

RESULTS OF A SPECIAL EFFORT TO OBTAIN EXPENSE DATA FROM PHYSICIANS

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Introduction

This paper reports results of a special effort to improve item response rates on practice expense questions in the American Medical Association's ongoing telephone survey of physicians. The survey regularly collects information about physicians' practice characteristics including: hours and visits in different settings, income, involvement with alternative delivery systems, Medicare participation, patient characteristics, as well as practice expenses. In 1990, the policy needs for quality practice cost data and generally poor response rates on expense questions dictated that an effort be made to improve those data, without altering the nature of the other information obtained in the survey.

Practice expense information is requested from respondents who are full or part owners of their practices. The practice expense section typically is the most difficult part of the interview to complete, although sampled physicians are sent an expense summary, listing the expense questions on the survey, with the advance letter (Appendix A includes a copy of the expense summary). Item response rates to these questions are generally below 70%.

In the 1990 survey, additional efforts were made to obtain complete expense information. Of the 2,752 interviews completed with physicians who were full or part owners of their practices, only 1,589 had complete expense information (that is, had responses for each of the expense components of the survey). Follow up calls were made for those cases which had responded to the question on annual net income; about 43% of those with incomplete expense data qualified for the special ef-

fort. New or corrected expense information was obtained for 341 respondents.

This study examines the characteristics of those who required the special effort as well as those who did and did not respond to the special effort. In addition, the expense data obtained through the special effort is examined; changes in item response rates, means, and variances are presented.

Description of the Socioeconomic Monitoring System

The American Medical Association's Socioeconomic Monitoring System (SMS) is a series of semi-annual telephone surveys of non-federal patient care physicians (excluding resident physicians). The spring survey collects data from approximately 4,000 physicians through an interview averaging 25 minutes in length. The autumn survey collects data from approximately 2,800 respondents through a 16-minute interview.

The sample for each survey is selected from the AMA Physician Masterfile, an enumeration of all physicians in the U.S. The sample design is a stratified random sample with the strata defined by specialty and geographic region. Since 1982, Mathematica Policy Research Inc. (MPR) has conducted the SMS surveys under contract with the AMA. Each survey includes reinterviews with physicians who were initially interviewed a year earlier, as well as interviews with physicians selected for the first time. Survey response rates have averaged 70% for the past few years.

Item response rates to the practice expense questions have generally been lower than 70%, which is lower than the remainder of the

survey questions. Respondents are asked for expenses for the previous year in each of six categories: personnel, liability premium, office space, office supplies, medical equipment, and "other." For respondents who answer each separate item, the total is calculated and verified with the respondent. Those who had missing values for individual components are asked to estimate their total expenses.

The special effort in the 1990 survey consisted of follow-up telephone calls to all owners who answered the income question and had missing expense information, including refusals as well as don't knows. It was felt that those who had refused to answer the income questions were poor candidates for conversion on the expense items.

Analysis

The analysis is limited to physicians who reported that they were full or part owners of their practices, and thus were asked questions on practice expenses. Demographic and practice characteristics of those who did and did not initially respond to the expense items, who did and did not qualify for the special effort, as well as those who did and did not respond to the special effort are compared. The results of the special effort are examined in terms of the proportion of unchanged responses, corrected data, and new data for each expense item on the survey. Item response rates are compared for each expense item before and after the special effort; item response rates of the initial and reinterview respondents are compared. Sample statistics are presented for each of the expense items before and after the special effort. Finally, least squares regressions of demographic and practice characteristics, interview type, and follow-up on effort on each expense item are performed.

Results

Table 1 presents demographic and practice characteristics by initial response to expense items, qualification for and response to the special effort. Chi-square tests were used to compare the frequency distributions. The characteristics related to initial response to the expense questions are: specialty, sex, type of practice, location, and type of interview. Physicians in emergency medicine or psychiatry were most likely to respond while pediatricians and obstetrician/gynecologists had the lowest response rate. As expected, physicians in solo practices and those who were reinterview respondents had higher initial response rates to the expense questions. Males had higher response rates than females and those located in nonmetropolitan areas were also slightly more likely to respond. Follow-up efforts were attempted for nearly 43% of those who did not answer all the expense items initially. Significant differences between those who did and did not qualify for the special effort were found in terms of specialty, type of practice, location, and type of interview. Approximately 68% of these cases responded to the special effort. The only characteristic related to response to the special effort was sex, with males significantly more likely to respond than females.

Table 2 presents logistic regression results on the probability of initial response to all expense questions, the probability of qualifying for follow-up efforts, and the probability of responding to the follow-up effort. The same set of explanatory variables is used as in the frequency distributions. The reference category is male, office-based, reinterview respondents in general/family practice in large metropolitan areas. In a multivariate context, those characteristics identified in Table 1 are gen-

erally significant. As can be seen from the model chi-square values, the set of characteristics examined predict the probability of initial response to the expense questions and of qualifying for follow-up, but observable characteristics did not predict response to the follow-up effort.

