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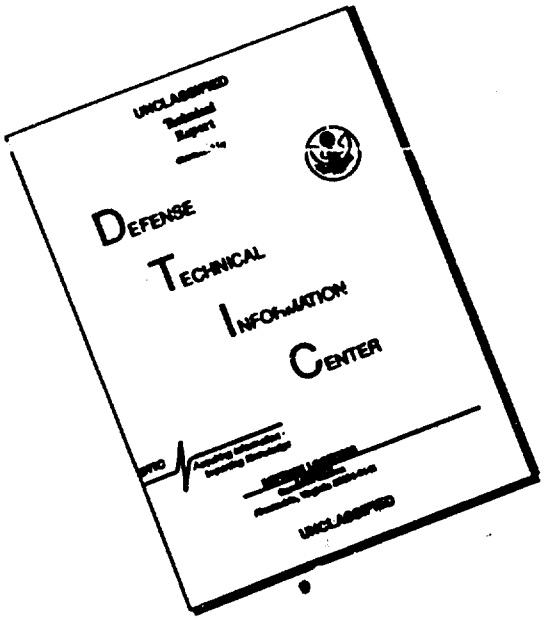

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THE ECONOMICS OF GROUP PRACTICE

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INTRODUCTION AND SUMMARY

This paper presents a theoretical and empirical discussion of how costs of outpatient medical practice vary with the size of the group providing services. It focuses upon an element which seems to have been ignored by those advocating increased emphasis upon group practice, namely the incentives facing the individual physician to keep the costs of his practice down and his work effort high. Cost and revenue sharing schemes are more prevalent as group size increases; therefore any individual physician is less likely to have to bear the financial consequences of his decision. Likewise, the reward he obtains from additional work effort falls. Thus, we would predict that total costs would rise as an individual physician's share of costs falls because of greater X-inefficiency (Leibenstein 1966, Comanor and Leibenstein 1969).(1) We would also predict that hours worked would fall as the individual physician's share of marginal revenue falls. The situation reaches an extreme in hospital outpatient clinics. Since the cost to the patient is often kept below the market price in these clinics with the deficit made up from philanthropy or from the state, the incentive to control costs is at a minimum. Likewise, the incentive

*More than the usual acknowledgment is due Vincent Taylor. The research reported in this paper was conducted jointly, and many of the ideas reflect his thinking. The author also would like to thank Jan Acton and Frank Sloan for helpful comments and Ken Maurer for research assistance.

(1) X-inefficiency is the economist's name for that type of inefficiency which reduces the output produced from a given set of inputs below the maximum obtainable.

for a physician to work additional hours or to see as many patients as possible in the hours he works is at a minimum, since his reward for the additional effort will (in the usual case) be purely psychic.

We report some findings on the costs of outpatient medical practice. They are based on data from a small number of physicians and outpatient clinics. The physician data became available when a group of physicians indicated that they might be interested in moving into a new office building. As part of ascertaining their preferences for certain features of the new office building, cost information upon their practices was gathered. One of the major questions of interest was the comparison of the overhead costs of the private physician with cost information from three outpatient clinics we had studied. The expected result was found: namely; that overhead costs of private physicians are very much below those of outpatient clinics. The second question of interest was how costs varied by size of practice. Many health policy experts, for example, Fein [1967], have advocated group practice as a method for achieving economies. Bailey [1970], however, has contended that the productivity of the physician does not change as the size of his practice increases. In our sample, as might be expected because of the regression fallacy, there are initial increasing returns to scale.(2) However, the minimum cost point is at 860 visits per month, which is a relatively small size practice. This conclusion must be tentative, since we have only one observation greater than 860 visits per month. More importantly, however, we included a variable which measured the presence or absence of cost sharing arrangements. It was significant with the expected sign, and its size showed that the magnitude of potential economies of scale is offset by additional X-inefficiency.

Revenue sharing will clearly decrease the marginal reward to physicians. As a result, it should decrease the hours which a physician devotes to his practice. Bailey [1968], in fact, finds that as group

(2) For an explanation of the regression fallacy, see page 13.

size increases, the number of hours worked decreases. In our sample, dividing the practitioners who share revenue from those who do not, those who share revenue do work less, but it is a very small amount and not statistically significant. The sample, however, is quite small.

We conclude by considering the implications of our analysis for public policy. The findings should give pause to those who believe that large clinics or large groups can give more efficient care than physicians working alone or in small groups and hence that group practice should be subsidized. Besides being more costly, the clinics we have observed are much less pleasant settings in which to receive care. The cottage industry may not be so bad after all.

