

NATIONAL BUREAU OF ECONOMIC RESEARCH, INC.
1050 Massachusetts Avenue, Cambridge, MA 02138

**UNIVERSITIES RESEARCH CONFERENCE
IMPACT OF RECENT FEDERAL AND STATE REFORMS IN
PUBLIC ASSISTANCE AND SOCIAL INSURANCE PROGRAMS**

May 14 and 15, 1999

Royal Sonesta Hotel
Cambridge, Massachusetts

GOVERNMENT DECISION-MAKING AND THE INCIDENCE OF FEDERAL MANDATES

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Scheduled for: May 14, 9:00 AM

Discussant: HOWARD CHERNICK, Hunter College

GOVERNMENT DECISION-MAKING AND THE INCIDENCE OF FEDERAL MANDATES

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This paper analyzes the effects of federally-mandated program changes on state spending and revenues, incorporating and evaluating the predictive value of several common theories of the state decision-making process. Using several sources of exogenous increases in public medical spending, I estimate that the entire state portion of the burden of mandated spending is borne by decreases in other public welfare spending. Comparison of state reactions to different shocks suggests that these reductions are due in part to the substitutability of programs in the voter utility function but also in large part to a flypaper-like “stickiness” of spending by budget category. States with greater racial differences between recipients and voters and states with less generous neighbors reduce other public welfare spending by even more, alleviating the burden the medical expansions imposed on their taxpayers. There is no evidence that the existence of self-imposed tax and expenditure limits affects state reactions to these shocks.

*I thank Martin Feldstein, Christopher Avery, Edward Glaeser, Claudia Goldin, James Hines, Caroline Hoxby, Sendhil Mullainathan, Jonathan Skinner, workshop participants at Harvard University, and especially David Cutler and Lawrence Katz for innumerable helpful comments. Robert Deane and Paul Romary provided useful insight and information. I am grateful to the National Institute on Aging, the National Science Foundation and the Harvard/MIT Research Training Grant in Positive Political Economy for support. Comments are welcome to Katherine Baicker, Department of Economics, Dartmouth College, 6106 Rockefeller Hall, Hanover, NH 03755-3514 or Katherine.Baicker@Dartmouth.edu.

I. INTRODUCTION

In recent years individual states have been given more control over how federal grant money is spent. A number of programs once run through the federal government have been folded into block grants to the states, including Aid to Families with Dependent Children (AFDC) and the provision of health care for poor children. How will this decentralization affect the level or distribution of benefits? In a recent debate about financing benefits for disabled children, the Congressional Budget Office worried that states would "substitute federal money for state money already being spent," in response to which "Governors insist[ed] that they will use the money as Congress intended" (New York Times, July 2, 1997). It is impossible to predict the effect of welfare devolution, unfunded federal mandates, or block grants without understanding the factors that influence the state decision-making process. This paper provides both a theoretical framework for how states determine spending and a case study of the incidence of federal mandates. How states responded to mandated increases in spending on a federally subsidized program reveals the factors that govern their budgetary process.

Several models have been proposed to explain government decision-making. The most basic assumes that states are rational decision-makers, maximizing the utility of their median voter. Even within a median voter model, however, voter preferences for transfers may be based on the demographics of the likely recipients. These demographic preferences could also influence the way that states respond to changes in federal program rules or funding. Voters may, in addition, enact tax and expenditure limits which reduce the options available to states, and these laws may constrain a state's reaction to fiscal shocks. In this context, these limits may restrict states' ability to respond to federal mandates by raising tax rates.

Furthermore, the actions of one state may be influenced by the actions of its neighbors. States may be concerned with driving away taxpayers or attracting welfare recipients from other

states if their benefits are too generous. This fear of being a “welfare magnet,” justified or not, may temper states’ reactions to fiscal shocks and federal mandates.¹

Last, the state budget process may be subject to a “flypaper” effect, such that increases or decreases in federal grants “stick” within particular programs, rather than being spread across programs in the way that a standard median voter model would predict.² States may behave this way because they fear that maximization in one period will reduce future federal grants.³ Public sentiment is strong that states ought not to spend federal revenues for purposes other than that for which they were “intended,” and that they ought not to divert their own funds from programs receiving increased federal aid. A recent New York Times editorial defended New York’s “suspect” manipulation of federal Medicaid reimbursement rules by noting that it “has not, like many states, diverted these reimbursements to highways and other non-health programs” (New York Times, August 12, 1997).

The different implications of these models make it difficult to predict how the recent increase in control by the states over federal monies will play out and which state characteristics will most influence their response. One way to discriminate among these theories is to estimate directly how each factor – demographics, tax and expenditure limits, neighbors’ actions, and budget category stickiness – affects state spending and revenues. The problem with such direct estimation is that other factors which are difficult to control for adequately, such as the general economic climate, may confound the estimates. For example, if states spend more on both AFDC and on food stamps when times are bad, for instance, estimating a positive correlation

¹ Many states are enacting rules to limit benefits to new residents. Such rules are now permitted under the 1996 welfare law. One such rule was recently overturned by a federal judge in Pennsylvania. The state argued that it “wanted to discourage people from shopping around for the best benefit.” Washington State has a similar law “designed to prevent an influx,” according to a state spokesman. (New York Times, Oct 14, 1997)

² Such an effect has been observed in many different public spending contexts. Hines and Thaler (1995) report, for example, that an unconditional federal grant to states raises spending by much more than increases in income do (perhaps by close to 100 percent of the grant, versus 5 to 10 percent of income).

³ This fear of future revenue loss is consistent with a median voter model and can be incorporated into a rational maximization framework (see Brennan and Pincus (1996)). Other rationales for observed flypaper

between food stamp spending and AFDC spending would not imply that higher food stamp spending *caused* higher AFDC spending. In addition, these confounding factors may change the cost of government services as well as the demand for these services, making interpretation of such estimates difficult.

An alternative approach to estimating these effects is to examine the reaction of states to required increases in spending imposed exogenously by the federal government. Since required spending changes are not chosen by the state and are unrelated to state-specific factors such as economic conditions, they can be used as “natural experiments” to estimate the decision rules of government. How states respond to exogenous requirements to spend more on a particular program implicitly reveals the way that states make fiscal decisions.

In this paper I examine how states responded to a series of exogenous increases in spending on Medicaid in the 1980s and 1990s. Medicaid is an ideal program with which to test the alternate theories of government decision-making for several reasons. First, the program is a large enough component of state budgets that cost increases place a significant strain on state budgets. Second, federally-mandated expansions of Medicaid eligibility and the substantial increase in medical costs of the 1980s and 1990s create a series of natural experiments of exogenous spending increases. Third, the Medicaid program serves several demographically distinct sectors of the population, which will allow me to distinguish between the two hypotheses of substitutability and budget “stickiness.”

I find that states financed the mandated increases in Medicaid spending by paring back only other welfare spending (such as low-income energy assistance or foster care). The remainder of the benefits were funded by increased federal revenues and, in smaller part, short-run decreases in state surpluses covering the balance. The evidence suggests that spending within

phenomena (involving bureaucratic power and agency problems, for example) are not so easily incorporated into a median voter model (see Brennan and Buchanan (1977)).

budget categories is "sticky," and that funds are not easily transferred between categories. Federal Medicaid mandates shifted the composition of overall welfare benefits, but not the level.

While states on average financed the entirety of new Medicaid spending by cutting back on other welfare spending, a state's demographic composition and the generosity of neighboring states' welfare programs affected the magnitude of its reaction. States with greater racial diversity pared back other welfare programs more sharply than did their more racially homogeneous counterparts. States with less generous neighbors, and thus more concern with disadvantageous migration, also cut back other welfare spending more sharply. In both cases, the additional reduction in public welfare spending benefited taxpayers by reducing their share of the burden.

The empirical results are thus most consistent with a model in which state spending and revenue decisions are governed primarily by the cost of shifting spending between budget categories, and are influenced by the demographics of residents and the spending of neighboring states.

Section II presents a model of state decision-making and analyzes its predictions for changes in state budgets when federal financing changes or new federal mandates are introduced. Section III summarizes the Medicaid program and section IV describes the data. Section V uses Medicaid eligibility expansions and cost growth to estimate changes in state spending patterns. Section VI evaluates the predictions of the model of state decision-making. Section VII concludes.

II. MODELING ALTERNATE EFFECTS ON STATE SPENDING

A state's reaction to federally-imposed constraints depends on how state preferences are formed. Ultimately, every (mandated) increase in spending must be matched by some combination of an increase in taxes, an increase in deficits, or a decrease in spending on other

programs. Alternate theories of state decision-making suggest different combinations under different circumstances.

