Factors Affecting Physician Provision of Preventive Care to Medicaid Children

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Medicaid data for California, Georgia, Michigan, and Tennessee were used to analyze changes in fee and non-fee policies on physicians' service provision to children, before and after the enactment of the Omnibus Budget Reconciliation Act of 1989 (OBRA-1989). Only Michigan raised Medicaid preventive fees relative to the private sector. Higher relative fees increased child caseloads of participating physicians and the likelihood of providing preventive care. However, fee policy is less effective in urban poor areas due to residential segregation. Michigan's and Georgia's non-fee policy changes appeared effective in increasing EPSDT participation relative to the other States.

INTRODUCTION

Medicaid is known to increase beneficiary access, but this depends critically on a supply of providers in office as well as clinic settings in the areas in which enrollees reside. This is especially true for Medicaid children, who have greater need for contact with the health care system in their developmental years and are likely to have even greater health care needs than other, non-poor children. As the Medicaid program continues to phase-in newly eligible children, expand coverage under the State Children's Health Insurance Program (SCHIP), and move to managed care, it is important to assess physician participation and provision of preventive care. Medicaid's Early and Periodic Screening, Diagnostic, and Treatment (EPSDT) program provides for the coverage of comprehensive, periodic evaluation of health and developmental and nutritional status, as well as vision, hearing, and dental screening services to all Medicaid children enrolled from birth to 21 years of age. When preventive care is provided to Medicaid children and billed outside the formal EPSDT program, it is often referred to as "shadow" billing. Physicians participating in Medicaid can use either program to provide preventive care to children.

Congress included several provisions in OBRA-1989 (Public Law 101-239) to increase children's access to EPSDT. The changes made by section 6403 include: "Clarifying that nothing in the Medicaid law permits limiting program participation for EPSDT providers to those that can furnish all required EPSDT diagnostic or treatment services or prohibiting the participation of qualified providers that can furnish only one such service." OBRA-1989 also required States to set payment rates to ensure that the availability of obstetrical and pediatric services for Medicaid recipients were comparable to that of the general population within the same geographic area. These amendments were intended to increase the number of physicians participating in EPSDT and in turn, the number of Medicaid children screened and treated for medical conditions.

The purpose of this study is to build on earlier descriptive analyses (Adams and Graver, 1998) to examine the importance of policy tools, such as Medicaid payment levels, on the behavior of participating physicians. Specifically, it includes multivariate analysis of changes in the number of children served by physicians participating prior to the effects of OBRA-1989 (1989) and after (1992) and the likelihood that these physicians will provide preventive care to these children in four study States: California, Georgia, Michigan, and Tennessee. The existence of the Tape-to-Tape data in these States permits us to analyze the factors (e.g., enrollment, fees) shaping these changes. These data are used here to examine the short-run effects of OBRA-1989. The Tape-to-Tape data were compiled and maintained by CMS from 1980 to 1992 for California, Georgia, Michigan, and Tennessee. These data have been replaced by a new data base, called the State Medicaid Research Files, based on Medicaid data from a larger number of States.

BACKGROUND

Earlier Studies

Most earlier studies have been guided by the two-part model (Sloan et al., 1978; Held and Holahan, 1985) that asserts that physicians face a downward-sloping private demand curve and, in a separate Medicaid market, administered or flat prices for their services. Physicians accept Medicaid patients only as their private demand revenue curve drops below the Medicaid rate of payment. Much of the earlier work on Medicaid provider supply focused on the impact of reimbursement levels on participation (Hadley, 1979; Sloan, Mitchell, and Cromwell, 1978; Held and Holahan, 1985;

Mitchell, 1991). A consistent finding is that the level of reimbursement for physician services positively affects providers' decisions to participate in Medicaid. A seminal study (Long, Settle, and Stuart, 1986) on this issue noted that higher Medicaid physician fees were not associated with the probability of seeing a physician nor the level of use among the publicly versus privately insured but rather were associated with differences in the site of care. Medicaid enrollees obtained services from non-office-based physicians in areas where fees were lower (Long, Settle, and Stuart, 1986). A more recent study (Decker, 1993) also found that higher Medicaid fees were associated with more use of office-based care and less use of hospital-based care. Finally, a recent study of the determinants of limited versus full participation in Medicaid (accepting all presenting for treatment) concluded that increased Medicaid fees for primary care physicians or those in underserved areas could convert limited participants into full participants (Perloff, Kletke, and Fossett, 1995).

A complication raised in this literature is evidence of a significant maldistribution of poor persons and physicians within inner city areas (Fossett et al., 1992; Goldstein, 1994). Further, physicians in these inner city areas are likely to either opt out of the Medicaid program or specialize in Medicaid in order to generate sufficient revenues to cover average costs (Fossett and Peterson, 1989).

One study of Washington, DC metropolitan area physicians found that there was an excess of specialists but a shortage of family doctors, particularly in communities where the poor are residentially segregated (Goldstein, 1994). These locational barriers to access for the poor are determined by where doctors want to work versus where potential patients live and are able and willing

to travel. This systematic residential segregation can result in geographic areas characterized by "excess" Medicaid demand.