Results of the special effort were examined in terms of the proportion of responses to each expense item for which there was no change, a correction, or new data. The greatest proportion of corrections and new data were for liability premium expenses.

Item response rates for the expense questions were examined. Before the special effort, 1990 item response rates were generally similar to those in the previous years; although the response rates for liability premium and total expenses were quite low. After the special effort, response rates for most items increased by at least ten percentage points. For total expenses, the final response rate was about five percentage points higher than the average for the 1988 and 1989 surveys.

Table 3 presents sample statistics on the expense variables obtained before the follow-up effort, in the follow-up effort, and included in the final data set in 1990. Sample statistics are presented for 1988 and 1989 for comparison purposes. All the results are weighted to correct for survey nonresponse. The sample means are not changed markedly by the follow-up effort. There appears to be less variation in the values obtained through the follow-up effort. In using a t-test to compare the mean values obtained initially with those obtained through the follow-up effort, the only significant difference is between office space expenses for the two groups.

Table 4 presents regression equations for each expense item

using the same set of explanatory variables as in previous tables as well as a dummy variable indicating whether or not a follow-up effort was made. After controlling for the observable characteristics, total practice expenses obtained before the follow-up effort are significantly higher than those obtained in the follow-up effort. The results of Glejser's test confirm that the variances of the two sets of values are not different, except for total expenses.¹

Discussion

The results presented help answer a crucial question about the quality of the practice expense data in the SMS survey and the need for special efforts. Given about 30% unit nonresponse in the survey, the item nonresponse on individual expense questions raises serious concerns of nonresponse bias. Since physician practice expenses are of immediate policy interest, it is important to understand the degree and nature of such bias if it exists.

Our results indicate that there is generally little uncorrectable nonresponse bias in an estimate of mean expenses based on a sample with no special effort respondents. While nonrespondents differ systematically from respondents on observable characteristics, these differences can be corrected by weighted calculation of means. When these observable characteristics are controlled for, the regression analysis finds few systematic differences between expense means and variances of normal respondents and those of special effort respondents. The significant exception here was total expenses, where special effort respondents had significantly lower expenses than respondents obtained without the special effort. The inference we draw here is direct: the special effort is not necessary on the basis of possible biases in

estimates of means for individual expense items, but some additional effort to improve responses on total expenses should be considered.

The limitations of this analysis must be reiterated, however. The special effort improved item response rates to 70 to 80%, capturing one-quarter to one-third of item nonrespondents. We thus have examined a reasonably large proportion of item nonrespondents. A potentially important subgroup of nonrespondents was excluded from the special effort sample, however: those who also refused to answer the income question. If these refusals are related in any systematic fashion to expense levels, we have not captured a representative sample of item nonrespondents.

A second limitation is that, given a unit response rate of about 70% for the survey, net response rates on expense items are generally under 70%, which is considered low. In an earlier SMS special effort to improve unit response rates, Marder and Thran (1989) found no bias in mean values of several variables, due to unit nonresponse, but they did not examine the expense data. The combined results of these two special efforts indicate, but do not necessarily prove, that the low net response rate does not invalidate most expense data gathered in the SMS survey, with the possible exception of total expenses.

In conclusion, we infer that individual expense item data from SMS surveys without special efforts appear to be representative enough to be used for policy analyses, as long as calculations use unit

weights to control for observable characteristics of the physician. However, total expense data should be used with some caution until further research can illuminate the reasons for the bias found here. For the present, it appears that some special effort to improve item response for total expenses is justified. Because reinterview respondents have higher item response rates for the expense questions, one strategy to improve overall item response rates is to increase the relative size of the reinterview sample. However, additional analysis of possible biases present in the reinterview sample should be conducted before such a strategy is implemented.

Footnotes

¹Glejser's test for heteroscedasticity takes the following form: Estimate the regression $|e_i| = \alpha + \beta x_i$ where e_i is the estimated residual from a first stage regression (i.e., for total expenses) and x_i is a variable suspected to be related to the variance. See Madalla, 1977, page 262. The coefficient estimates β are reported on Table 7.

References

Madalla, G.S. Econometrics, McGraw-Hill Book Company, New York, 1977.

Marder, W. D. and Thran, S.L. "Are Nonrespondents Different? Results of a Special Survey Effort." American Statistical Association 1989 Proceedings of the Section on Survey Research Methods.