THE ECONOMIC THEORY OF GROUPS

The economic theory of groups is well understood. (See, for example, Olson [1965]). Olson shows that when the output of a group is a public good (that is, a good from which no one can be excluded), each individual will have an incentive to minimize his input into the group. As the discrepancy between the reward to the individual from additional effort and the cost to him of that effort widens, the incentive grows stronger to reduce his input into the group. Olson remarks that:

> ...when a partnership has many members, the individual partner observes that his own effort or contribution will not greatly affect the performance of the enterprise, and expects that he will get his prearranged share of the earnings whether or not he contributes as much as he could have done. The earnings of a partnership, in which each partner gets a prearranged percentage of the return, are a collective good to the partners, and when the number of partners increases, the incentive for each partner to work for the welfare of the enterprise lessens. [Olson, 1965, pp. 54-55.]

The tendency to work "for the welfare of the enterprise" is less the larger the group for at least two reasons. First, assuming an equal sharing arrangement, the reward to the individual from his actions is less, the greater the number of individuals sharing in that

reward. Second, the forming and enforcing of informal agreements whereby each partner agrees to work a certain amount is clearly easier in a smaller group.

At one extreme is the solo practitioner. Since he keeps all his net revenue (after taxes), we would expect that the incentive to control costs and work long hours would be maximized. With group practice the incentive for each physician to devote effort to maximize net revenue will clearly depend upon his share in that revenue. How are shares determined? Of 4,289 medical groups surveyed by the American Medical Association in 1965 (80.8 percent of the total number), 12 percent divided net income according to the dollar amount of fees charged accountable to each physician (American Medical Association, 1968, p. 30). An additional 34 percent divided net income into non-equal shares, where, in some cases, amount of fees generated was one of the factors determining the share. (Examples of other factors might be seniority and original capital investment in the group.) Thirty-seven percent of the groups divided net income equally. Thus, some groups attempt to take account of the individual's effort to generate additional revenue by making his share dependent upon gross revenues generated. Almost none, however, appear to recognize extra effort to control cost.

At the other extreme from the solo practitioner are large outpatient clinics. If overhead costs of private practitioners get too far out of line, their fees will reflect that, and they may find themselves with fewer patients. Although cross-elasticities of demand between physicians are likely to be low, it is doubtful that many physicians would survive very long with overhead costs of the magnitude we observed in clinics.[3] By contrast, clinics can pass their costs along to third parties such as the Medicaid program or to private philanthropy which may underwrite any deficit in the entire operation. Charges to patients are kept at rates below what they would pay on the market, so that high clinic costs do not drive patients

[3] Cross-elasticity of demand is the percentage change in visits to one physician as the result of a one percent change in the fee of another physician. If this is low, it means patients are not likely to change physicians because of a change in fees.

elsewhere. The community at large bears the penalty through increased philanthropic donations, higher taxes, and larger insurance premiums. Thus we would expect the highest costs of all in such clinics because of the highest X-inefficiency. The X-inefficiency comes from both the lack of incentive to control costs and from the lack of market forces which could weed out inefficient producers.

EMPIRICAL EVIDENCE: CLINIC COSTS AND PRIVATE PRACTICE COSTS

In the course of our research we have become quite well acquainted with the operation of three rather traditional outpatient clinics.[4] One of the clinics was part of a medical school, one was in a hospital with a large teaching program, and one had relatively little teaching. Each of the first two clinics had more than 100,000 visits per year, the third clinic operation was very small with only 15,000 visits per year.

In working with these clinics it became apparent that they were extremely costly operations. In reporting this finding informally, the rationale generally given for high costs was the existence of a teaching program. Usually some form of the following syllogism was expressed: (1) The only difference between the clinics and private practice is the existence of a teaching program; (2) The clinics are much more expensive than private practice; (3) Hence, teaching is expensive. However, closer examination of the sources of costs revealed that costs were very much higher for functions which had nothing to do with the teaching program. To obtain some idea of the efficiency with which the clinics were being run, we compared the non-physician costs of the clinics with the overhead costs of the private physician.

A comparison using data from the three clinics is shown in Table 1. To preserve confidentiality, we present only the mean costs of the three clinics in the various categories. We compare clinic costs with

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[4] For further elaboration of the material in this section, see Vincent Taylor and Joseph Newhouse, 1970a and 1970b.

Table 1

COMPARISON OF CLINIC AND PRIVATE PHYSICIAN COSTS PER VISIT

Cost	Average of Three Clinics	Sample of Private Physicians
Total Overhead Cost per Visit[a]	$ 14.24	$ 4.54[b]
Components of Total[c]		
Billing and Cashiering Cost	2.07	.46
Medical Records	1.13	.35
Outpatient Department Administration	.79	--
Registration	.27	--
Appointments	--	.53
Other Clerical and Nursing	3.57	3.20
Other Professional Personnel (non-M.D.s)	1.22	--
Household and Property and Institutional Overhead Charged to Clinics[c]	3.93	(included in rent)
Supplies	.90	Not available
Rent	note b	1.53

Notes:

[a]Overhead costs consist of all non-physician costs except costs of ancillary services and costs of space.

[b]Excludes $1.53 per visit for rent. This was done because we did not want to impute a rental value to the clinic buildings which were owned. We felt most of the rental charges were capital costs and not maintenance costs. Hence, to keep the total costs as comparable as possible, neither rent nor an imputed space charge was added in. Costs of supplies are excluded from the private physician figure.