Based on traditional economic theory, increases in Medicaid fees lead to increases in provider output in areas with excess Medicaid demand but not in areas without excess demand, unless access is effectively increased by means of reductions in costs (decreased transportation costs, waiting time, etc.) to patients (Held and Holahan, 1985). According to this model, increased Medicaid demand will go unmet in areas with excess demand. The residential-segregation thesis (Fossett et al., 1992; Fossett and Peterson, 1989), however, leads to a different prediction regarding fees. This line of thinking argues that fees would have to increase inordinately to induce physicians to relocate or travel to the inner city to provide services; those in the inner city already have large Medicaid practices that cannot readily expand.

The effect of systematic residential segregation on physician participation has been examined to some extent. An analysis of Tennessee data found that, although fee increases were related to increases in Medicaid physician supply overall, the residential segregation and concentration of Medicaid enrollees were related to lower numbers of participating physicians, enrollees served, and visits per enrollee (Adams, 1994) in those areas. However, no study has directly tested the differential effect of fee policies in urban areas where residential segregation (and hence locational barriers to access) likely exist. The present analysis addresses this question by testing for differences in fee effects in urban ZIP Codes with high levels of poverty—areas where residential segregation is likely to exist.

Although earlier studies shed insight on provider participation more generally, less has been published in the literature on the effects of fees and other factors on physician service provision to Medicaid children. This is especially true for the effects of fees on participation in EPSDT and the provision of preventive care through shadow billing. EPSDT screening fees are sometimes set higher than fees for comparable Medicaid services (e.g., well-child visits in the shadow program) and this may be a factor in physicians' decisions to participate in EPSDT. If preventive care for children is cost-effective, it is important for policymakers to know more about what affects physicians' decisions to provide such care to poor children. It is also important to test whether the residential-segregation hypothesis holds for the provision of services to children.

Study State Background

The study States differ in many dimensions. The States also differed in their response to the OBRA-1989 legislation. Table 1 provides summary State data related to Medicaid children and managed care. California is the largest study State in terms of children served, but the other study States are similar to each other in size. Although spending per Medicaid child is quite comparable across the study States, Tennessee spent the least, $987 in fiscal year 1998.

Nationally, States are increasing their reliance on managed care in part to increase access to mainstream providers; children's eligibility groups are usually included in these programs. The States also differ on this dimension. Tennessee uses both prepaid health plans and health maintenance organizations (HMOs) to serve all Medicaid enrollees, while Georgia had only 2-3 percent in fully capitated HMOs in 1997 (National Institute for Health Care Management, 1999). Currently, all HMOs have exited the

Table 1
Summary Study State Data

State	Number of Child Enrollees in 1998	Medicaid Expenses per Child in 1998	Medicaid Managed Care		SCHIP Program	Child Expansion Income Levels	
			Percent of All Enrollees in All Forms	Dominant Form		Percent of FPL	
						Ages 1-5	Ages 6-19
California	3,438,056	$1,079	46	Capitated	Medicaid Expansion, State-Designed	133 to 250	[1] 100 to 250
Georgia	746,845	1,133	76	PCCM	Medicaid Administered, State-Designed	133 to 235	100 or 82 to 235
Michigan	781,009	1,081	68	Capitated	Medicaid Expansion	150 to 200	150 to 200
Tennessee	669,062	987	100	Capitated	Medicaid Expansion	150 to 200	[2] 125 or 150 to 200

[1] Prior to the enactment of SCHIP, children ages 6-15 were eligible at 100 percent of the FPL and those over age 15 at 82 percent of the FPL.

[2] Uninsured children not eligible under Medicaid or SCHIP are eligible for TennCare at any income level. Prior to the enactment of SCHIP, children ages 6-15 were eligible at 125 percent of the FPL and those over age 15 at 150 percent of the FPL.

NOTES: SCHIP is State Children's Health Insurance Program. FPL is Federal poverty level. PCCM is primary care case management.

SOURCES: Centers for Medicare & Medicaid Services, Center for Medicaid and State Operations; National Governor's Association.

Georgia Medicaid market. California is now expanding Medicaid capitated enrollment and now reports almost 50 percent in capitated care, while Michigan has relied on partially capitated managed care programs as a transitional strategy until markets mature (Zuckerman et al., 1998; Hurley and Wallin, 1998). Hence, some States still rely on fee-for-service (FFS) care, and setting fees will remain an issue for them. The study States have largely chosen to implement SCHIP as a Medicaid expansion.

The study States also responded differently to the OBRA-1989 provisions related to provider recruitment, and these differences are key to the analysis. With respect to fee policy, only Michigan and Tennessee actually raised Medicaid fees over the period before and after the enactment of OBRA-1989. Michigan and Georgia implemented the Resource-Based Relative Value Scale (RBRVS) in the latter part of 1992 as part of a general effort to improve the rationality of their fee schedules. The study States also implemented other strategies aimed at increasing the number of providers participating in the EPSDT program (Hill and Zimmerman, 1995). For example, California established toll-free telephone lines to answer providers' questions on eligibility status and payment of claims and dispatched fiscal agents to train providers' billing personnel. In Georgia, the local chapter of the American Academy of Pediatrics (AAP) developed and distributed a recruitment video. Georgia also recruited EPSDT providers at schools, trained providers in billing procedures, and instituted electronic billing statewide.