I begin with a median voter model where voters choose taxes and transfers to maximize their utility, and then incorporate the demographic characteristics of the voting population, the existence of tax and expenditure limits, and the possibility of a flypaper effect.⁴ I assume that there are multiple states and one federal government. The median voter's utility is:

$$(1) \quad U = u(y - \tau) + \alpha(\bar{X}_j, \bar{T}_j)$$

There are two components to this voter utility. The median voter has consumption composed of personal income y (exogenously determined) minus (non-distortionary) taxes τ . u is the utility the median voter derives from this private consumption.

The median voter also cares about the consumption of others. Some altruism function α determines how much the median voter values the utility that recipients derive from their consumption of transfers, but this altruism is tempered by the demographic differences between the voter and the recipients (X_j for program j , the absolute value of X_M minus X_{Rj}).⁵ Because welfare recipients are a small minority of each state's voting population, I assume that the median voter does not currently receive welfare benefits. T_j is the transfer amount through program j . $\bar{T}_j$ is the vector of transfers and $\bar{X}_j$ is the vector of demographic differences for the J programs.

⁴ More technical assumptions about the model are included in Appendix A. Note that while I use a median voter framework as the basis for the state optimization problem (see Gramlich and Rubinfeld (1982), for example), the empirical results do not rely on the median voter model.

⁵ Voters may value transfers purely out of altruism, because of the future costs that uncovered poor people may impose on society (social unrest, reduced productivity, etc.), or because of the insurance value of the social safety net. Each voter's characteristics, such as gender and education, would affect the likelihood that she will at some point be eligible for some program, and thus might affect the insurance value that she receives from the existence of a program for which she is not currently eligible.

I will also assume that transfers to the same recipient are more substitutable in α than transfers to different recipients.⁶

The voter's maximization problem is subject to the budget constraint

$$(2) \quad \bar{\tau} N_M \geq \tau N_M \geq \sum_j N_{R_j} (T_j) T_j (1 - s_j) = \sum_j E_j (1 - s_j)$$

where N_M is the number of voters (of the median voter "type") subject to the tax τ ,⁷ N_{R_j} is the number of recipients of program j (and is a function of T_j), and E_j is defined as $T_j N_{R_j}$, or the expenditure on program j . These taxes, together with government subsidies s_j , must fund all public spending.⁸ Taxes and expenditures may also be subject to some legal ceiling $\bar{\tau}$ (as they are in many states).

There may be additional costs inherent in the state budgeting process. Changing the level of spending on any program or department may be difficult practically or politically. Voters may fear that federal funds will dry up if they are not spent as "intended" (a fear justified by the Congressional attention to such behavior discussed above), and budgets for different departments may be controlled by different bureaucratic processes. The cost of a transfer T_j may increase as it differs from a target level T^* determined by previous transfer levels and by changes in federal grants for program j . This cost, F , can be represented as

$$(3) \quad F = F(\bar{T}_j - \bar{T}^*)$$

⁶ I am assuming that the form of the transfer does not matter. This would not be the case if voters had paternalistic concerns for the use to which the recipient puts the transfer.

⁷ This formulation makes the simplifying assumptions that the marginal tax rate faced by the median voter is the average tax rate and that there is no distortion caused by the tax system. The qualitative results carry through in the absence of these assumptions.

⁸ The amount of financing the state receives from the federal government can depend both on the total amount that the state spends on eligible programs and on state characteristics such as average state per capita income. The federal government may set some lower limit on the amount of transfers some groups must receive. The federal government may also impose other constraints, such as that states may not have

Voters choose transfers to maximize utility minus this cost, subject to the budget constraint. The solution to this maximization problem produces four types of comparative statics, which are described here and proven in Appendix A. Most of the results address the sensitivity of state spending E_j to fiscal shocks in the form of increases in mandatory spending. Define this sensitivity of spending to fiscal shocks as $\eta_j = -\partial(E_j) / \partial(\text{mandatory spending})$. In several cases, the sign of the comparative static will depend on parameters that must be evaluated empirically. I will later evaluate these propositions by examining changes in state spending in response to the exogenous increases in Medicaid spending described below, and the sensitivity of those responses to demographics, the existence of tax and expenditure limits, and the actions of neighboring states.

Proposition 1: Demographic Effects

The level of transfer spending will decrease as demographic differences increase, or

$$\frac{\partial E_j}{\partial |X_M - X_{R_j}|} < 0 . \text{ The responsiveness of transfer spending to increases in mandatory}$$

spending will also depend on demographics, but the sign of this relationship depends on the shape of the utility function. If the utility from private consumption is sufficiently less concave than the utility from transfers, greater demographic differences will cause

$$\text{greater sensitivity of state budgets to expenditure shocks, or } \frac{\partial \eta_j}{\partial |X_M - X_{R_j}|} > 0 .$$

The value that people place on transfers to others may depend both on their own characteristics and on the characteristics of the recipients. Most voters probably place more

programs which discriminate on the basis of race. I assume that federal preferences are determined exogenously.

weight in their own utility function on transfers to poor people than on transfers to rich people, while some voters may place more weight on transfers to people of their own race or ethnicity than on transfers to others.⁹ Programs for which they themselves might some day be categorically eligible should carry additional insurance value.¹⁰ The assumption that α is a negative function of $X_M - X_{Rj}$ drives the result that transfer levels decline as demographic differences increase, which is consistent with previous studies.

While the intuition that population demographics will influence the *level* of spending is clear, the way in which demographics will influence the *sensitivity* of spending to shocks is less clear, since voters were presumably starting at an equilibrium level of spending. It is easy to tell different stories: voters who dislike transfers because of the demographics of the recipients may already be at rock-bottom spending levels, and may not adjust their spending at all when faced with shocks, or they may be more likely to decrease their already low transfers when any excuse to do so arises. As shown in Appendix A, the sensitivity of transfer spending is governed by the way that those transfers enter the utility function relative to the way that private consumption enters. If the utility that voters derive from their own consumption is less concave than the utility they derive from transfers, this sensitivity will increase as demographic differences increase. If the marginal utility gained from altruistic spending diminishes more quickly than the marginal

⁹ See Alesina, Baqir, and Easterly (1997), Poterba (1996), Cutler, Elmendorf, and Zeckhauser (1993), and Luttmer (1997). Luttmer (1997) finds, using the General Social Survey, that voters prefer to spend more on welfare when they are of the same race as the likely recipients.

¹⁰ Cutler, Elmendorf, and Zeckhauser (1993) explore the effects of demographics on the public bundle provided by states and localities. Citizens may care about consumption by other members of the community in an “even-handed” way, where community demographics enter the equilibrium conditions but individual’s own demographics do not, or in a “discriminatory” way, where people of different demographic groups have different preferences over public spending. “Even-handed” community preferences correspond to voters’ preferences being a function of the demographic characteristics of the j recipients, while “discriminatory” preferences correspond to the demographics of group j entering the function U_i differentially based on the demographics of i . Any model with demographic community preferences would have state responses which varied by the demographics of the recipient population, while the discriminatory model would also have the demographics of the median voter and the degree of demographic fragmentation or diversity of non-recipients as significant determinants of spending. See also Alesina, Baqir, and Easterly (1997), who find that the degree of ethnic fragmentation is negatively related to public good provision, and Poterba (1996), who finds that the racial difference between the elderly and school-age populations is negatively related to the growth in spending on education.

utility gained from private consumption (which does not seem unreasonable), demographic differences will make voters more likely to cut transfers when faced with a shock.¹¹ Table 1 summarizes this result and those that follow. As line (1) indicates, with certain assumptions, the more diverse the population is, the more sensitive spending will be to shocks, but these assumptions can only be verified empirically.

Proposition 2: Tax and Expenditure Limits

The imposition of a binding tax limit will increase the sensitivity of transfer amounts to increases in mandatory spending, or $(\eta_j | \bar{\tau} = \tau) > (\eta_j | \bar{\tau} > \tau)$.

Voters may have imposed limits on the amount by which a state can change taxes or change its expenditure patterns. Poterba (1994) explores the effects of states' fiscal institutions on their responses to fiscal distress in the late 1980s and early 1990s (see also Poterba and Rueben (1995)). These same institutions may influence states' responses to budgetary shocks. These previously determined limitations would add an important constraint to the state's ability to increase total spending, for instance, when faced with a mandated increase in eligibility. States constrained in this way would have to reduce spending on other programs by more when faced with a shock than they would if they were also able to raise taxes. This suggests, as shown in line (2) of Table 1, that constrained states will raise more of the additional money spent on Medicaid through reduced spending than unconstrained states.¹²

¹¹ Another interpretation of this condition is that there is more uncertainty about the benefits to be gained from spending on others (who may be demographically dissimilar) than there is about private consumption.