[c]The component costs are based on data from the two large clinics; equivalent data for the small one was not gathered, therefore, the components do not sum to the total.

[d]In one of the clinics household and property were disaggregated from institutional overhead charges. In that case they were over 60% of the total household and property and institutional overhead charges.

cost information gathered from the private practices of twenty single specialty groups or solo practitioners.[5]

The striking difference in overhead costs between the clinics and private practice naturally leads to questions about the representativeness of our sample of clinics and private practitioners, and about what kind of costs are included in the calculations. The only way in which the representativeness of the sample can be determined is to gather data from additional clinics and practitioners. We hope this paper stimulates that effort. In the meantime, however, conversations with persons familiar with operations at other clinics suggest to us that the numbers are representative. Further, the costs of private practitioners are, if anything, biased upwards. This is because the personnel of the private practitioners may perform tasks which are unrelated to office visits per se, but rather are related to the physician's activities in the hospital or to his teaching activities. The same cannot be said for the personnel in the clinics, whose time, so far as we can tell, is entirely devoted to the production of clinic visits.

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[5] The specialties and group sizes of the physicians in the sample are as follows:

Distribution by Specialty		Distribution by Group Size	
Internal Medicine	5	Solo Practitioners	11
General Surgery	4	Two Man Group	5
Obstetrics and Gynecology	2	Three Man Group	1
Ophthalmology	2	Four Man Group	1
Pediatrics	1	Five Man Group	2
Neuropsychiatry	1		
Neurosurgery	1		
Thoracic Surgery	1		
Othorhinolaryngology	1		
Plastic Surgery	1		
Urology	1		

What costs are included, and how did we gather these cost data? For private physicians each employee filled out a questionnaire which asked her to allocate her time among ten activities: Appointments; Receiving and Registering; Billing and Cashiering; Accounting; Medical Record Filing; X-Ray Procedures; Laboratory Tests; ECG Tests; Vision and Hearing Tests; and Other Work Tasks. Information was gathered from the physician on the employee's salary, and the salary was allocated to the various tasks. We excluded ancillary services cost (X-Ray, Laboratory, ECG, Vision and Hearing) from total overhead, and calculated the remaining overhead costs for each physician. These were divided by his monthly visits in October 1969 to arrive at an average cost figure for each physician. The figures shown in Table 1 are weighted averages of the twenty physicians in the sample, using the proportion of total visits in the sample associated with each physician as weights. Thus, the figures show the expected costs which any patient chosen at random from the patients of the physicians in the sample would have to bear. The final figure arrived at for total overhead costs, $4.54, excluding rent, appears a little high. An overhead percentage of 30 percent (excluding rent) and a typical Los Angeles visit charge of $12 will produce a slightly lower figure. Still, if the true figure for all physicians is lower, the differences between private practice and the clinics are that much greater.

For the clinics, insofar as was possible, we calculated the actual amount of personnel time going into each separate task and, using actual wage rates, made our own cost estimates. In two of the three cases the outpatient department was charged with some of the overhead of the entire institution. In one case these costs were less than 10 percent of total non-physician costs in the outpatient department. In the other case such costs were slightly over 20 percent of total non-physician costs. In the latter case, however, fringes and telephone charges were charged as overhead. Thus, while there is a certain amount of arbitrariness in the clinic figures, we feel that they are not merely accounting figures, but do reflect the resources used to produce clinic visits.

Assuming our data are representative of the population, the evidence provides extremely strong confirmation of the hypothesis that

because of higher X-inefficiency, clinics will have higher costs than private practitioners. There is a second possibility which may account for some of the variation, although we believe it is a small factor empirically. When a patient goes through an outpatient clinic, he sees a number of people: he may start with a triage nurse, then be asked to register, then be interviewed for financial eligibility, then see a screening physician or a regular physician, and possibly see a public health nurse. In addition, a medical record must be obtained for him, most commonly from a central file. (If the clinic is not a walk-in clinic, this may be done in advance.) At any one point in this chain, congestion may occur. If it does, those personnel further down the chain will be idle. Thus, there may be a moderate amount of idle time in clinics. During our observations of clinics, we did in fact observe what seemed to us to be a significant amount of idle time. It is hard, however, to distinguish the above argument from the argument that there are simply too many warm bodies at clinics. Given the traditional low salaries in hospitals and their ability to pass along costs, it is quite plausible that hospitals have not adjusted very quickly to a change in the factor prices which they face.(6)