Michigan undertook the most comprehensive policy change. This State put into place a two-tiered payment policy in September 1990 in response to OBRA-1989. Under this policy, the State designated both comprehensive and basic EPSDT providers. Well-child visits provided in physicians' offices under the traditional Medicaid program could be billed as basic services. Alternatively, if providers obtained certification as comprehensive providers, they received higher fees for the preventive care they provided. This policy went hand in hand with Michigan's overall fee increase over the study period.

Descriptive results from the Tape-to-Tape data used in this study were published earlier (Adams and Graver, 1998). A summary of key patterns is presented in Table 2 as background for the multivariate analysis summarized here. These data show the overall trends in the number of physicians serving children and those providing preventive care either through EPSDT or shadow billing over the study period. The size of the shadow program can be seen by subtracting the number of physicians participating specifically in EPSDT from the number providing some preventive care. The relative importance of the shadow program varies across the States. In California, those in the shadow program (4,918) comprise approximately 68 percent of the total in 1992, whereas in Michigan, shadow providers make up about 33 percent of the total.

As the data show, all study States saw an increase in the numbers of participating physicians serving children, but Georgia experienced the greatest percentage increase. Georgia and Tennessee experienced the largest percentage increase in the number providing preventive care, while Michigan's percentage growth in the number of EPSDT participants far exceeded that of the other States. Growth in the number of participating physicians serving children, however, can only be gauged relative to the growth in the number of Medicaid child enrollees. As the data in Table 2 show, Georgia experienced the highest growth in the number of child

Table 2

Descriptive Data on Study States' Provider Systems: 1989-1992

| State | Number of Physicians Serving Children 1992 | Percent Change in Number of Physicians Serving Children 1989-1992 | Number of Physicians Providing Preventive Care to Children | | | | Growth in Number of Child Enrollees[1] 1989-1992 | Medicaid Children per Physician Providing Preventive Care to Children | |
| | | | Number in 1992 | | Percent Change 1989-1992 | | | | |
			Any Care	EPSDT	Any Care	EPSDT		1989	1992
California	36,453	17	7,219	2,301	11	11	42	382	373
Georgia	8,161	43	758	245	48	169	66	839	976
Michigan	12,930	17	3,730	2,482	11	5,672	4	237	233
Tennessee	7,369	20	1,685	278	33	29	47	325	455

[1] Under age 21.

NOTE: EPSDT is Early and Periodic Screening, Diagnostic, and Treatment program.

SOURCES: (Adams and Graver, 1998; Gavin et al., 1998.)

enrollees, 66 percent, while Michigan's growth rate was quite low. Both California and Michigan's provider systems grew such that the number of child enrollees per preventive care physician fell, although this held for EPSDT providers only in Michigan (Adams and Graver, 1998). The present study tries to shed insight on key factors leading to these observed changes.

DATA, METHODS, AND VARIABLES

Data

In addition to the Tape-to-Tape data, other major sources of data include the Area Resource File, the 1990 census and the MEDSTAT Group's MarketScan® data are used. The Tape-to-Tape data contain full information on all enrollees, claims, and providers of Medicaid services in the study States: California, Georgia, Michigan, and Tennessee. Outpatient claims, enrollment, and provider files were used to identify active providers, age of enrollee served, and counts of those providing specific services (e.g., preventive care, EPSDT). As in the overall EPSDT evaluation (Herz et al., 1994), claims for children under age 21 were used for the analysis, but claims for institutionalized children, children covered under Medicaid capitated health plans, and children with dual Medicare and Medicaid coverage were excluded.

The State provider files within the Tape-to-Tape data contain a record for all providers who have billed Medicaid sometime during the year. These files are organized by an identification number (ID) that is used to identify unique providers. Providers were determined to be physicians only if their provider type on the uniform file was "physician," and they submitted at least some claims during the year with this provider type. Physician specialty was determined by the specialty under which they billed most of the time. Georgia and Michigan use only one ID for the billing process; this ID represents the actual treating provider (not billing provider). In Michigan, a master file of physician IDs is available from the State to link multiple IDs for the same physician. In Tennessee and California, unique treating and billing provider IDs are included on the claim. The treating-provider ID is used in the analysis. In rare instances in Georgia, providers may be assigned more than one ID; those providers with the same name and city were then combined as one provider.

The Area Resource File, compiled by the Bureau of Health Professions, was used to measure total counts of physicians, total population, counts of children, square miles in county, unemployment rates, household income, and other sociodemographic data at the county level. These variables are used to calculate measures that are indicative of the level of supply (e.g., physicians per capita) or demand (e.g., total child population) within the county area. We also obtained the more detailed Rural/Urban Continuum Code (RUCC), developed by the U.S. Department of Agriculture for the 1989 and 1992 data to characterize whether the participating physicians' ZIP Code was in an urban, suburban, or rural area. The RUCC in the Area Resource File groups counties according to the overall level of the urban population in the county and whether the county is adjacent to a metropolitan county, based in part on the commuting patterns of workers. Four categories were developed based on the RUCC: urban, inner urban, suburban, and rural (Adams, Chawla, and Graver, 1996). In the regression analysis, the two urban categories are collapsed, and those physicians in poor ZIP Codes (more than 20 percent of the population with incomes below 100 percent of the Federal poverty level [FPL]) are flagged.