¹² This does not fit into a basic rational median voter model because any rational voter would not impose a constraint on herself that was binding. For this to be rational, we would need to tell a story about the median voter changing over time, being different for votes on different issues, or fearing a Leviathan government, etc. (see Brennan and Buchanan (1977)). If, in fact, these constraints are non-binding, then we would not expect them to have a differential effect in a model containing *all* the variables relevant to determining the underlying preferences.

Proposition 3: “Neighbor” Effects and Mobility

The level of transfer spending will decrease as the elasticity of recipients to the transfer amount increases, or $\frac{\partial E_j}{\partial \epsilon_{N_R_j T_j}} < 0$. The sensitivity of transfer spending to increases in

mandatory spending will also depend on the sensitivity of the number of recipients to the level of transfers, but the sign of this relationship depends on the shape of the utility function. If the utility from private consumption is sufficiently less concave than the utility from transfers, the more sensitive the number of recipients is to the level of transfers, the more sensitive spending will be to shocks, or $\frac{\partial \eta_j}{\partial \epsilon_{N_R_j T_j}} > 0$.

The relative generosity of welfare benefits may affect the sensitivity of the number of recipients to benefits. If having more generous welfare benefits relative to the benefits in neighboring states causes immigration of welfare recipients and emigration of non-recipients, the price of additional welfare spending will be greater than the direct cost of increasing the transfer amount.¹³ Consistent with previous empirical findings, the model predicts that transfer amounts will decrease as this elasticity of recipients to transfer amounts increases.

Again, while the intuition about the effect of neighbors’ generosity on the *level* of benefits is clear, the effect on the *sensitivity* of spending is less clear. As in Proposition 1, there are stories that go along with a result of either sign. Once again making the assumption that the marginal utility gained from altruism diminishes more quickly than the marginal utility gained

¹³ The existence of this “welfare magnet” effect is controversial (see, for example, Levine and Zimmerman, 1995). Case, Hines, and Rosen (1993) conclude from an empirical analysis of spending patterns in a panel of U.S. states that a state’s spending level is positively and significantly affected by its neighbors’ spending. (Besley and Case (1995) postulate that this sensitivity may be due to “yardstick competition” by politicians.) The generosity of welfare benefits may similarly be influenced by neighboring states. See also Brown and Oates (1987) and Borjas (1996)

from private consumption, this sensitivity of transfer spending to shocks will increase as the potential inflow of recipients increases. As shown in line (3) of Table 1, the fewer recipients potentially attracted by higher benefits (that is, the more generous neighbors are, or the smaller the elasticity of recipients with respect to benefits, $\varepsilon_{N_R j T_j}$), the less likely the state will be to cut those benefits.

Proposition 4: The Flypaper Effect

With large costs of shifting dollars between budget categories, a shock to spending through one program will have a greater effect on programs in the same budget category than it will have on programs in other categories, even if programs in other budget categories are highly substitutable. When F is large enough, there will be more substitution between programs in the same category that serve different populations (n and $-n$) than there will be between programs in different categories (j and $-j$) that serve

the same population, or $\frac{\partial E_j^{-n}}{\partial E_j^n} > \frac{\partial E_j^n}{\partial E_{-j}^n}$.¹⁴

When a state is forced to spend more on a given program, theory suggests that two things should happen. First, having less disposable income should reduce spending on all public goods in proportion to the state's marginal propensity to consume each good. Second, the increase in spending on a certain program should decrease spending on substitutable programs and increase spending on complementary programs. Thus, the magnitude of the reduction in spending on other programs should depend on how closely substitutable they are for the increased program in voter utility.

¹⁴ When F is small or 0, $\frac{-\partial E_j^{-n}}{\partial E_j^n} > \frac{-\partial E_j^n}{\partial E_{-j}^n}$ and $\frac{-\partial E_j^{-n}}{\partial E_j^n} > \frac{\partial E_j^n}{\partial Y}$

When transfer levels change, however, there may be another effect at work. Hines and Thaler (1995) review the extensive literature suggesting that money is not completely fungible across programs. This “flypaper effect” is manifested in a negative way in this context as within-budget category “stickiness”: for example, they might treat the welfare budget as separate from the education budget, and would absorb negative shocks to the welfare budget primarily by reducing other welfare spending, rather than by spreading the cost across categories.¹⁵ This may be true even if welfare and education are highly substitutable in the voter utility function.¹⁶

How can we distinguish this negative flypaper effect from a basic median voter model in which different welfare programs are highly substitutable in the voter utility function? If substitutability in the median voter’s utility function drives the decision-making process, programs which serve the same demographic groups but happen to fall into different budget categories ought to be more sensitive to each other than programs which serve disparate groups but which fall under the same budget category. Positive shocks to spending on children ought to reduce spending on children through other programs more than shocks to spending on the elderly would reduce spending on children, regardless of their broad budget category.¹⁷ If, on the other hand, a flypaper stickiness is driving the reaction to shocks, positive shocks to spending on children will primarily reduce spending on other programs in the same budget category, regardless of the population served, as shown in line (4) of Table 1. The ability to distinguish between substitutability and stickiness is a particularly important advantage of this approach.

This paper uses changes in the Medicaid program to test the four predictions of this model and to gauge their relative importance in the state decision-making process. Table 1

¹⁵ Conversations with the Budget Director of the Massachusetts House Committee on Ways and Means supports this interpretation. Human services and non-human services budgets are allocated and reconciled separately, for instance, so that accommodating increases in one by decreasing the other is not considered.

¹⁶ This analysis focuses on spending shifts between budget categories and within the welfare budget. See Cullen (1996) for an analysis of spending within the education budget at the local level.

¹⁷ This assumes that programs benefiting the same demographic group are more substitutable in the voter utility function, and that “stickiness” in the budget process applies more within traditional budget categories than between them.

summarizes both these predictions and the empirical results that will be presented in more detail in Section VI.

III. THE MEDICAID PROGRAM

Medicaid is a particularly good program through which to examine the utility function of government because it provides benefits to disparate demographic groups, and because it has undergone several federally-mandated changes in the last decade. Like many welfare programs, Medicaid is jointly financed and administered by states and the federal government. Federal and state payments for health care through the Medicaid program were \$150 billion in 1995. These payments comprised almost 40 percent of federal grant dollars to states and localities (Advisory Commission on Intergovernmental Relations, 1995). There were over 36 million children, nursing home residents, disabled, and medically-needy recipients of Medicaid, including 37 percent of all children under 5 years old and 32 percent of all citizens over age 85 (HCFA, 1997). Total Medicaid spending is nearly 20 percent of total state expenditures.

Since its inception in 1965, Medicaid has covered three broad classes of people: poor single women and their children (AFDC recipients), the disabled (SSI recipients), and the elderly poor. While the federal government determines some broad eligibility guidelines, the states are given a great deal of latitude in defining their own eligibility criteria.¹⁸ For instance, while states must provide Medicaid coverage for AFDC recipients, they are free to determine AFDC eligibility standards, and SSI-recipient Medicaid eligibility may be more restrictive than federal standards for SSI receipt. States may choose to extend coverage to other groups, such as the "medically needy" or "Ribicoff kids" who meet financial eligibility but not other categorical requirements (Holahan and Cohen, 1986, p. 34).

¹⁸ Holahan and Cohen (1986) find a great deal of variation in state per capita Medicaid spending, much of which is not explained by variation in the matching rate. It does seem to be correlated with per capita

The fact that different demographic groups are covered will allow me to look at the different effect of mandatory spending increases on children versus mandatory spending increases on the elderly, for example. In this way I can evaluate the substitutability of spending on different populations in the voter utility function.

State spending is matched with federal contributions at a rate determined by state per capita income using a formula that has not changed since the original legislation was enacted. The state share of expenditures is

$$(4) \quad \text{state share} = .45 * \left(\frac{\text{state per capita income}}{\text{U.S. per capita income}} \right)^2$$

with the federal government paying the balance. The federal share is at minimum 50 percent and is capped at 82 percent. The population-weighted average federal share is 58 percent over the sample time period.