EMPIRICAL EVIDENCE: ECONOMIES OF SCALE AND THE EFFECT OF SHARING ARRANGEMENTS IN PRIVATE PRACTICE

The theory outlined at the beginning of this paper would predict that costs of physician practice would be a function of sharing arrangements. There may also be economies or diseconomies of scale. We report below regressions of average salary costs (excluding salaries for ancillary services) and average rents of the practitioners in our sample upon office visits per month, office visits squared, and a dummy variable which assumes the value one if the physicians share costs and is zero otherwise. The latter variable is intended to be a measure of X-inefficiency induced by cost sharing. The results give a textbook U-shaped average cost curve with the dummy variable significant and positive. This specification of average costs is equivalent to specifying total costs as a linear function of visits^3, visits^2, visits, and a zero-one dummy variable times visits, forcing the intercept through the origin, and weighting

(6) Salkever (1970, Ch. 3) finds that hospitals adjust their costs to desired levels very slowly.

by the reciprocal of visits. To see how sensitive the results were to these additional assumptions (on weighting, forcing the intercept through the origin, and the form of the dummy variable), alternative versions of this total costs model were run: 1) with no restrictions on the intercept; 2) unweighted and weighted by the reciprocal of $(\text{visits})^{1/2}$; 3) with a zero-one dummy rather than a zero-one dummy times the number of visits.

The results of these additional regressions are not reproduced but can be briefly summarized. The results, particularly for the parameters of the visit variables, are sensitive to whether the intercept is set equal to zero or not. Theoretically the intercept should be zero in the long-run (if no visits are produced, no costs need be incurred), so with cross-section data a zero intercept seems reasonable. Further, the results are generally more plausible when the intercept is forced through the origin, and the intercept, when included, is never significantly different from zero at the 5% level. Hence, we report only results with the intercept constrained to be zero.

The results are somewhat sensitive to the weighting scheme used; however, the main result, which is the sign and significance of the dummy variable, is not sensitive to the weights employed. Weighting is normally employed to reduce heteroscedasticity. A variant of Glejser's (1969) test for heteroscedasticity was run on both the weighted and unweighted regressions.(7) For every dependent variable but one (appointment costs) the test did not reveal heteroscedasticity in any weighting scheme. In the case of appointment costs, all three weighting schemes showed the error term to be heteroscedastic. It was decided to report results using 1/visits as a weight in part so that there would be a simple interpretation of the results as an average cost curve, in part because a priori considerations made it seem likely that there would be a relationship between scale and the variance of the error term.

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(7) For the unweighted regressions and the regressions weighted by $1/(\text{visits})^{1/2}$, the absolute value of the residuals was regressed upon visits; for the regressions weighted by 1/visits, the absolute value of the residuals was regressed upon $(\text{visits})^2$.

The results are not very sensitive to the two specifications of the dummy in terms of testing the hypothesis that cost sharing raises costs. (The magnitude of the increase, of course, is sensitive to this specification.) The specification of a zero-one dummy in the average cost curve seemed better for the following reason: Ideally, we would make some distinction among groups; that is, we would, ceteris paribus, expect X-inefficiency induced by cost-sharing to be least in two man groups, next least in three man groups, and so forth. Unfortunately, we only have nine groups which share costs and five of them are two man groups. Hence, it did not seem reasonable to specify a dummy variable which was an arbitrary function of group size. However, specifying the dummy variable as adding a constant amount to average cost implies that the absolute amount of X-inefficiency increases with scale. Thus, results with this specification are reported.

One other phenomenon should be dealt with before proceeding to the results. In moderately large groups the costs of X-inefficiency may become sufficiently large to warrant hiring a business manager to administer the non-medical aspects of the practice (One group in our sample had a business manager.) This, of course, should reduce the amount of X-inefficiency; the salary of the business manager must, however, be counted as a cost. In very large groups, such as the Kaiser Foundation Health Plan, the role of administrative personnel in controlling costs is well known (National Advisory Commission on Health Manpower 1970).

The results for salary costs are shown in Table 3. They are consistent with our hypotheses. Holding visits constant, sharing expenses leads to significantly higher salary costs. The estimated average cost curve is U-shaped; however, only one observation is past its minimum point; thus, it could be that the curve is L-shaped, as most empirically estimated long-run average cost functions have been [Johnston 1960]. Further, although there very likely are economies of scale, little emphasis should be placed upon them. First, they are exhausted rather quickly. The estimated average salary cost of

a solo practitioner who sees 400 patients is only $2.48. Table 4 shows predicted average overhead salary costs for visit levels up to 1000 per month. No figures are shown for more than 500 visits with no sharing, because sharing always existed with that many visits.[8]

Table 2

SALARY COSTS PER VISIT

Total office salary costs per office visit	$= 8.50 + 1.14 \times 10^{-5}$ Office Visits^2 (4.05)	
	-1.96×10^{-2} Office Visits (4.47)	
	+2.55 Cost Sharing Dummy (2.19)	$R^2 = 0.60$ $F(3,16) = 8.09$

Note: Figures in parentheses are absolute values of t-statistics. There are twenty observations. The probability of a t value greater than |2.12| is 5 percent, greater than |2.92| is 1 percent. The probability of a F value greater than |5.29| is 1 percent.