The 1990 census data were used to count numbers of households with incomes at or below the FPL. Poverty cutoffs have been used by others (Kasarda, 1993) to indicate poverty areas (population incomes at least 20 percent below the FPL) and extreme poverty areas (population incomes at least 40 percent below the FPL). The census data are used to designate whether the Medicaid participating providers' ZIP Code is characterized by more than 20 percent of the population with incomes below 100 percent of the FPL. The intent is to identify those participating physicians practicing in urban areas where there is likely to be residential segregation of providers and enrollees.

The key policy variable used in this analysis is a measure of the generosity of Medicaid payments relative to those in the private sector. To derive this measure, data from MEDSTAT Group's 1989 and 1992 MarketScan® Database were used. The MarketScan® data include health care claims of employees (and their dependents) of large self-insured employers across a broad range of industries, health care plans, and geographic areas. Data on selected procedures for which there were 20 or more claims were obtained for each of the study States for 1989 and 1992 and by major metropolitan area.

Two sets of procedure codes were used: one for a representative set of the services generally used by Medicaid enrollees and another for preventive care services. The representative set includes office and hospital visits, obstetrical care, selected surgeries, imaging, and laboratory tests. (Medicaid fees for this set of services were surveyed earlier [Norton, 1995]). Data on EPSDT and specific preventive care procedures were used to create the preventive care fee index. The indexes are derived using the average payment for the procedures in the Medicaid and private (MED-

STAT) insured data and the proportion of total Medicaid expenditures each procedure comprised in 1989 as the weight for both years. Private fee measures also varied across urban and rural county areas.

Finally, geographic cost factors developed by earlier researchers (Zuckerman, Welch, and Pope, 1990) were used to reflect variations in the cost of doing business for the 1989 data, and the Medicare Geographic Practice Cost Indexes were used for the 1992 data. These indexes are designed to reflect the costs of providing physician services (e.g., rents, nursing labor costs) and are published in the *Federal Register* for major metropolitan and rural counties in each State. The 1989 and 1992 indexes were assigned to each physician depending on the county in which they served Medicaid enrollees in each year.

Methods

Both logit and ordinary least squares (OLS) estimators are used to examine the behavior of participating physicians. An OLS equation is used to examine annual child caseloads. In this equation, the log form of the variables is used for continuous variables. Logit equations are used to estimate the likelihood that: (1) participating physicians serving children provide any preventive care; and (2) participating physicians that provide preventive care participate in EPSDT. Maximum likelihood estimators are used. Analyses presented here are on the pooled State data set. Pooling the States' data introduces variation in the Medicaid fee indexes which allows for a better test of its significance; the index does not vary significantly within each study State and is correlated with the respective State's geographic cost index. Pooling the data also allows for testing the significance of differences in States' non-fee policies.

Variables and Expected Effects

Dependent Variables

The following dependent variables were defined: (1) the number of children served; (2) whether the physician provided preventive care or not (yes, no); and (3) whether these physicians participated in EPSDT (yes, no). The first two were derived for all physicians participating and serving children in either 1989 or 1992, while the third variable was defined only for those providing some preventive care.

Physicians with even one claim for children (as defined earlier) were counted; those with any claims for preventive care (either EPSDT or shadow billing) or for EPSDT specifically were counted. Only physicians billing under their own ID sometime during the year were counted; this includes office-based physicians regardless of site of care (e.g., office, emergency room, clinic) but does not include clinic providers. The sample is a conditional one, based only on those participating in Medicaid in either year. Hence, the effects of the fee variable, for example, may be moderated, as physicians in the sample have already made the major decision to work with the program. However, the analysis does measure its impact on physicians' decisions to start (or stop) serving children once they are Medicaid participating physicians.

Independent Variables

The multivariate analysis includes a number of independent variables derived from the Area Resource File and, in some instances, data from Tape-to-Tape combined with Area Resource File data. The major independent variables used to reflect measures of supply and demand and their expected effects are described here.

Measuring the effects of fee changes over the study period requires that we account for changes in eligibility, or demand, occurring over this time period. Independent variables used to reflect the demand for private or Medicaid physician services within the county include: (1) percent of children in the county enrolled in Medicaid; (2) percent of Medicaid children under 2 years of age; (3) percent of county population enrolled in Medicare; (4) population per square mile; (5) percent of county population enrolled in an HMO; (6) unemployment rate in county; and (7) county average household income.

In general, these variables reflect either a change in Medicaid demand (enrollment) or private demand (unemployment, household income, HMO enrollment, etc.). If Medicaid child demand increases, the number of physicians serving children, holding other factors constant, should increase. If private demand for physicians' services increases (lower unemployment, higher household income), Medicaid participation should decline because physicians prefer the higher paying private patients. A higher percentage of persons enrolled in Medicare in the county is expected to lower participation, as this program also pays more generously than Medicaid. Although this has been found in an earlier analysis of overall physician participation (Adams, 1994), it is unclear whether this will hold for Medicaid children. Factors such as population per square mile are used to reflect the size and concentration of the population, which will affect overall access and demand.