To examine the effect of Medicaid spending on public budgets I look at Medicaid spending over the 1980s and 1990s, a period of federally mandated expansions in Medicaid coverage aimed primarily at poor women and children. Because of the pre-existing variability in state eligibility, these mandates affected some states more than others: states that were already covering more of the mandated group experienced smaller budget shocks from the introduction of the federal mandate, while those that covered less of these groups before faced greater shocks. There is evidence that these expansions increased access to, utilization of, and spending on Medicaid services.¹⁹

A second change to the program was the Boren Amendment in 1980, which required states to reimburse nursing homes for Medicaid patients at a "reasonable" rate. Several lawsuits

spending on other poverty programs. They do not find breadth of coverage to be influenced by the size of potentially eligible population.

¹⁹ For further discussion see Currie and Gruber (1996). Cutler and Gruber (1996b) find that each additional dollar in their eligibility index leads to 30 cents of increased spending. Currie and Gruber (1996) show that increased eligibility for children, while not fully taken-up, does lead to increased utilization of services.

initiated by nursing homes in the late 1980s and early 1990s were successful in the courts and led to increases in reimbursement rates in those states.

Third, overall medical price increases also had differential effects on state budgets. States with initially larger public medical spending programs faced a greater fiscal shock as medical prices rose. A ten percent rise in medical prices imposes a much bigger increase in dollar terms on a state spending \$300 per capita on Medicaid than it would on a state spending \$100 per capita.

Because of these different factors, Medicaid is an ideal program through which to examine the state budgeting process and the effect of federal financing and program changes.

IV. DATA

The data for this analysis comes from several sources (see Appendix B). Medicaid spending, services covered, and the federal medical assistance rate are taken from the Health Care Financing Administration's publication *Medicare and Medicaid Data Book* (various years). Budget information is from the Census Bureau publication *State Government Finances* (various years). Expenditures are broken down by the Census Bureau into the categories of education, social services and income maintenance, transportation, public safety, environment and housing, governmental administration, and other. State population by age and race are also from the Census Bureau. All dollar figures are expressed in real 1987 per capita terms (using the CPI to deflate). Alaska and Hawaii have been omitted as extreme outliers (and because they have no "neighbor" states). The panel thus consists of 48 states for the thirteen years 1983 to 1995.

Only "general" state revenues and expenditures have been included (leaving out liquor stores, utilities, and insurance trust funds, which comprise approximately 7.5% of total expenditures and 11.5% of total revenues). Local expenditures and revenues are not included because they are not available for the most recent years (and not available for some categories of

spending at all), and because of difficulties caused by inconsistencies in reporting state-to-locality and locality-to-state transfers in earlier years. Thus, for example, any expenditure by the state either at the state level or through transfers to the local government is included in the data, but local expenditures out of local revenues are not unless noted.²⁰ Most federal grants to the localities are channeled through the state, and are included in state revenues.

Summary statistics are shown in Table 2. Total general state expenditures per person average almost \$1750 per year during this period. Education is the largest category of spending at \$627 per capita, with social services second at \$537 per capita. Per capita total Medicaid spending is about \$277, which is 16 percent of total state spending and more than 70 percent of the \$394 that states spend per capita on public welfare (which also includes categorical assistance programs like AFDC, welfare institutions, low-income energy assistance and other assistance programs). With the federal medical assistance percentage (FMAP) averaging 58 percent, federal contributions towards Medicaid expenditures comprise almost 10 percent of state general revenues.

V. AVERAGE STATE RESPONSES TO MEDICAID CHANGES

As a first pass at examining the effect of the Medicaid expansions of the 1980s I estimate a simple OLS model of annual state spending on various programs regressed on annual Medicaid spending for each state and year. States have a great deal of flexibility in categorizing their public medical spending. Beginning in the mid-1980s, several states exploited a loop-hole in the Medicaid code to generate more federal revenues for Medicaid. By "taxing" a hospital and dedicating those funds for Medicaid use, the state would be eligible for federal matching funds. The entire amount of the tax could then be remitted to the hospital, often later that day! The

²⁰ In the instances where I combine state and local spending, I add state direct spending (which is total state

GAO (1994) estimates that Michigan, Texas, and Tennessee alone received \$800 million in federal contributions without committing any matching funds of their own. For this reason, I add together the total package of public medical spending (including not only medical vendor payments but also other public hospital spending), which provides a better picture of state finances than reported medical vendor payments alone.

In the OLS specification, state per capita spending on various budget categories and revenue from various sources are regressed separately on the state's *total* public medical spending (the sum of the state contribution and the federal contribution) and controls. Table 3 presents the following estimations:

$$(5) \quad E_{it} = \alpha + \beta_i + \delta_t + X_{it}\gamma + \lambda \text{medical spending}_{it} + \varepsilon_{it}$$

where i indexes states and t indexes time. Each E_{it} is real (1987 dollars) per capita spending on a budget category, such as education.²¹ The control variables X_{it} are the annual unemployment rate (and three lags), per capita personal income (and three lags), the crime rate (lagged by two years), and three demographic variables (fraction of the population under age 15, fraction female and between age 15 and age 44, and fraction over age 65). Each coefficient reported in column (1) of Table 3 represents λ from a *separate* equation, or the amount by which per capita real spending on or revenue from the budget category shown on the left changes for each additional dollar of medical spending.²² λ corresponds to the term η from the model above, showing the sensitivity of spending on categories E to shocks in medical spending. Standard errors, Huber-adjusted for

spending minus intergovernmental spending) to local direct spending.

²¹ I use a levels specification rather than a logs one because all spending increases must be accommodated dollar for dollar (not proportionally) within state budgets.

²² It is appropriate to estimate these equations separately, rather than as a system, because voters are choosing the total level of spending as well as the components. Voters are implicitly choosing τ when they choose transfer levels, so taxes may be thought of as just another choice "program."

heteroskedasticity, are reported in parentheses. The regressions are weighted by state population.²³

The OLS regressions imply that each additional dollar of medical spending generates an increase of only 77 cents of total spending (the first row in column (1) of Table 3). Thus, the increase in medical spending is partially off-set by reductions in other spending. As the remainder of the column indicates, the only category of spending significantly reduced is non-Medicaid public welfare spending, which is cut by 26 cents.

These results may be biased because of omitted variables. For example, we may be inadequately controlling for the overall state of the economy. When a state is experiencing a recession, it may need to spend more on Medicaid as a growing fraction of its population becomes needy while also spending more on other programs and collecting less in revenues. Then the estimates of λ (the change in spending associated with a one dollar increase in medical spending) presented in column (1) would be biased upward, and the estimate of fiscal responses would thus be too small; at times when states are spending more on Medicaid, they may be spending more on many other things.²⁴

I use instrumental variables to address potential omitted variable biases and the endogeneity of Medicaid spending. The discussion above suggests several natural instruments. The first is the Medicaid spending caused by federal mandates. When the federal government expands eligibility, requiring coverage of 5 to 7 year olds, for example, the expansion would be binding in some states but not in states that already covered that group. Similarly, states with more 5 to 7 year olds would feel a bigger budget shock from this expansion than states with fewer

²³ The weighted regression seems the appropriate one for gauging average responses (or the response faced by the average person). Results for unweighted regressions are similar.

²⁴ Of course, if the covariance of medical spending and these omitted variables is negative, the coefficient on medical spending would be overestimated and the degree of responsiveness would be underestimated. However, if we exclude our economic control variables (the unemployment rate and its lags, and per capita personal income and its lags), the estimated coefficients rise slightly, while including gross state product for the years in which it is available cuts the coefficients in half. It would thus seem that even better controls might decrease our estimates of the average state response.

additional children to cover, and states with higher costs related to serving this group would feel a bigger budget shock than states with lower medical costs.²⁵ The implementation date of the new mandates also varies from state to state.

A variable which measures the potential cost to the state of its particular eligibility rules in a given year (some of which are enacted by the state, others of which are imposed by federal mandate) can serve as an instrument for actual Medicaid spending. In order to abstract from each state's particular economic climate in any year, I take a national sample of women and children and see how much potential Medicaid spending they would generate in each state in each year, using the average Medicaid expenditure by demographic group times average per capita state medical expenditures in the year before the sample as a weight.²⁶ This index simulates the state's potential Medicaid expenditure on women and children (rather than using the actual expenditure on them), allowing me to isolate the effect of the legislative environment from other confounding factors.