Table 3

ESTIMATED SALARY COSTS PER VISIT

Number of Visits	No Sharing of Costs	Sharing of Costs
100	6.65	9.20
200	5.04	7.59
300	3.65	6.20
400	2.48	5.03
500	1.55	4.10
600	--	3.39
700	--	2.92
800	--	2.67
900	--	2.64
1000	--	2.85

[8] At the other extreme, there were a few small practices which shared costs, however. (In particular, there were practices with 63,100, and 108 visits per month which shared costs.)

More importantly, the costs of cost sharing are large relative to potential economies of scale; those who share costs have salary costs which average $2.55 per visit higher than those who do not. Thus, for example, a solo practitioner with 400 visits per month has lower estimated average salary costs than a group which shares costs regardless of the number of visits. Furthermore, the estimated economies of scale in the lower range of visits are likely to be the result of the regression fallacy [Johnston 1960]. That is, total costs have been deflated by visits in October; however, it is highly likely that physicians have adjusted their personnel needs to a long-run equilibrium flow of visits (with perhaps some allowance for peak periods). Therefore, those physicians who had an abnormally low visit total in October will have average costs biased upwards and vice-versa. This will tend to produce a finding of economies of scale, even though there may be none if each physician could adjust to the actual visit total he had in October. To the extent that our estimates are biased, scale economies are even smaller and the minimum point on the average cost curve is biased to the right (that is, the true minimum is at a lower number of visits).[9] Hence, the optimal size group may be even smaller than our estimates indicate.

Roughly the same pattern appeared in the average cost of three major components of salary cost: appointments, medical records, and billing. These results are shown in Table 5. These results are somewhat less precise, particularly for appointments, than the results in Table 3, although the cost sharing dummy is significant at the 5% level each time using a one-tail test. This is to be expected, since we relied upon the employee's estimates to allocate her time, and there were undoubtedly some errors of measurement. The total salary cost, however, is likely to be measured nearly correctly,

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(9) Let the true model be Average Cost = $aOV^2 - bOV + c$, $a, b, > 0$. The minimum point on the Average Cost Curve thus occurs at $OV = b/2a$. If there are errors in variables, a and b are both biased towards zero, but the bias factor for a is the square of the bias factor for b. Hence, b/2a is biased upwards. See Griliches and Ringstad (1970).

Table 4

COSTS OF VARIOUS FUNCTIONS PER VISIT

Medical Records Costs per office visit =	$0.36 + 4.52 \times 10^{-7}$ Office Visits^2 (2.35)	-6.17×10^{-4} Office Visits (2.07)
	+ 0.24 Cost Sharing Dummy (3.08)	$R^2 = 0.54$ $F(3,16) = 6.24$
Appointment Cost per office visit =	$0.73 + 4.24 \times 10^{-7}$ Office Visits^2 (1.33)	-1.02×10^{-3} Office Visits (2.05)
	+0.23 Cost Sharing Dummy (1.78)	$R^2 = 0.34$ $F(3,16) = 2.72$
Billing Cost per visit =	$2.34 + 2.37 \times 10^{-6}$ Total Visits^2 (1.70)	-5.79×10^{-3} Total Visits (2.43)
	+ 1.11 Cost Sharing Dummy (2.24)	$R^2 = 0.43$ $F(3.16) = 5.62$

Note: Figures in parentheses are absolute values of t-statistics. There are twenty observations. The probability of a t value greater than |1.75| is 10 percent, greater than |2.12| is 5 percent, greater than |2.92| is 1 percent. The probability of an F value greater than |5.29| is 1 percent, greater than |3.24| is 5 percent.

since the total salary figures were gathered from the physician, and while ancillary services are excluded, they are but a small portion of total costs in most instances. The visits variable in the billing equations is total visits (including hospital visits) rather than office visits, since the office personnel bill for hospital visits also. Using total visits rather than office visits raises R^2 from 0.17 to 0.43 in this equation.

Some qualifications of these results are in order. There is the obvious qualification that the sample is extremely small. Moreover, the magnitude of the sharing coefficient dummy may well be too large. It is increased by one extreme though accurate observation. But since the sample was so small, we have little notion of how frequently extreme observations are likely to occur. Also the amount of

inefficiency induced by cost sharing is sensitive to the specification and weighting scheme used. For example, if $1/(\text{visits})^{1/2}$ is used to weight the observations rather than 1/visits, the cost-sharing coefficient falls from 2.55 to 1.91 (t=2.00). If the dummy is specified as a zero-one dummy in the total cost function, its value is 450 (t=2.46), implying that at 450 visits the increment to average cost is only $1. Further, we have an extremely small number of groups with large visit totals. (There are only two with more than 800 office visits per month.) Thus, the upturn in costs we observe past 860 visits per month may well be a statistical artifact, brought about by the sharply declining average costs in the lower range of visits (which may also be a statistical artifact due to the regression fallacy).