TABLE 1
Demographic and Practice Characteristics

	Initially Responded to all Expense Questions (n=2752)		Qualified for Follow-up Effort (n=1163)		Responded to Follow-up Effort (n=499)	
	<u>Yes</u>	<u>No</u>	<u>Yes</u>	<u>No</u>	<u>Yes</u>	<u>No</u>
<u>Overall</u> (Number of Cases)	57.5% (1589)	42.3% (1163)	42.9% (499)	57.1% (664)	68.3% (341)	31.7% (158)
<u>Specialty</u>						
General/Family Practice	60.6***	39.4	48.3**	51.7	65.9	34.1
General Internal Medicine	51.2	48.8	54.3	45.7	62.9	37.1
Internal Medicine Subspecialty	56.5	43.5	33.0	67.0	73.3	26.7
General Surgery	60.8	39.2	39.2	60.8	62.1	37.9
Surgical Specialty	58.3	41.7	35.6	64.4	77.5	22.5
Pediatrics	49.2	50.8	53.8	46.2	74.0	26.0
Obstetrics/Gynecology	48.8	51.2	40.4	59.6	66.7	33.3
Radiology	55.3	44.7	30.2	69.8	57.9	42.1
Psychiatry	71.8	28.2	43.5	56.5	80.0	20.0
Anesthesiology	52.3	47.7	42.9	57.1	48.2	51.8
Pathology	65.3	34.7	41.2	58.8	85.7	14.3
Emergency Medicine	75.0	25.0	70.0	30.0	85.7	14.3
Other	69.2	30.8	37.8	62.2	71.4	28.6
<u>Sex</u>						
Male	58.4*	41.6	43.3	56.7	69.7*	30.3
Female	51.1	48.9	38.9	61.1	54.6	45.4
<u>Type of Practice</u>						
Group	50.4***	49.6	46.7**	53.3	65.3	34.7
Solo	65.0	35.0	37.6	62.4	73.6	26.4
<u>Major Professional Activity</u>						
Hospital-based	62.8	37.2	35.1	64.9	50.0	50.0
Office-based	57.4	42.6	43.3	56.7	69.1	30.9
<u>Experience</u>						
0-10 years	57.6	42.4	46.3	53.7	67.0	33.0
11-20 years	58.2	41.8	41.0	59.0	68.3	31.7
21-30 years	61.9	38.1	44.0	56.0	67.9	32.1
31-40 years	58.7	41.3	49.1	50.9	71.4	28.6
> 40 years	59.2	40.8	64.5	35.5	70.0	30.0
<u>Location</u>						
Nonmetropolitan	61.6*	38.4	54.2**	45.8	69.7	30.3
Metro < 1,000,000	55.2	44.8	39.0	61.0	71.4	28.6
Metro ≥ 1,000,000	58.2	41.8	41.9	58.1	65.1	34.9
<u>Type of Interview</u>						
Reinterview	61.6**	38.4	51.5***	48.5	72.6	27.4
Initial	55.7	44.3	39.0	61.0	65.8	34.2

***, **, * p < .001, .01, and .05 respectively

TABLE 2

**Logistic Regression Results
Beta Values**

	<u>Probability of Initial Response to All Expense Questions</u>	<u>Probability of Qualifying for Follow-up</u>	<u>Probability of Responding to Follow-up</u>
Intercept	0.2815	0.5235	0.9092
General Internal Medicine	-0.3149*	0.4751*	-0.1839
Internal Medicine Subspecialty	0.0828	-0.2821	0.1765
General Surgery	0.0236	-0.2962	-0.2990
Surgery Subspecialty	0.0156	-0.3541	0.4608
Pediatrics	-0.2748	0.2756	0.4583
Obstetrics/Gynecology	-0.3817*	-0.2556	-0.0142
Radiology	0.0682	-0.9642**	-0.2835
Psychiatry	0.4837*	0.1189	0.6363
Anesthesiology	-0.1566	-0.0890	-0.7630
Pathology	0.4595	-0.3637	1.5669
Emergency Medicine	1.0016**	1.0765	1.7488
Other Specialty	0.3918	-0.2690	0.1322
Female	-0.3948**	-0.3019	-0.7496*
Solo	0.6322***	-0.5476***	0.4110
Hospital-based	0.1105	-0.3646	-0.9068
Years of Experience	0.0067	-0.0252	-0.0212
(Years of Experience) ²	-0.0003	0.0008	0.0004
Nonmetro	0.1434	0.6154***	0.2241
Small metro	-0.1037	-0.0780	0.3429
Initial interview	-0.2835***	-0.4880***	-0.3416
Model Chi-Square	121.26***	80.33***	30.91