The second instrument relies on differences in state medical burdens. States with higher initial medical spending levels will be more heavily burdened by national medical cost increases (depending on the relationship between cost levels and cost growth), so state spending on Medicaid in 1982, inflated by the real growth of national medical expenditures,²⁷ should capture a state-specific, exogenous budget shock.²⁸

Using these experiments I perform instrumental variables estimation. This estimation will capture just the exogenous, or mandated, changes in Medicaid spending utilized in the

²⁵ Yelowitz (1995), Currie and Gruber (1994 and 1996), and Cutler and Gruber (1996) also utilize this source of variation.

²⁶ While we would not want to use each state's demographic profile in each year for fear of the population changing endogenously, based on Medicaid eligibility rules, we could also use each state's demographic profile in the year before the sample period as a basis for this cost analysis, instead of a national sample. The national-sample-based index used here is that used by Cutler and Gruber, with an additional weight of state-specific medical expenditures in the base year. The results are not sensitive to this choice.

²⁷ We could use state-specific real growth, but there is some danger that the growth of state medical costs is in part a function of that state's reaction to changes in the financing of Medicaid program.

model. The first stage predicts public medical spending based on the simulated index and the medical spending trend variable:

$$(6) \quad \text{medical spending}_{it} = \alpha + \beta_i + \delta_t + X_{it}\gamma + \phi_1 \text{index}_{it} + \phi_2 \text{medtrend}_{it} + \varepsilon_{it}$$

ϕ_1 is estimated at .58 (with a heteroskedasticity-robust standard error of .25), while ϕ_2 is estimated to be 1.71 (.22).²⁹ The partial F-statistic for these two regressors is 35.4. The exclusion of these instruments passes the test of overidentifying restrictions (see Newey, 1985, for example).

The coefficients reported in column (2) of Table 3 are the estimated differences-in-differences λ coefficients from the second stage regressions. Again, each coefficient in the table comes from a separate regression in which the dependent variable is state spending on the category reported at the left. For every additional dollar spent on Medicaid, about 40 cents is taken away from other public welfare spending (reported in the fourth row in column (2) of Table 3). This is the only expenditure category to see a significant reduction in response to the exogenous spending increases.

Understanding the changes in state revenues requires an examination of state financing games like the voluntary taxes and donations plan described above. The large and significant reduction in state revenues from own taxes and charges is surprising at first pass, as is the 19 cent increase in revenue from localities. However, the Congressional Research Service reports in the *Medicaid Source Book* (1993) that “. . . some states [use] intergovernmental transfers as a source of Medicaid funding When the transferred funds are treated as part of Medicaid, the funds can be matched with Federal dollars For some states these revenues amounted to a sizable

²⁸ Note that this is just the inclusion (in the first stage only) of a state-specific trend term, constrained to be proportional to initial medical spending levels. Results without this trend term are similar (but with larger standard errors). Including state-specific trends as covariates further increases the standard errors.)

²⁹ Cutler and Gruber (1996) estimate a similar equation without the “medtrend” variable (and without the economic control variables). Their estimate of ϕ_1 is .30. The Cutler and Gruber result is replicated when the dependent variable is Medicaid spending instead of total medical spending (Medicaid plus health and hospital spending). The specification in this paper is more appropriate in capturing the total fiscal implications of Medicaid expansions.

share of their Federal Medicaid grant.” The legal status of these intergovernmental transfers remains even less clear than that of other “taxes and donations” schemes.

The observed coefficients are consistent with such manipulation: the localities tax specific hospitals and remit the funds to the state, where they are matched by federal revenues and returned to the hospitals. To test this possibility, I examine the combination of state and local revenue-raising.³⁰ The effect of medical spending on local revenues from own sources (not reported in the Table) is an increase of 47 cents (with a robust standard error of .17), and local revenues from the state (also not reported) increase by 17 cents (.10). The effect of increases on public medical spending on *combined* state and local revenues from own sources is insignificant (with a coefficient of -.17 and a robust standard error of .27, reported in column (4) of Table 3).³¹ Thus, while state revenues appear to be going up, the increase is off-set by an increase in local revenues, accompanied by a parallel increase in intergovernmental transfers between states and localities. These revenue effects are in the accounting, not in the real resources.

As another test for the presence of these financing games, I split the sample into the periods before and after such schemes became prevalent. For the period 1983 to 1989, state revenues from own sources increased by 4 cents (.44) for each additional dollar of medical spending. The negative effect of Medicaid spending on state revenues appears only in the period when the use of “taxes and donations” financing schemes was prevalent, and disappears when total state and local revenues are looked at in combination. The negative coefficient in the state revenues from own sources equation should thus not be taken as indicative of a real decrease in revenue-raising, but rather as evidence of the increased use of funding schemes over the period.³²

³⁰ Local data is only available through 1992. State data for this period is also reported in Table 3.

³¹ Combined state and local expenditure results are not reported for most categories because intergovernmental transfers at a suitably detailed level are not available.

³² We might be concerned that localities are raising taxes in order to fund programs no longer supported at the state level, but the coefficient on combined state and local spending on public welfare (netting out intergovernmental transfers) is not significantly different from the coefficient on state spending alone (reported in column (4) of Table 3). This is thus not evidence of the state pushing programs down to the local level: the extra tax revenues are primarily remitted to the state in the form of intergovernmental revenues (also reported in column (4) of Table 3).

Similarly, the effect on surpluses for the period 1983-1989 is less than half a cent, again indicating that financing games may be largely responsible for the observed negative coefficient.³³

Perhaps most important is the question of what the 40 cent reduction in social service spending represents. There are several possibilities. States may feel increasing pressure to move people into the more heavily subsidized programs such as SSI.³⁴ Regressing the number of SSI recipients (per 1,000 population) on instrumented medical spending yields a coefficient of .02 (.003) (an elasticity of .4 at the mean), which lends support to the notion that budgetary pressure on one program may affect the states' use of other programs.

Yelowitz (1995b, 1996) notes that participation in Medicaid also changes the individual recipients' propensity to participate in other programs, such as increasing food stamp participation (perhaps through a heightened awareness of other programs' existence) or decreasing SSI participation (elderly recipients may substitute one program for the other). Most importantly here (since SSI and the food stamp program are federally funded), he finds that increased eligibility for Medicaid reduces AFDC participation. Some of the change in state spending on social services might represent this shift off of welfare.

To test this AFDC explanation, I break out non-Medicaid welfare spending into AFDC and non-AFDC spending, using the same IV specification. Table 3 also shows these results. An additional dollar of Medicaid spending has no significant effect on AFDC expenditures (with an estimated coefficient of -.04 (.03)). In fact, neither the maximum benefit for which an AFDC

³³ To examine the persistence of the effect of increased public medical spending on state surpluses, I regress surpluses on instrumented lagged surpluses (using the same two instruments as above). This yields a negative and significant (at the 5% level) coefficient for a one-year lag, a much smaller negative and statistically insignificant coefficient for a three-year lag, and a positive insignificant coefficient for a five-year lag, supporting the intuition that while these shocks may decrease surpluses temporarily, that decrease cannot be a permanent accommodation. The elimination in the long-run of effect on surpluses comes in equal parts from decreased expenditures and increased revenues.

³⁴ Conversations with the Budget Director of the Massachusetts House Committee on Ways and Means, for instance, revealed that Massachusetts had closed several state-funded facilities for the mentally retarded and moved those people onto federally-funded SSI rolls as soon as that option became available through a waiver.

family is eligible nor the average payment made to recipient families is sensitive to additional Medicaid expenditures (not reported).³⁵ As the next row shows, the bulk of the reduction is in non-Medicaid, non-AFDC welfare spending.

What is this "other" welfare spending? Data from a few states (NY, MA, CA) indicates that this "other" spending, which is almost as large as AFDC spending, includes, among other things, public employment for welfare activities (besides Medicaid), regulation of welfare institutions, foster care, low-income energy assistance, transportation of the physically disabled, and homeless shelters.³⁶ Unfortunately, states are not required to submit separate accounting of expenditures within this category, so no finer analysis can be performed. A reduction of spending on this category paints a picture of reduced support for all programs and particular reductions in programs catering to small segments of the population.

Table 4 summarizes these results and some of those that follow. The first column breaks down the financing of additional public medical spending into reductions in other spending, increases in revenues, and decreases in surpluses. To summarize this column: a *one dollar (exogenous) increase* in state spending on Medicaid results in: (1) a *40 cent reduction* in non-medical welfare spending (not AFDC, but other programs including foster care, low-income energy assistance, etc.) and a *15 cent reduction* in transportation, public safety, environment, housing, administration and other spending (statistically insignificant); (2) a *12 cent increase* in revenues; and (3) a *33 cent reduction* in surpluses (likely a relic of financing schemes and not sustained in the long-run).