The expected effect of HMO enrollment is difficult to predict. The percent of HMO enrollment in the population may lower the demand for specialists' services while also lowering the price that can be obtained for services in the private sector. Both of

these would theoretically increase physicians' participation in Medicaid because private demand is lowered (for some services), and private fees may become more comparable to Medicaid. On the other hand, HMO enrollment can increase private demand for primary care providers' services, which would work in the other direction. This effect may dominate for children because they more often use primary care physicians.

The primary independent variable used to reflect the supply of physicians in the area is the number of office-based physicians per capita. (We also tested other supply measures but found them insignificant: growth in physician supply from prior year; number of HMOs per 1,000 physicians; number of hospitals with emergency departments; number of teaching hospitals; and a flag for counties with a shortage of primary care physicians.) The expected sign for the number of office-based physicians is positive because this indicates more competition for private patients. However, this variable has often led to the opposite result (Sloan, Mitchell, and Cromwell, 1978; Mitchell, 1991) in cross-sectional studies. This may indicate correlation with unmeasured characteristics of the area that also affect participation decisions (e.g., private insured) and the fact that researchers generally only have proxies of the privately insured (e.g., household income). Reliable sources for insurance coverage do not generally exist for the county or subcounty level. Another variable, the number of children per participating clinic, is used to reflect demand relative to alternative sources of supply of preventive care for Medicaid children. The expected sign is positive.

The key independent variable is the Medicaid fee index. Fees are a major policy tool for Medicaid agencies, and setting relative fees was an explicit part of the OBRA-1989 language. This analysis is the first to use a broad set of private sector fees to create a measure of Medicaid generosity and a separate index for preventive care. The Medicaid fee index for the representative set of services is used to explain changes in child caseloads, while the preventive care fee index is used to explain the probability that providers will offer preventive care in the shadow or EPSDT program. Although the expected sign on the fee variable is always positive, the analysis tests for differences in its effect in areas where there is potentially excess demand.

As noted, physicians are less likely to locate in poorer, inner urban areas where Medicaid enrollees more likely reside, leading to excess demand. Economic theory indicates that fee policy will be most effective in these areas, while the residential-segregation hypothesis predicts they will be less effective. These alternative hypotheses are tested by including a location and interaction term (location * fee index) based on physicians' location in relatively poorer ZIP Codes. The fee effect is allowed to vary for urban, suburban, and rural ZIP Codes, although the effect is expected to differ only in the first. Given some earlier evidence that the segregation hypothesis may hold (Mitchell, 1991; Adams, 1994), the expected sign on the interactive term is negative.

Other physician-specific independent variables include: (1) physician specialty flags, including internist, obstetrician/gynecologist, pediatrician, general practitioner, and family practitioner (other specialties are the omitted category); and (2) physicians' dominant place of service when serving Medicaid children. The expected sign for pediatricians and general and family practitioners is positive. The expected sign on the dominant place of service is uncertain, as office-based physicians often limit the size of their

Medicaid practices (Perloff, Kletke, and Fossett, 1995), and preventive care, particularly EPSDT, is often provided by physicians in public clinic settings.

The relative cost index included in the equations is used to measure the costs of doing business in a physicians' office across geographic areas of the States. The expected sign for this variable is negative. The higher the costs of producing physician's services, the lower the probability the physician will participate in Medicaid or have higher caseloads. Its expected sign on preventive care service provision specifically is less certain, as the cost of producing these services may be lower than other types of services.

Finally, a set of State and time (before and after the enactment of OBRA-1989) dummy variables is used to account for average differences across the States and the effect of OBRA-1989. An interaction variable (State * time) is also included. The coefficient on this interactive term reflects the difference in the changes before and after the enactment of OBRA-1989 for each State relative to the omitted State—Tennessee. These differences are significant if the coefficient on the State's interactive term is significant (Table 3). Because the effect of the States' fee changes are accounted for with a separate variable, the interactive terms are interpreted as the effect of the States' non-fee policy changes. The expectation is that there will be greater increases in States where incentives were changed more, such as under Michigan's two-tiered system.

RESULTS

Relative Payments

A major question was whether States responded to OBRA-1989 by increasing provider payment levels and, in turn, whether increases were in line with those in the private sector. The indexes of relative Medicaid generosity are presented for each State for 1989 and 1992 and for urban and rural counties in Table 4.

As these results show, Medicaid fees are significantly lower than private fees in both years in each study State. These range from 35 percent of private fees in California to 62 percent in Georgia in 1989 for the representative set of services. As noted, only Michigan and Tennessee raised Medicaid fees over the study period; this increase was 23 percent in Michigan and 10 percent in Tennessee. (Georgia's implementation of RBRVS late in 1992 increased fees by only 1.5 percent from 1989.) The relative generosity of Medicaid payments for the representative set of services, however, increased only in Tennessee and California. The increase in California apparently reflects a decline in private payments. Tennessee's overall Medicaid generosity increased from 54 percent to 57 percent of private fee levels, increasing 43 percent to 53 percent of private fees in urban counties.