Finally there is the question of quality; do the additional dollars spent on personnel reflect X-inefficiency, higher quality care (in a technical sense), or care produced with more amenities? We do not know. Note, however, that the additional cost of obtaining a medical record, preparing a bill, and making an appointment accounted for sixty-two percent of the estimated cost differential between cost-sharing and non-cost-sharing practices. The amount of paramedical time spent in these functions seems unlikely to affect the quality of care.[10]

Similar results appear when we consider average rent.[11] These results are shown in Table 6. Rent and visit data were made available for 16 physicians and physician groups, of which eight shared expenses. The office visit variables are quite significant, though this no doubt stems in part from the regression fallacy. Perhaps because of the smaller sample, the precision with which the cost sharing dummy can be estimated has decreased. (Still it is significant at the 5 percent

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[10] Jelinek (1967) found that when hospital nursing hours/patient day increase, direct patient care time tends to increase, but at a rapidly diminishing rate, while non-productive and miscellaneous time tends to increase at an increasing rate.

[11] All the physicians had offices within a mile of each other; all were in a "high-rent" area.

level using a one-tail test.) But its magnitude is again such as to offset (or more than offset) economies of scale. The predicted average rent per visit for a solo practitioner who sees 400 patients per month is only $.73, while cost sharing arrangements raise rents $.96 on the average.

It is, of course, difficult to attribute the results on rent to an increase in X-inefficiency; if the office rental market is competitive, rent should reflect location, space, and newness of facility, among other things. To the extent that prices vary because of search costs (Stigler 1961), cost sharing lowers the incentive to search for "bargains." But to the extent that variance in rent reflects quality, the physician who pays the higher rent and his patient will obtain some return in the form of "better" facilities. The question may be raised, however, to what extent the additional rent benefits the patient.

Table 5

AVERAGE COSTS OF RENT PER VISIT

Rent costs per visit	$= 5.64 + 1.43\times10^{-5}$ Office Visits^2 $- 1.80\times10^{-2}$ Office Visits
	(3.37) (5.14)
	$+0.96$ Cost Sharing Dummy
	(1.98)
	R^2 00.84
	$F(3,12) = 20.51$

Note: Figures in parentheses are t-statistics. There are sixteen observations. The probability of a t value greater than $|1.78|$ is 10 percent, greater than $|2.18|$ is 5 percent, and greater than $|3.06|$ is 1 percent. The probability of an F value greater than $|5.95|$ is 1 percent.

To what extent are our results compatible with the findings of others? To date, there has been relatively little investigation of the costs of production of outpatient care. Of the two published studies found which are relevant, one is consistent with our results and one is not. A study done by Donald Yett (1967) does not support

our results. However, questions can be raised concerning Yett's specification, in particular, his inclusion of salary variables.[12]

Support for our results is provided by the 1969 AMA group practice survey. This survey found that the correlation between total office personnel per physician and the total number of physicians was positive and significant at the 10% level. The correlation between professional personnel, other than nursing and laboratory personnel, per physician and total physicians was also positive and significant. But the correlations between professional nursing and laboratory personnel per physician and total physicians were insignificant. (Medical Group News, September 1970 abstracted in Medical Care Review, December 1970).

EMPIRICAL EXPERIENCE: GROUP PRACTICE AND PHYSICIAN HOURS

Bailey [1970] finds a small, but noticeable, decline in physician hours worked as group size increases. His findings are reproduced in Table 6. He does not explain this, and the question arises whether it is due to chance. Bailey presents only the mean number of hours for each group size, so that it is difficult to conduct a formal test of significance.

Table 6

PHYSICIAN HOURS PER MONTH BY SIZE OF PRACTICE

Size of Practice	Average Hours in April 1967	Number of Observations
Solo	218	12
Two-Man	222	4
Three-Man	197	6
Four- or Five-Man	200	5
Clinics	197	4

[12] See an earlier draft of this paper, "The Economics of Group Practice," RAND P-4478-2, for a discussion of Yett's paper.

These findings are lent credence by considering the incentives facing the physician. Since the marginal reward for additional effort is lower when revenue is shared, we would predict that hours worked would be less as revenue sharing increases.[13] In hospital outpatient clinics, where there is no financial incentive, the reduction in hours should be the greatest. Although we have no data, the casualness with which many physicians treat clinic duties is well-known.

In our sample the effect of revenue sharing upon hours worked was not so marked as in the above two studies. We had data on hours worked for 25 physicians and whether they shared or did not share revenue. Of the 25, 18 did not share revenue, 7 did.[14] The mean number of hours worked of those who did not share revenue was 44.47 with a standard deviation of 9.16. The mean number of hours worked of those who did share revenue was 43.86 with a standard deviation of 16.47. Clearly the difference is insignificant statistically, although the small difference is in the right direction. With a larger sample the hypothesis could be formally tested holding other relevant variables such as specialty constant. Also, physicians who share equally should be distinguished from those who determine shares on the basis of fees generated.