³⁵ We can decompose the 4 cent reduction in spending into changes in eligibility rules, changes in take-up rates, and changes in benefits per recipient. Eligibility standards are computed using the state need standard, while take-up rates are imputed using income and family structure data from the March CPS. The reduction is driven almost entirely by a decrease in the maximum income allowing AFDC eligibility. Take-up rates also increase, but all other changes are insignificant. The reduction in AFDC reciprocity (-.05 (.01)) for each dollar of Medicaid spending is consistent with the Yelowitz results.

³⁶ This data was obtained from Bureau of the Census (Governments Division) internal records of state reported spending within the "other" category, only available for recent years. In New York in 1992, for example, expenditures on foster care services were the largest in this category.

VI. TESTING THE DETERMINANTS OF STATE VARIATION

Having estimated the basic facts about responses to Medicaid eligibility expansions, we would like to understand why this response occurs. I test each of the predictions of the model: (1) that demographics influence responses to changes in Medicaid spending; (2) that responses are driven by binding limits on state expenditures; (3) that the level of spending of neighboring states influence a state's spending decisions; and (4) that money is "sticky" within particular budget categories.

The Effect of Demographics

To test the influence of demographics, I use interaction terms designed to capture demographic fragmentation, the term $|X_M - X_{Rj}|$ in the model. There are several ways that demographic fragmentation might be measured. Ideally, we would have a different measure for each program, based on the demographic characteristics of the typical recipient. In the absence of such detailed data, a summary measure is needed. I use the percent of the potential recipient population for most programs (children under age 15, women between 15 and 44, and people over 65) that is black minus the percent of the total population that is black, which is about 1 percent on average in this sample. Other measures of demographic fragmentation include the absolute value of the fraction of children who are black minus the fraction of the old who are black (due to Poterba (1996)) and simply the percent of children who are black. These measures produce similar results, not reported here.³⁷

The equation I estimate is thus:

³⁷ Results using a measure of ethnic fragmentation due to Alesina, Baqir, and Easterly (1997) are sensitive to the breakdown of ethnicities used: different minority groups have different effects on sensitivity.

$$(7) E_{it} = \alpha + \beta_i + \delta_t + X_{it}\gamma + \lambda_1 \hat{med\ spending}_{it} + \lambda_2 (\hat{med\ spending}_{it} * \% \hat{demog\ diffs}_{it}) + \varepsilon_{it}$$

The instruments for medical spending and the medical spending*demographic differences interaction term are the two variables discussed above and their interactions with the fragmentation variable. The measure of demographic differences is also included in the X_{it} control variables. In this formulation, λ_1 corresponds to η_j from the model (the sensitivity of spending on other programs to medical spending shocks) and λ_2 corresponds to the term

$$\frac{\partial \eta_j}{\partial |X_M - X_R|} \text{ from Proposition 1 (the change in this sensitivity as demographics change).}$$

The results of these regressions are reported in Table 5. The more demographically diverse the state's population, the more sharply the state curtails other welfare spending in response to medical spending shocks. While a state with average demographic diversity (0.8 percent) reduces non-Medicaid welfare spending by 33 cents in response to a one dollar increase in public welfare spending, a state one standard deviation above the mean (1.5 percent) decreases its non-Medicaid public welfare spending by 39 cents. These results are summarized in the second column of Table 4. Non-social services spending also declines more sharply as demographic fragmentation increases, but this reduction is not statistically significant. The reduction in revenues, however, is significant. Taxpayers reap the benefit of the reduction in public welfare spending by enjoying a reduced tax burden. Thus, demographic fragmentation significantly changes which segment of the population feels the bite of increased Medicaid expenditures, bearing out Proposition 1.

The Effect of Tax and Expenditure Limits

To test the effect of the presence of tax and expenditure limits on states' responses to the fiscal shock of increasing Medicaid costs, I create interaction terms based on the existence of tax

and expenditure limits from 1983 to 1995 (as above).³⁸ The results are reported in the left panel of Table 6. Again, λ_1 , reported in column (1), corresponds to η_j from the model (the sensitivity of spending on other programs to medical spending shocks) and λ_2 , reported in column (2), corresponds to the term $\frac{\partial \eta_j}{\partial \tau}$ from Proposition 2 (the change in this sensitivity when tax and expenditure limits are present).

These coefficients show that the existence of tax and expenditure limits has almost no effect on state responses. States without these limits reduce their welfare spending by 33 cents for each dollar of increased public medical spending, while states with such a limit in place do not reduce their spending by significantly more (5 cents, reported in the fourth row of columns (1) and (2) of Table 6). The gap between revenues and expenditures is smaller in states with tax and expenditure limits than it is in states without but the difference is statistically insignificant, and no single spending category is significantly reduced by the presence of limits. Thus, while both types of states seem to off-set a disproportionate amount of the increase in Medicaid spending by reducing other public welfare spending, there seem to be no *additional* constraints imposed by the existence of tax and expenditure limits. Either the effect postulated in Proposition 2 is very small or the limits are not binding.

The Effect of Neighboring States

If states fear that welfare policies more generous than those of their neighbors will generate an influx of welfare recipients and an egress of non-recipient taxpayers, the generosity of neighboring states' programs should have a positive effect on each state's own generosity. If states are concerned about attracting welfare recipients, they should reduce spending on other

³⁸ This extends the Poterba (1994) sample, which includes 231 observations from 1988 to 1992 with data on the existence of tax and expenditure limits and budget gathered from the ACIR publication *Fiscal Discipline in the Federal System*.

welfare programs by less when faced with a positive Medicaid spending shock if the neighboring states are more generous.

I test this hypothesis by including as an interaction term the expenditure on different programs by neighboring states. I define a state's "neighbors" as all states geographically bordering it, weighted by population. One measure of a state's welfare generosity is its AFDC need standard. The higher the need standard is set, the more people who will qualify for AFDC benefits and the higher the maximum benefit will be. The comparison of a state's need standard with that of its neighbors is a measure of its relative generosity and a proxy for $\varepsilon_{N_j T_j}$. Including the interaction of that measure with public medical spending tests the effect of neighbors' generosity on state reactions to shocks to Medicaid spending.³⁹ The results of this experiment are reported in the right panel of Table 6. λ_1 , reported in column (3) corresponds to η_j from the model and λ_2 , reported in column (4), corresponds to the term $\frac{\partial \eta_j}{\partial \varepsilon_{N_j T_j}}$ from Proposition 3 (the change in η as the sensitivity of the number of recipients to the transfer amount changes).

The effects of increasing *relative* neighbor generosity by one standard deviation are shown in column (6) and also summarized in the third column of Table 4. Being more generous relative to its neighbors would make a state cut back welfare spending more sharply in response to shocks. Non-social services spending taken together increases with neighbor generosity, but not significantly (not reported). As in the case of demographics, it is the taxpayers who benefit from the reduction in public welfare spending by an accompanying reduction in revenues. The effect postulated in Proposition 3 is present.

Table 7 assesses the relative magnitude of demographic effects, tax and expenditure limits, and the generosity of neighbors by running regressions with all three interaction terms. Tax and expenditure limits are still largely insignificant (except in the revenue equation), while

demographic variation and generosity relative to neighbors continue to drive much of the variation in state reactions. A decrease of each by one standard deviation would cut the reduction of public welfare spending by one third, from 32 cents to 20 cents.

The Flypaper Effect

One test for the presence of the flypaper effect is to compare a negative income shock to an exogenously imposed increase in Medicaid spending. If there is no flypaper effect, a one dollar decrease in income should have the same effect as forcing the state to spend one dollar more on Medicaid (except for the substitutability of Medicaid spending for other spending). If these are significantly different, then we can say that voters are not treating a shock to their spending on Medicaid in the same way that they would treat an income shock. Results of this comparison are presented in Table 8. Column (2) represents the effect on state spending of a one dollar increase in spending on Medicaid, calculated by dividing the coefficient on instrumented medical spending in column (1) (first subtracting one from the total expenditure coefficient to net out the Medicaid spending itself) by the average state share of Medicaid spending (42 percent). Column (3) represents the effect on spending of a one dollar decrease in income, calculated by multiplying the sum of the coefficients on income and its lags by negative one. The coefficients in columns (2) and (3) are significantly different in both the total spending regression and in the public welfare spending regression. A one dollar increase in the state share of Medicaid spending causes a much larger decline in other public welfare spending (94 cents) than a one dollar loss in income would (2 cents).