***, **, * p < .001, .01, and .05 respectively

Table 3
Sample Statistics

Expense Items:		<u>1988</u>	<u>1989</u>	1990		<u>Final Data Set</u>
				<u>Values Before Follow-up Effort^c</u>	<u>Values from Follow-up Effort</u>	
Personnel	mean	\$42,538	\$48,441	\$52,970	\$51,720	\$52,748
	Std. deviation	(48,354)	(55,195)	(65,679)	(41,024)	(62,789)
	n	1,814	1,858	1,736	301	2,004
Liability Premium	mean	14,974	15,872	15,700	14,898	15,534
	Std. deviation	(18,738)	(19,354)	(21,097)	(16,775)	(20,561)
	n	2,274	2,237	1,961	334	2,255
Office Space	mean	29,966	34,046	34,586*	29,130	33,304
	std. deviation	(37,157)	(42,152)	(45,631)	(30,723)	(43,000)
	n	1,835	1,887	1,731	305	2,017
Office Supplies	mean	13,471	14,498	17,174	16,492	17,032
	std. deviation	(22,601)	(24,285)	(34,091)	(23,100)	(32,588)
	n	1,739	1,805	1,654	299	1,946
Medical Equipment	mean	6,453	6,866	7,481	8,199	7,601
	std. deviation	(16,691)	(15,669)	(15,288)	(14,914)	(15,253)
	n	1,669	1,762	1,623	288	1,904
Other	mean	14,967	17,075	22,835	23,921	22,980
	std. deviation	(27,328)	(32,632)	(48,367)	(37,096)	(46,890)
	n	1,708	1,787	1,648	290	1,925
Total Expenses	mean	123,696	140,796	149,380	142,374	148,387
	std. deviation	(113,659)	(130,757)	(153,282)	(97,874)	(146,496)
	n	1,944	1,967	1,695	292	1,985

NOTE: Results are weighted to adjust for survey nonresponse.

^cIncludes physicians that revised responses during follow-up.

*Mean values of the follow-up and non-followup groups are significantly different at the .05 level.

Table 4

Expense Item Regression Results

(In Thousands of Dollars)

	<u>Personnel</u>	<u>Liability Premium</u>	<u>Office Supplies</u>	<u>Office Space</u>	<u>Medical Equipment</u>	<u>Other</u>	<u>Total</u>
Intercept	58.14	9.51	20.61	36.91	7.66	19.64	147.54
General Internal Medicine	-2.21	-1.99	4.02	-1.98	0.17	-1.85	-0.61
Internal Medicine Subspecialty	0.50	-0.59	-4.24	2.70	0.69	4.68	6.56
General Surgery	-10.44	15.48***	-12.02***	0.66	-1.12	2.92	0.41
Surgical Subspecialty	29.72***	16.62***	0.71	19.09***	8.13***	17.32***	96.14***
Pediatrics	-9.72	-2.34	1.74	-1.54	-0.13	3.17	-3.46
Obstetrics/Gynecology	5.10	25.55***	-2.88	7.80	5.01**	7.56	54.16***
Radiology	-13.48	1.73	-3.07	-0.47	5.11**	10.60	14.62
Psychiatry	-30.95***	-1.62	-16.96***	-11.61**	-3.88*	-8.79	-71.44***
Anesthesiology	-17.98*	11.25***	-18.30***	-21.14***	-5.40**	1.79	-46.79**
Pathology	-39.39***	-6.17	-9.24	-23.76**	-2.92	-3.03	-77.74**
Emergency Medicine	-36.06**	0.82	-11.59*	-16.73	-2.85	-4.64	-69.35**
Other Specialty	-3.43	-1.18	-6.95	2.85	-0.13	1.88	-0.51
Solo	-28.16***	-4.24***	-5.37***	-6.28**	-0.60	-8.52***	-51.60***
Hospital-based	-18.12**	-2.47	-3.98	-4.48	-3.00	-9.38	-30.09*
Rural	0.93	-2.14	-0.40	-2.26	-0.74	-6.30*	-10.06
Small Metro	4.90	-1.17	1.41	-3.06	-0.04	-2.16	3.17
Female	5.06	0.86	-4.22	-4.97	-1.17	5.49	-0.83
Years of Experience	1.71***	0.50***	0.37	0.26	0.10	0.96**	3.59***
(Years of Experience) ²	-0.04***	-0.01***	-0.01	-0.01	-0.00	-.02*	-0.08***
Initial Interview	-2.06	-0.67	-0.55	0.89	-1.05	-2.86	-6.11
Effort	-6.82	-0.51	0.15	-0.83	0.53	-0.40	-18.23*
Adjusted R ²	.1193	.1934	.0462	.0621	.0687	.0332	.1412
<u>Results of Glejser's test</u>							
Coefficient for effort	-4.54	-0.33	2.75	1.61	0.08	1.47	-15.15*
Adjusted R ²	.0005	-0.0004	0.0009	-0.0002	-0.0005	-0.0004	.0015

***, **, * p < .001, .01, and .05 respectively.