Although relative fees increased in California for the representative set of services, it declined from 47 percent to 45 percent of private fees for the subset of preventive services. Only in Michigan did Medicaid payments for preventive services increase markedly relative to private levels. Michigan's relative generosity for preventive care services increased from 48 percent to 56 percent of private fees across all counties over the time period before and after the enactment of OBRA-1989.

Multivariate Analysis

The full regression results are available from the author upon request. A summary of the results is shown in Table 3. This table denotes the direction of the effect only for those variables significant ($p=0.01$) in at least one equation.

Table 3
Summary of Multivariate Results[1]

Item	OLS Equation	Logit Equations	
	Children Served per Physician	Physicians Providing Preventive Care	Physicians Participating in EPSDT
Demand-Related			
Percent Medicaid Children	+	+	NS
Percent Medicare	-	NS	+
Population per Square Mile	-	NS	-
Percent HMO-Enrolled	-	-	-
Unemployment Rate	-	NS	NS
Household Income	-	-	+
Supply-Related			
Office-Based Physicians per Capita	-	-	NS
Medicaid Children per Participating Clinic	NS	NS	+
Internist	-	-	-
Obstetrician/Gynecologist	-	+	-
Pediatrician	+	+	NS
General Practitioner	+	NS	-
Family Practitioner	-	+	-
Dominant–Office	NS	+	-
Practice in Urban Poor * ZIP	-	NS	NS
Practice in Suburban Poor * ZIP	+	NS	NS
Fee Index Effect in Urban Poor * ZIP	-	-	NS
Fee-Index–Urban ZIP w/20+ Under FPL			
Participated in 1992 Only	+	+	NS
Participated in Both 1989 and 1992	+	+	+
Physician Cost Index	-	NS	NS
Fee Index (Medicaid/Private)	+	+	+
Time	+	+	NS
State Dummy Time/Interaction	GA(+)	CA(-)	GA(+),MI(+)

[1] Detailed results are available from the author.

NOTES: Variables are significant at the p=0.01 level. OLS is ordinary least squares. EPSDT is Early and Periodic Screening, Diagnostic, and Treatment program. NS is not significant. HMO is health maintenance organization. FPL is Federal poverty level. GA is Georgia. CA is California. MI is Michigan.

SOURCE: Adams, E.K., Emory University, 2001.

Caseloads

The first results are based on an OLS equation that tests the effects of the independent variables on changes in the number of children served by physicians participating in Medicaid in either year. Increases in child caseloads can result from new child providers or increases in the volume of those previously serving children. The results on the demand, supply, fee, and State variables are discussed in turn.

The results on the demand variables are largely consistent with expectations. As shown in Table 3, increases in the percent of children in the county that are enrolled in Medicaid is positive and significant. The

magnitude of the coefficient (not shown) indicates that a 10-percent increase in this variable leads to an increase of almost four children served per participating physician. The sign on the percent enrolled in Medicare in the county is negative, suggesting a trade-off of Medicare for Medicaid child clientele. As noted, Medicare is a more generous payer.

The signs on household income, a proxy for the level of private demand in the area, are negative in two equations, consistent with the theory. The results on the HMO penetration rate are negative, indicating that participating physicians in these areas maintain smaller Medicaid child caseloads. This is consistent with an increase in pri-

Table 4

Index of Medicaid to Private Payment Levels for Representative and Preventive Services in Study States, by Urban or Rural Status: 1989 and 1992

Service Type and Area	California		Georgia		Michigan		Tennessee	
	1989	1992	1989	1992	1989	1992	1989	1992
Representative Services								
All Counties	0.35	0.37	0.62	0.57	0.45	0.45	0.54	0.57
Urban	0.29	0.35	0.52	0.53	0.40	0.40	0.43	0.53
Rural	0.43	0.40	0.65	0.58	0.48	0.47	0.59	0.59
Preventive Services								
All Counties	0.47	0.45	0.45	0.40	0.48	0.56	0.51	0.48
Urban	0.40	0.43	0.42	0.36	0.44	0.52	0.45	0.44
Rural	0.56	0.48	0.47	0.42	0.50	0.57	0.53	0.50

SOURCE: (Adams and Graver, 1998.)

vate demand for primary care physician services which, in turn, lowers the tendency of physicians to participate fully in Medicaid. The percent unemployed is unexpectedly negative in this first equation and insignificant in the others.

Two key supply-related variables do not perform as expected. As shown in Table 3, the number of physicians per capita has the wrong sign in predicting child caseloads. As noted earlier, this may reflect the lack of good geographic-based measures of the level of private demand. The number of Medicaid children per participating clinic is insignificant in this first equation. Specialty differences in the numbers of children served were not surprising. Pediatricians and general practitioners have higher Medicaid child caseloads than the omitted category of physician (non-primary care specialists). Internists and obstetrician/gynecologists, as well as family practitioners, have lower caseloads than this omitted category.

Other physician characteristics that were significant in this first equation include the physician's ZIP Code and whether they were participating in Medicaid in both years. The child caseloads of participating physicians located in urban ZIP Codes with 20 percent of the population or more with incomes below the FPL were significantly lower than those in

ZIP Codes with lower poverty levels. This is consistent with the thesis that most physicians in residentially segregated urban poor areas tend to opt out or limit their Medicaid practices. Although the sign on the location of a physician in suburban poorer ZIP Codes is positive and significant, indicating the opposite might hold, the magnitude of the coefficient is quite small. We note also that the RUCC may be a rough categorization of suburban areas. Finally, an interesting finding in this first equation is that those physicians participating in both 1989 and 1992 were more likely to serve more children during the year. Physicians may become more familiar with families' needs and develop greater compliance as they serve them longer.