Is this evidence of the flypaper effect (as in Proposition 4), or merely evidence that spending on Medicaid is seen by the voters as highly substitutable for other welfare spending? We can try to distinguish between these two effects in two different ways. The first is by looking

³⁹ Using a related measure of generosity, the maximum benefit available to a family, yields very similar results.

at the effect that increases in Medicaid spending have on demographically dissimilar groups served within the same category. If increased spending on children within Medicaid decreases spending on the elderly within Medicaid, that would suggest that stickiness, rather than substitutability, was driving the reductions. The second way to distinguish substitutability from flypaper phenomena is by looking at programs in different budget categories that serve the same demographic population. If increases in Medicaid spending on children crowd out spending on children in other programs by more than increases in Medicaid spending on the elderly do, substitutability may explain state behavior without a flypaper effect. If, on the other hand, increases in spending on children and increases in spending on the elderly generate the same amount of crowding out of other spending on children (or on the elderly), that would suggest that substitutability alone cannot explain the observed within-category stickiness.

Table 9 presents evidence supportive of the flypaper explanation. Column (1) instruments for public medical spending with an index of eligibility expansions for children only. Coefficients in this column should thus reflect only increases in spending on children. Column (2) instead instruments for public medical spending with a dummy variable indicating a successful Boren Amendment lawsuit (discussed above) and with the interaction of state spending on nursing homes in the initial period and the growth of the fraction of the population over age 65.⁴⁰ Coefficients in this column should thus reflect only increases in spending on the elderly. The coefficients in these columns are not significantly different from each other (using a Hausman specification test).⁴¹ There is insignificantly more crowding out of non-Medicaid welfare spending by Medicaid spending on children (39 cents) than by Medicaid spending on the

⁴⁰ Robert Deane of the *American Health Care Association* provided materials relating to Boren Amendment Litigation.

⁴¹ This is a non-standard interpretation of the usual Hausman test statistic. By assuming that there are two different (unobserved) components of observed medical spending (spending on children and spending on the elderly), each correlated with two different (sets of) instruments, I interpret the statistic here as a test of whether the coefficients on the two components of medical spending are different.

elderly (26 cents), with no significant reduction in AFDC or education spending observed in either case.⁴²

States may also reduce the “optional” services covered by Medicaid as they are forced to expand eligibility. Optional services include dental care, inpatient psychiatric services for youths, and intermediate care facilities for the mentally retarded, among others. States in this sample offered an average of 22.6 optional services (population-weighted, with a standard deviation of 5.6). Using the same sets of instruments shows that medical spending on children and medical spending on the elderly have similar effects on the number of optional Medicaid services offered, generating declines in the number of services offered of .02 in each case.

These results are consistent with both of the tests for the flypaper effect. First, spending one dollar more on *either* demographic group leads to the same size reduction in spending on other programs within the same budget category, even though these programs disproportionately benefit children. Second, programs in different budget categories are not more affected by changes in spending on the same demographic population than they are by changes in spending on different demographic populations. This suggests that stickiness within the budget allocation process causes increases in Medicaid spending to be absorbed by reductions in other welfare spending, not just substitutability within the voter utility function.

VII. CONCLUSIONS

Understanding the different factors that drive state decision-making is central to assessing the effects of federal policy changes. By examining exogenous changes in a large program affecting multiple segments of the population, I am able to separate and evaluate the importance of several factors governing state fiscal responses to budget shocks.

⁴² The marginally significant increase in AFDC spending resulting from increases in Medicaid spending on children (reported in the last row of column (1)) is consistent with a story of increasing participation by

Across all specifications, states consistently finance increases in Medicaid spending by reducing spending exclusively on other public welfare programs. In fact, almost the entire burden of the state portion of the additional Medicaid spending is borne by reductions in other welfare programs.

The reduction in other public welfare spending caused by additional Medicaid spending is significantly larger than the reduction caused by a similar decrease in income and the reduction is not concentrated in programs serving similar recipients. This suggests a model of the state budget process where re-optimization is severely limited by "stickiness" between budget categories, and adjustments are disproportionately made between programs within the same budget category. This stickiness is the most important factor driving state reactions.⁴³

Differences between states in the size of the reduction are driven primarily by two factors. First, states with more demographically diverse populations reduce other public welfare spending by more than states with more homogeneous populations. Second, states that are more generous relative to their neighbors reduce spending by more than states that are less generous than their neighbors. The size of the reductions is not significantly affected by the existence of tax and expenditure limits. These stylized facts together depict a federal-state system in which states have different objective functions from each other and from the federal government, and in which optimization is constrained by the political nature of the budgeting process.

The United States' system of fiscal federalism involves joint federal and state financing of programs from education to welfare to highways to community development, and recent legislation has given even more authority to the states in designing their own programs. This study has important implications for predicting the effects of decentralization and the imposition of unfunded mandates. It is much easier for the federal government to affect the composition of

children in all programs once they are "in the system" through Medicaid.

⁴³ An alternate interpretation is that the burden of any shock is borne by the weakest group in the economy, the poor. An ideal test of this alternate theory would be an examination of the effect of shocks to other budget categories such as prisons or highways on public welfare spending.

benefits than the total level of transfers. Those most likely to bear the cost of federal mandates are those who benefit from other programs in the same budget category. Decentralization may lead to greater inequality between states. The more demographically different recipients are from the typical taxpayer, the greater the fraction of the burden they will face and the smaller the fraction that will be borne by the taxpayer. Greater state control may lead to lower benefit levels. Decreased generosity by one state may cause decreased generosity by its neighbors, leading to a race-to-the-bottom that benefits taxpayers at the expense of welfare recipients. Recent policies requiring states to provide health insurance to poor children, for example, may have the unintended effect of reducing state spending on other welfare programs that help not only poor children but also other demographic groups. States where those poor children are predominantly black but voters are predominantly white will reduce their spending by even more, benefiting taxpayers. The actions of those states may cause their neighbors to enact further reductions. Policies that do not explicitly address these types of responses may fail at their redistributive goals.

TABLE 1: SUMMARY OF PREDICTIONS

Proposed Effect	Sensitivity of Spending to Shocks is Affected by	Predicted Effect on Related Spending	Evidence
1. Demographics	Population being more diverse	- ?	Support for negative effect
2. Tax and Expenditure Limits	Existence of binding limit	-	No support for any effect
3. Neighbors	Neighbors being more generous	+ ?	Support for positive effect
4. Flypaper stickiness	Categorization of spending	- (disproportionately within same budget category)	Support for negative effect

Table 2: Summary Statistics

	Population- Weighted Mean	Standard Deviation
<i>State Budgets</i>		
Real Per Capita General Expenditures	\$1,743.67	453.58
Education	627.36	139.63
Social Services	536.88	224.74
Public Welfare	393.81	186.11
AFDC*	67.10	42.01
Medicaid	277.27	165.08
Other*	50.36	52.74
Transportation and Public Safety	223.16	63.35
Environment and Housing	40.69	17.80
Administration and Other	315.57	150.38
Real Per Capita General Revenues	1778.69	461.57
Intergovernmental	470.07	161.74
Federal Medicaid grants	156.25	89.95
(Match Rate)	(0.58)	(0.08)
Taxes	1016.59	256.77
Miscellaneous charges	292.03	156.25
<i>Instruments</i>		
Medicaid Eligibility index	95.79	42.41
National health expenditures	2332.43	360.81
State medical spending trend	248.65	101.20
Boren Amendment suit indicator	0.31	0.46
State medical spending on nursing homes trend	26.98	20.96
<i>Other Covariates</i>		
Population (millions)	10.76	8.34
% population under 15	22%	2%
% population over 65	12%	2%
% population female and 15 - 44	23%	1%
% black and (under 15 or over 65 or female and 15 to 44) - % pop black	1%	1%
Economic Conditions		
Per capita annual income	\$15,874.05	2,356.38
Unemployment rate	6.62	1.87
Crimes/100,000 pop	5501.41	1344.94

Notes: Sample includes data from 48 continental states in the years 1983-1995 (624 obs).
Revenues and expenditures are expressed in real 1987 dollars.
* AFDC data is unavailable for 1995.

