated. The dummy variables controlling for state are strongly associated with the proportion of capitated revenue. Practices in Colorado have an average of 5 percent more revenue in the form of capitation than practices in

Pennsylvania. Oregon is not significantly different from Pennsylvania in terms of the proportion of capitated revenue. Practices in every other state (Michigan, Minnesota, New York, Washington, and Wisconsin) have significantly lower proportions of revenue in the form of capitation than Pennsylvania.

DISCUSSION

Based upon the results of the empirical models, the hypothesis that affiliation with intermediary entities affects the degree of risk shared by rural primary care practices cannot be rejected. In addition, it appears that the type of intermediary affiliation is important in determining the degree of risk reduction to rural primary care practices. While none of the affiliation types are significantly associated with the level of managed care involvement, in terms of the proportion of revenue from managed care, contractual relationships with PHOs are statistically significantly associated with the probability that the practice has contracts that involve risk. The empirical results also show that hospital and other types of intermediary entities are statistically significantly associated with practices maintaining risk contracts, at less conservative levels ($p<.10$).

All types of intermediary entities except IPAs are associated with lower levels of risk sharing by rural primary care practices. There are several possible explanations for this finding. Hospitals, PHOs, and many organizational types in the "other" category are often large established entities. Therefore, these organizations may be positioned and prepared to absorb risk and negotiate contracts. In addition, many of these entities, especially those backed by hospitals, may have substantial power in the market and can therefore negotiate better contracts. PHOs and hospitals may be more likely than IPAs to have designated staff that is trained to negotiate rates of payment. These organizations also have enhanced incentives to provide physicians with

better, less risky contracts. Hospitals and PHOs are acting on behalf not only of the physicians, but of the hospital as well. Maintaining a good relationship with the physicians is important for maintaining hospital market share and retaining and attracting physicians in the area.

The result that practices affiliated with IPA intermediaries are not associated with lower degrees of risk sharing than practices without intermediaries is surprising. Several explanations are possible. First, many IPAs are primarily contracting vehicles and may lack the infrastructure to manage risk. Without resources specifically allocated to risk management and contract negotiation, obtaining less risky contracts from insurers may be difficult. IPAs may be in the initial stages of development in rural areas, with the intent to become risk-bearing entities in the future. Some IPAs may have not yet attained large enough risk pools in rural areas to enable them to absorb risk. Practices affiliated with IPAs may benefit from reduced risk once IPAs have had a chance to become more established in rural areas.

Even though we have evidence contrary to that hypothesized in the positive and significant association between affiliations with "other" intermediaries and higher proportions of capitated revenue, the generalizability of this result is questionable. Further analysis of this circumstance provides a possible explanation. This category includes several observations from Pennsylvania and Washington. The practices in these two states that reported affiliations with entities classified as "other" have much higher than average proportions of capitated revenue (in excess of 50 percent), compared to practices in the other seven states. Within each of the two states, many of the practices reported the same intermediary entity. A review of those observations proved that these two intermediary entities commonly use capitated payments to pay some of the physicians with whom they contract.

In summary, it appears that intermediary affiliations with large organizations such as hospitals and PHOs do help to alleviate some of the financial risk borne by rural primary care practices. However, we do not know from the results of this study exactly how the risk reduction is accomplished. One possibility is that the risk is being absorbed by the middle tier, the intermediary organization, as described by Hillman, Welsh, and Pauly (1992). Another explanation is that these large organizations can negotiate better contracts. The actual risk reduction is probably a combination of these two explanations, but further investigation is required to gain this information.

The apparent risk reduction to rural primary care practices associated with certain types of intermediary organizations potentially has both positive and negative implications for rural communities. First, intermediary affiliations may make it easier for rural primary care practices to accept managed care contracts and risk. Managed care contracts may look more attractive to rural primary care practices if the financial risk is buffered and the administrative responsibilities are alleviated by an intermediary entity. This has the potential to expand physician panels available to rural HMO enrollees and therefore improve access to rural HMO enrollees. A larger physician panel increases choice and potentially decreases travel times because patients may no longer have to travel to the nearest big city to find a physician participating in their plan. Larger physician panels in rural areas may encourage more rural residents to enroll in HMOs, potentially saving costs and increasing continuity of care (a presumed, yet debated, benefit of managed care). A third possible advantage of these arrangements is that physicians can band together and reap the benefits of cooperation without completely sacrificing autonomy. Several other services were reported as being provided by these intermediary organizations (Moscovice,

Brasure, and Yawn, 1998); examples include group purchasing, quality assurance programs, management services, and management information systems.