The results on both the Medicaid fee index and the measure of the costs of doing business are as expected. Higher physicians' costs are associated with lower child caseloads per participating physician, holding other factors constant. The key policy variable—the Medicaid fee index—is positive and significant. The magnitude of the coefficient (0.77, not shown) indicates that a 10-percent increase in this fee index leads to an increase in a participating physician's annual caseload of almost eight children. The effect of the fee variable, as expected, is lower in those urban ZIP

Codes with high rates of poverty and potential residential segregation. Indeed, the sum of the two coefficients [0.77 + (-0.79), not shown] indicates that an increase in relative fees leads to no increase in children served per participating physician in these areas.

Finally, as noted, because we have directly accounted for the effect of State changes in fees, the effect of their non-fee policy changes can be gauged by the (time * State) interactive variable. The sum of the coefficient on the time and interactive term measures the change in child caseloads for each State (relative to the omitted State—Tennessee) over the period before and after the enactment of OBRA-1989. The coefficient on the interactive term in this first equation is only significant for Georgia. Because the coefficient is positive, this indicates that the non-fee policies implemented in Georgia after the enactment of OBRA-1989 led to greater increases in child caseloads than those used in the remaining study States.

Preventive Care

The results for preventive care are summarized in Table 3, including a logit equation that explains the likelihood that a physician participating in Medicaid and serving any children during the year will provide them any preventive care. The demand variables in this equation are generally of the expected sign in the equation explaining preventive care, although fewer are significant. The percent of Medicaid children in the county area is again positive, indicating that participating physicians are not only more likely to serve children but to provide them preventive care as Medicaid demand in their county increases. The percent enrolled in Medicare in the county is insignificant.

The household income variable is again of the expected sign and indicates that higher private demand lowers the likelihood of participating physicians providing preventive care. Interestingly, the HMO penetration variable is again negative. This suggests that the effect seen for child caseloads carries through to the provision of preventive care; participating physicians in areas with greater HMO penetration are less likely to provide preventive care to Medicaid children.

The results for specialty and office setting are somewhat different in this preventive care equation than in the child caseload equation. As expected, pediatricians are more likely than the omitted category (non-primary specialists) to provide Medicaid children preventive care, but this does not hold for general practitioners, even though they were more likely to have higher child caseloads. Family practitioners and obstetrician/gynecologists, on the other hand, appear more likely to provide preventive care, even though the results in the child caseload equation were positive for them. Although dominant office setting was insignificant in the child caseload equation, the results in the preventive care equation indicate that participating physicians serving Medicaid children predominantly in the office setting are more likely to provide them preventive care.

As found for child caseloads, those physicians participating in Medicaid in both 1989 and 1992 were more likely to provide them preventive care. Again, this applied to those newly participating or participating after the enactment of OBRA-1989 as well. The results seen for lower child caseloads in poorer urban areas did not hold for the preventive care equation, nor was the variation in costs of doing business a significant factor. As noted, preventive care may be a relatively low-cost

service to provide, and once a physician decides to serve children, higher average costs may not affect this line of service.

The key policy variable is again the relative (Medicaid/private) fee index. Note that the fee variable in this and the next equation is the preventive care fee index from Table 4. This variable has the expected positive sign, indicating that the odds of providing preventive care increase with higher relative fees. However, the results also again indicate that the effect of fee changes is less for physicians practicing in those very poor (20 percent of the population or more with incomes below the FPL) urban areas. Thus, although fees increase the odds of providing preventive care, they increase them by less in the residential areas where the poor are concentrated and where there is likely excess demand for Medicaid services.

The last results summarized in Table 3 are based on a logit equation that examines factors affecting the decision of those providing preventive care to Medicaid children to participate specifically in EPSDT. We can gain insight by comparing the results across the EPSDT and the preventive care equation because the latter also includes those providing preventive care through shadow billing. Although the billing process should not matter for the end goal of children receiving preventive care, there is a desire to increase office-based physician participation in the formal EPSDT program, which was designed to allow for indepth screening, referral, and coordination of care. If the factors affecting EPSDT participation are found to be different, this could guide policies on outreach and recruitment of EPSDT providers.

Many of the results are the same for this last equation, including the HMO effect, but there are also some key differences. For example, whereas pediatricians, obste-

trician/gynecologists, and family practitioners were all more likely to provide some preventive care than non-primary specialists, the results for the latter two indicate they are less likely to do so through the formal EPSDT program. Thus, obstetrician/gynecologists and family practitioners appear more likely to use shadow billing when providing preventive care. The coefficient for pediatricians is not significant in the EPSDT equation, indicating that they are not more or less likely (than the omitted category) to provide preventive care through the EPSDT program. Thus, pediatricians appear to use both shadow billing and the EPSDT program to provide a relatively greater amount of preventive care.