GROUP PRACTICE AND PUBLIC POLICY

There appears to be a consensus of opinion that expansion of group practice is desirable. For example, Fein [1967] says, "For a number of years many knowledgeable observers have felt that an expansion of group practice would make possible significant improvement in American medical care." (See also Boan 1966.) In many discussions of the question little distinction has been drawn between prepaid, multi-

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[13] It may be thought that if the physician's supply curve is backward bending, this will not be true. Note, however, that the income effect caused by the sharing arrangements is mitigated (and perhaps exactly compensated) by the income the physician receives from others in the group. Hence, we observe (approximately) a pure substitution effect, which should be positive.

[14] We do not know the sharing arrangements.

specialty groups, such as the Kaiser Foundation Health Plan, and fee-for-service groups. Our data (including the clinics) come entirely from the latter category.

There are a number of advantages claimed for group practice by its advocates; we consider them in turn. First is the argument that there are economies of scale in medical practice; that because of indivisibilities, groups can produce care more cheaply than a solo practitioner. Sometimes this is just assumed to be true. For example, "Second, it is assumed, following Adam Smith, that the division of labor, permitting specialization by task, increases productivity. Finally, it is assumed that a greater division of labor is possible in a group setting than in solo practice." (Boan 1966, p. 4.) That economic theory is equally consistent with diseconomies of scale (due perhaps to coordination difficulties) is unrecognized. Also unrecognized is that in a non-competitive market, observed cost functions may reflect behavioral as well as technological relationships (Evans 1970).

Evidence purporting to show economies of scale sometimes takes the form that physicians in groups have higher incomes than solo practitioners. As Bailey shows [Bailey 1968, 1970], the income differential can largely be explained by group practitioners obtaining income from ancillary services produced within the group, while solo practitioners are likely to send the patient elsewhere for such services. More relevant are cost data. Our evidence, based on cost rather than income data, shows that for small groups, economies of scale are likely to be outweighed by additional X-inefficiency, particularly considering that the estimated economies of scale are surely biased upwards by the regression fallacy.

The second claim is that group practice increases the productivity of the physician by substituting paramedical personnel time for his time. Again, Bailey's evidence is that this does not happen in practice; the rate at which internists process patients is independent of group size. Further, there is evidence that pediatricians in solo practice delegate more patient care tasks and produce more visits than

pediatricians in large multi-specialty group practices, holding the number of ancillary workers constant. (Yankauer, Connally, and Feldman, 1970.)

The third claim is that quality of medical care changes. Most of the evidence on this point comes from studies which show there is less questionable surgery, less hospitalization, and (perhaps) lower costs in prepaid group plans than in conventional insurance plans. [Donabedian 1965, Monsma 1970.] Leaving aside the question of what is medically appropriate, this outcome appears to be due to the prepayment feature and not to group practice. (Monsma 1970.) Nor is group practice, as it is conventionally thought of, a prerequisite for prepayment. For example, the Physicians Association of Clackamas County (Oregon) offers a prepaid plan, but permits its members to practice medicine as they wish. In fact, there are a number of solo practitioners affiliated with the plan.[15] Even more importantly, it has not been demonstrated that encouragement of group practice per se will lead to the lower hospital admission rates and/or lower surgical rates which are found in the prepaid plans. Other arguments about quality, such as the influence of peers, are difficult to assess without evidence.

Finally, it is claimed that group practice facilitates full utilization of physician resources immediately upon finishing training (rather than having a situation where the physician is underemployed while he is building up a practice). The relevant question, however, is whether the full utilization comes at the expense of other physicians, particularly other members of the group; that is, when a new physician joins a group rather than hanging out his own shingle, is the total supply of physician services to the community greater than it otherwise would be? There is no evidence on this point. It is

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[15] If solo practitioners (in the primary specialties) were to be encouraged to provide prepaid comprehensive care (so that the household would treat its physician as a Kaiser member does Kaiser), the physician would probably want to insure against large losses. We would thus expect a market for such insurance to develop. Initially, the government might wish to sell such insurance. I owe this suggestion to Fred Hoffman.

also claimed that group practice facilitates part-time work for the semi-retired physician. However, in most locations the older physician who wants to practice part-time should have little difficulty finding a group with which to affiliate (or even a younger partner to take over the bulk of his practice); thus, this point appears to have no policy implications.

The policy question is, of course, whether group practice should be encouraged through some form of financial incentive. No strong reason why it should be follows from the above discussion. We cannot measure any significant social benefit from group practice per se. It is possible that the quality of care is higher because of peer review, but no evidence was found. Hence, this seems too uncertain a consideration to base policy upon it. (A stronger influence on quality of care is likely to be peer review outside the group, such as tissue committees in hospitals.) There are, however, two social costs stemming from group practice: additional X-inefficiency from cost sharing (and/or a business manager to mitigate the inefficiency) and fewer hours worked from revenue sharing, if the group shares revenue.