On the other hand, adding a tier to the contracting arrangements between rural primary care practices and managed care organizations also has potential negative consequences. Freeing physicians from the cost and utilization constraints inherent in managed care contracts may reduce insurers' influence over practice patterns. This lack of utilization control could lead to costly overutilization of health care services in the long run. For instance, if the managed care organization pays the intermediary a capitated fee and the intermediary pays the physicians on a fee-for-service basis, the incentive for physicians to provide more services is restored. Secondly, an additional tier introduces additional complexity, which, if the arrangements do not also serve to streamline processes, could result in higher costs.

This study provides a snapshot of what can be expected as rural managed care markets in other states continue to mature and expand. This early evidence suggests that rural physician practices may benefit by affiliating with intermediary entities. However, practices should thoroughly investigate their options before entering such arrangements. The potential risk reduction, the provision of other services, and the degree of autonomy sacrificed may vary widely between the different types of intermediary entities. The benefits of intermediary affiliations that are properly planned and structured have the potential to outweigh the potential negative consequences. Further investigation is necessary to determine the best way to structure affiliations that minimize the negative consequences.

REFERENCES

Aldrich, J. and Nelson, F. "Linear Probability, Logit, and Probit Models." *Sage University Papers on Quantitative Applications in the Social Sciences*, 07-045. Beverly Hills, CA: Sage Publications, 1984.

American Hospital Association. *The American Hospital Association 1995 Annual Survey of Hospitals Data Base.* Chicago, IL: AHA, 1997.

American Medical Association, Survey Data Resources. *Medical Groups in the U.S.* Chicago, IL: AMA, 1996.

Bureau of Health Professions. *The Area Resource File.* Washington, DC: Health Resources and Health Services Administration, DHHS, 1997.

Christianson, J., Wellever, A., Hamer, R., and Knutson, D. "HMO Financial Arrangements with Rural Physicians," *Journal of Rural Health* 13:240-252, 1997.

Gold, M., Hurley, R., Lake, T., Ensor, T., and Berenson, R. *Arrangements Between Managed Care Plans and Physicians: Results from a 1994 Survey of Managed Care Plans*. Washington, DC: Physician Payment Review Commission, 1995.

Greene, W. *Econometric Analysis*, Second Edition. Englewood Cliffs, NJ: Prentice-Hall, 1993.

Hellinger, F. "Regulating the Financial Incentives Facing Physicians in Managed Care Plans," *The American Journal of Managed Care* 4:663-674, 1998.

Hillman, A., Welch, W., and Pauly, M. "Contractual Arrangements Between HMOs and Primary Care Physicians: Three-tiered HMOs and Risk Pools," *Medical Care* 30:136-148, 1992.

InterStudy. *The InterStudy Competitive Edge 6.2*. Minneapolis, MN: InterStudy, 1996.

InterStudy. *The InterStudy Competitive Edge 7.2*. Minneapolis, MN: InterStudy, 1997.

Kennedy, P. *A Guide to Econometrics,* Third Edition. Cambridge, MA: The MIT Press, 1992.

Makuc, D., Haglund, B., Ingram, D., Kleinman, J., and Feldman, J. "Health Service Areas for the United States," *Vital and Health Statistics*, Series 2: Data Evaluation & Methods Research, 1991.

Moscovice, I., Brasure, M. and Yawn, B. *Rural Physician Risk-Sharing: Insights and Issues*. Minneapolis, MN: University of Minnesota Rural Health Research Center, 1998.

Moscovice, I., Casey, M. and Krein, S. "Expanding Rural Managed Care: Enrollment Patterns and Prospects," *Health Affairs* 17:172-179, 1998.

Physician Payment Review Commission. "Provider-Driven Integration" In: *Annual Report to Congress 1995*, Washington. DC: PPRC, 1995.

Ricketts, T., Slifkin, R., and Johnson-Webb, K. "Patterns of Health Maintenance Organization Service Areas in Rural Counties," *Health Care Financing Review* 17:85-89, 1995.

Simon, C. and Emmons, D. "Physician Earnings at Risk: An Examination of Capitated Contracts," *Health Affairs* 16:120-126, 1997.

Tirole, J. *The Theory of Industrial Organization*. Cambridge, MA: The MIT Press, 1993.