The results for dominant office setting are also different; those serving children predominantly in their office setting are less likely to provide preventive care specifically through the EPSDT program, even though they are more likely to provide some preventive care. Thus, they appear more likely to use shadow billing. This result is consistent with the significant use of EPSDT providers in public health departments and other clinics in our study States (Adams and Graver, 1998). It is interesting that the number of Medicaid children per participating clinic is significant and positive in the EPSDT equation; this would imply that office-based physicians are more likely to participate in areas where there are fewer clinic-based alternatives. Note however, the percent of Medicaid children is now significant at $p=0.05$ (not shown), indicating collinearity.

Again the key policy variable, relative fees, is positive in this equation. Finally, the results on the interactive term (time * State) in the EPSDT equation indicate that the non-fee policies initiated in Georgia and Michigan were effective in increasing participation in EPSDT physician

participation relative to the other study States. The size of the effect appears quite large for Michigan.

DISCUSSION

The foregoing analysis, although based on older data, has important implications for current policies aimed at increasing physician participation, provision of services, and children's access in Medicaid and SCHIP. These results are also informative regarding the specific State fee and non-fee policies that the study States undertook in response to OBRA-1989.

The results presented here indicate that although Michigan and Tennessee implemented increases in fees, and Georgia and Michigan restructured them toward primary care services, the States were generally unsuccessful in keeping up with changes in fees in the private sector. Michigan was the only State that successfully raised Medicaid fees for preventive care relative to private sector fees.

The key question is whether these changes in fee policies mattered. The foregoing analysis generally confirms that Medicaid fee generosity is an important variable with respect to physicians' decisions to serve children, provide them with preventive care, and participate in the EPSDT program. Although the regression analysis indicates that physicians respond to increases in fee generosity, the fact that the study States did not generally increase fees, coupled with continued increases in child enrollments over this time period, resulted in higher child/preventive care provider ratios in all States except Michigan. In turn, the study States were only moderately successful in increasing the percent of children with any preventive care or the recommended number of visits (Gavin et al., 1998).

Another key question concerns the effect of residential segregation on service provision for Medicaid children. The results strongly support concerns with the segregation of physicians' practices and enrollees' residences. The findings indicate that physicians serving Medicaid clients in relatively poorer urban areas, where there is likely residential segregation, tend to take on smaller child caseloads. Furthermore, the results confirm that these physicians are less responsive to changes in Medicaid fee generosity, as the residential-segregation hypothesis asserts. If fee policy is less effective, States may consider policies to encourage the location of physicians in these underserved areas and/or to encourage the location of satellite clinics. In the case of capitated payment arrangements, HMOs may need to carefully recruit providers in these areas. Physicians practicing in these poorer areas may be essential providers, and contracts could be written to include these pre-existing Medicaid providers. This is a particular issue for minority physicians who may not meet network criteria, such as board certification.

Other results indicate that the continuously participating physician, or those who participated in the study States over the 1989-1992 time period, were more likely to have higher caseloads, provide preventive care, and participate in EPSDT. Whether this reflects the practice of those physicians or the reaction of enrollees when they find reliable sources of care is unknown. Yet the finding that continuity in participation increases the likelihood of provision of preventive care and participation in EPSDT is important for States to consider in designing provider recruitment programs.

Another finding of note is that variation in physicians' costs was a significant negative determinant of child caseloads. This

indicates that physicians in more costly geographic areas tend to have smaller Medicaid child caseloads. Most States do not recognize geographic cost variations in their Medicaid reimbursements even when they use the Medicare RBRVS fee schedule (Physician Payment Review Commission, 1995). This may be an important consideration for future policy because urban and rural areas differ in terms of costs and increasingly, in terms of FFS versus managed care delivery.

The results are also important for broad interpretations of the impact of State-specific, non-fee policy changes on the EPSDT program. Both the descriptive and multivariate results indicate that Michigan's policy change, allowing both basic and comprehensive providers of EPSDT services, was effective. This policy is perhaps a combination of fee and non-fee policy because, although it allows physicians more flexibility in participation, the State clearly provided financial incentives to be a comprehensive provider through the fee schedule. Because fees are accounted for separately in the analysis, any non-fee effect should operate through the interactive term which, as noted, was significant. Georgia's efforts (recruitment video and electronic billing) appear to have increased child caseloads as well as the probability that physicians who serve children will provide them with preventive care through the EPSDT program, relative to the other study States.

Finally, the results indicate that States need to monitor relative fees for preventive care and other services as they expand insurance coverage for poor children. As States continue to implement SCHIP, issues regarding fee adequacy will arise. Many of those using a private SCHIP initiative are contracting with managed care plans while others are setting separate fee schedules. Fee generosity is important for preventive care services even under a capitated arrangement because ESPDT services are often carved out of capitated rates (e.g., California). Rates will need to be set so as to retain FFS providers of these services. Those States (e.g., Colorado) that are building their own provider networks for SCHIP will need to consider fees as well as the locational barriers to access noted in the literature and examined here. SCHIP children, however, will tend to be from higher income households and hence may not be as affected by the residential-segregation issues raised here. Finally, the finding that physicians continuously participating in the Medicaid program are more likely to provide preventive care to children suggests States may want to recruit traditional Medicaid providers for participation in their SCHIP programs.

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