Cost-sharing seems an almost inevitable arrangement in group practice. We have presented theoretical reasons why it is likely to raise costs and empirical evidence that it does. (The sample, it must be repeated, is extremely small, so the evidence is far from conclusive.) A pertinent question, then, is who bears these costs? We have elsewhere presented evidence that an appropriate model of physician pricing is that of a monopolist who is not a profit maximizer, but is attempting to achieve a certain income [Newhouse, 1970]. In that event, it is quite likely that the additional costs of group practice will be passed on to the patient. The problem is complicated, however, by the income a group practitioner receives from ownership of ancillary facilities. Were it not for this factor, a test of the joint hypotheses that costs are a function of group size and that costs are passed on is a test to determine if fees vary with group size. Despite this complication, Bailey found the average fee per physician hour to be markedly higher in large groups [Bailey, 1968].

The question for public policy, however, cannot be settled by determining whether group practices in fact have higher or lower costs or even higher or lower fees. That is because the patient quite likely has preferences for the setting in which he receives his care; in particular, some individuals may be willing to pay a differential not to receive medical care in a large, impersonal setting. Assuming patient preferences are relevant, the question for policy purposes is whether the market is not satisfying these preferences, that is, not supplying the mix of group and solo practice which is demanded. More precisely, since the question at issue is the encouragement of group practice through some form of subsidy, is there a reason why the market is producing an undersupply of groups?

If there are economies of scale, there is an incentive to form groups. Indeed, the distribution of groups among specialties would indicate that such incentives do play a role.(16) If such incentives exist, what case is there for a subsidy? Presumably it must be that there are economics of scale (which outweigh any induced X-inefficiency), that physicians have strong preferences for independent practice, and that competitive forces are sufficiently weak so that even if physicians priced at cost the more efficient form of practice does not emerge. These conditions, however, are not consistent with the observation that physicians in group practice charge higher fees. Moreover, even if the evidence showed economies of scale which were passed on, the appropriate policy is to make the market for physician services more competitive and permit the consumer to choose his setting and price, not to assume that the patient's preferences among settings are irrelevant and that group practice is in fact more efficient. One method for making the market more competitive would be to make medical

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(16) The lowest incidence of groups is found among psychiatrists (3.8%); the highest among radiologists (27.1%); and the third highest among orthopedic surgeons (18.8%). (AMA 1968, p. 52.) Both of the latter specialties use relatively expensive capital equipment (X-ray machines) which no single practitioner is likely to use to capacity; psychiatry, of course, uses minimal capital equipment. The clustering of individual (and small groups of) private practitioners in medical office buildings also appears to be a response to economic and medical incentives.

insurance premiums dependent upon the costliness of the physician used, a suggestion we have made elsewhere for hospital insurance. [Newhouse and Taylor, 1970a, 1970b, 1971.] Costliness can, and probably should, be defined broadly to include the frequency with which a physician uses inpatient, ancillary, and referral services.

Prepaid plans, including the Health Maintenance Organization (HMO) concept, are one important variant of this kind of proposal. Enthusiasm for HMO's is now widespread. A casual reader of the literature could be forgiven for believing that the answers to the health care "crisis" were known, and the problem was one of implementation. The foregoing indicates that the problem is rather more complicated. Specifically, mere agglomeration of physicians may raise rather than lower costs. HMO's are likely to face significant management problems in controlling costs. Study of the Kaiser Foundation Health Plan, a prototypical HMO, tends to support this view. The National Advisory Commission on Health Manpower found that:

> "Neither do economies of scale associated with Kaiser's large group practices appear to be a major explanatory factor [of the savings Kaiser has been able to achieve in the provision of medical care].... If this is the case, what are the sources of economy? In the final analysis, it is the individual physician who has the most influence on the cost of medical care.... Kaiser has been able to achieve substantial savings because it has been able to get individual physicians to control the costs of providing medical care." (National Advisory Commission on Health Manpower, Vol. II, p. 216.)

One frequently cited mechanism which Kaiser uses to motivate the physician is a share-the-savings feature; if costs are below budget, the surplus is distributed among physicians in the Plan. The above analysis indicates that this mechanism is of doubtful efficacy in and of itself. But it is significant, and rather little remarked upon, that Kaiser must and does compete with the private medical care system. This competition provides the organization with a strong incentive to find mechanisms to control costs. If this competitive aspect is lost in the current rush to establish

HMO's, it is a reasonable prediction that the cost problems in medical care will be exacerbated. Certainly the clinic data cited at the beginning are strong evidence for this position.

A final question concerns hours of practice. While revenue sharing is by no means inevitable, it is certainly a characteristic of many groups. The encouragement of group practice, then, with no restrictions upon sharing arrangements could lead to a diminution in the effective supply of physicians. Although the amount of diminution may not be large, it would, nevertheless, seem inconsistent for public policy to encourage group practice while maintaining that there is a shortage of physician services of sufficient magnitude that a substantial increase in medical school output (financed in part by government subsidy) is necessary.

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