Sources: See Data Appendix

Table 3: Estimation of Average Response

Independent Variable: State Public Health Expenditures				
	OLS	IV using eligibility index and medical trend		
	State Data 1983-1995	State Data 1983-1995	State Data 1983-1992**	Combined State and Local Budgets, net of intergovern- mental transfers 1983-1992**
	(1)	(2)	(3)	(4)
<i>State General Expenditures</i>	0.82 (.09)	0.45 (.13)	0.76 (.21)	
<i>Social Services</i>	0.74 (.06)	0.60 (.12)	0.73 (.16)	
Public Welfare (non Medicaid)	-0.26 (.06)	-0.40 (.12)	-0.27 (.16)	-0.28 (.14)
AFDC*	0.03 (.01)	-0.04 (.03)	-0.06 (.03)	
Other*	-0.30 (.06)	-0.34 (.11)	-0.22 (.05)	
<i>Non-Social Services</i>	0.08 (.06)	-0.15 (.14)	0.03 (.19)	
Education	0.08 (.04)	0.03 (.12)	0.11 (.21)	0.00 (.12)
Transportation and Public Safety	-0.01 (.02)	-0.04 (.05)	-0.07 (.07)	
Environment	-0.01 (.01)	-0.04 (.01)	-0.04 (.02)	
Administration and Other	0.01 (.03)	-0.10 (.05)	0.03 (.09)	
<i>State General Revenues</i>	0.54 (.08)	0.12 (.20)	0.32 (.33)	
<i>Intergovernmental</i>	0.62 (.04)	0.74 (.11)	0.84 (.19)	
From Federal Government***	0.55 (.04)	0.62 (.07)	0.59 (.08)	
From Localities***	0.10 (.04)	0.24 (.12)	0.24 (.12)	
Own Taxes and Charges	-0.08 (.06)	-0.62 (.12)	-0.52 (.21)	-0.17 (.27)
<i>State General Surplus</i>	-0.28 (.07)	-0.33 (.16)	-0.45 (.27)	

Each coefficient reported in this table is from a separate regression.

Left-hand side variables are state spending and revenue categories. (Robust standard errors in parentheses.)

The sample is 13 years (1983-1995) and 48 states (AK and HI excluded). All regressions have state and year dummies.

Control variables include three demographic variables (percent of population under age 15, percent of population over age 65, and percent of population female between ages 15 and 44), crime rate (lagged 2 years), the unemployment rate (and three lags), and state per capita income (and three lags).

Revenues and expenditures are expressed in real (\$1987) per capita terms, and regressions are weighted by state population.

* AFDC data is unavailable for 1995.

** Local data is generally only available through 1992, and data on intergovernmental expenditures

is entirely unavailable for many categories. State data for the same time period is included for comparability.

*** Local/Federal breakdown of intergovernmental revenues is available only through 1993.

Table 4: Summary of Results

Effect of \$1 Increase in Medicaid Spending			
	Baseline	Additional Effect from Increase of One Standard Deviation	
		Demographic Fragmentation	AFDC Generosity Relative to Neighbors
	(Table 3)	(Table 5)	(Table 6)
Public Medical Spending	1.00	0.00	0.00
Non-Medicaid Public Welfare Spending	-0.40	-0.06	-0.05
<i>AFDC*</i>	-0.04	-0.01	-0.01
<i>Other Welfare*</i>	-0.34	-0.05	-0.05
Other Spending	-0.15	-0.03	0.02
Revenues minus Surpluses	0.45	-0.09	-0.03
Total	0.00	0.00	0.00
= Change in Spending - Change in Revenues + Change in Surplus			

See indicated tables for notes and sources.

Boldface denotes significance at 5% level.

* Components may not add to totals because AFDC data unavailable for 1995.

Interaction Term: Pct of (Kids, Moms, and Old) who are Black - Pct of Pop Black

IVs: eligibility index, medical trend, eligibility index*interaction term, medical trend*interaction term

	medical spending (1)	interaction term (2)	Evaluated at Mean= .008 (3)	Evaluated at Mean+Std Dev (.015) (4)
<i>State General Expenditures</i>				
Total	0.62 (.14)	-13.67 (4.13)	0.51	0.41
Social Services	0.75 (.11)	-9.50 (2.28)	0.67	0.61
Public Welfare without Medicaid expenditure	-0.25 (.11)	-9.50 (2.28)	-0.33	-0.39
All Other	-0.13 (.14)	-4.17 (3.98)	-0.16	-0.19

State General Revenues

Total	0.24 (.23)	-9.90 (4.42)	0.16	0.09
Intergovernmental	0.83 (.13)	-5.56 (2.11)	0.79	0.75
<i>State General Surplus</i>	-0.38 (.18)	3.76 (3.80)	-0.35	-0.32

Each row of this table comes from a separate regression.

Left-hand side variables are state spending and revenue categories. (Robust standard errors in parentheses.)

The sample is 13 years (1983-1995) and 48 states (AK and HI excluded). All regressions have state and year dummies.

Control variables include three demographic variables (percent of population under age 15, percent of population over age 65, and percent of pop female between ages 15 and 44), crime rate (lagged 2 years), the unemployment rate (and three lags), and state per capita income (and three lags).

Revenues and expenditures are expressed in real (\$1987) per capita terms, and regressions are weighted by state population.

Main effect is included as another control.

Table 6: Fiscal Constraints and "Neighbor" Effects

<i>Fiscal Constraints</i>			<i>"Neighbor" Effects</i>			
Interaction Term: Tax and Expenditure Limits Present			Interaction Term: Average AFDC Need Std in Contiguous States - Own AFDC Need Std (in \$1,000s)			
	medical spending	interaction term	medical spending	interaction term	evaluated at mean =-.03	evaluated at mean - std dev =-.20
	(1)	(2)	(3)	(4)	(5)	(6)
<i>State General Expenditures</i>						
Total	0.39 (.13)	0.09 (.06)	0.42 (.16)	0.19 (.14)	0.41	0.38
Education	-0.01 (.10)	-0.03 (.06)	0.06 (.12)	0.00 (.10)	0.06	0.06
Social Services	0.67 (.11)	-0.05 (.04)	0.49 (.11)	0.31 (.07)	0.48	0.43
Public Welfare without Medicaid expenditure	-0.33 (.11)	-0.05 (.04)	-0.51 (.11)	0.31 (.07)	-0.52	-0.57
<i>State General Revenues</i>						
Total	0.06 (.23)	0.17 (.07)	0.05 (.20)	0.31 (.14)	0.04	-0.01
Intergovernmental	0.75 (.12)	-0.03 (.04)	0.69 (.11)	0.20 (.07)	0.68	0.65
<i>State General Surplus</i>	-0.32 (.18)	0.09 (.06)	-0.38 (.17)	0.12 (.13)	-0.38	-0.40

Each row of each panel comes from a separate regression.

Instruments are eligibility index, medical trend, eligibility index*interaction term, and medical trend*interaction term.

Left-hand side variables are state spending and revenue categories. (Robust standard errors in parentheses.)

The sample is 13 years (1983-1995) and 48 states (AK and HI excluded). All regressions have state and year dummies.

Control variables include three demographic variables (percent of population under age 15, percent of population over age 65, and percent of population female between ages 15 and 44), crime rate (lagged 2 years),

the unemployment rate (and three lags), and state per capita income (and three lags).

Revenues and expenditures are expressed in real (\$1987) per capita terms, and regressions are weighted by state population.

The "interaction" term is included as a main effect in each regression.

Table 7: Multiple Effects

	Instrumented Medical Spending (1)	Interaction Term: Tax and Expenditure Limits Dummy (2)	Interaction Term: Pct of Kids Black - Pct of Old Black (3)	Interaction Term: Avg "Neighbor" Need Std - Own (in \$1,000s) (4)	Effect at Means: T/E Limit = .40 Demographic Frag = .07 Neighbor Diff = -.029 (5)
<i>State General Expenditures</i>					
Total	0.66 (.23)	0.06 (.07)	-1.97 (.92)	0.19 (.15)	0.54
Social Services	0.81 (.11)	-0.06 (.04)	-1.44 (.40)	0.25 (.07)	0.68
Public Welfare without Medicaid expenditure	-0.19 (.11)	-0.06 (.04)	-1.44 (.40)	0.25 (.07)	-0.32
<i>State General Revenues</i>					
Total	0.26 (.26)	0.16 (.07)	-1.44 (.89)	0.28 (.13)	0.22
Intergovernmental	0.77 (.13)	-0.03 (.04)	-0.38 (.36)	0.19 (.07)	0.73
State General Surplus	-0.40 (.21)	0.10 (.06)	0.53 (.80)	0.09 (.13)	-0.33

Each row is from a separate regression.
 Instruments are Medicaid eligibility index, medical trend, and each of these two multiplied by each of the interaction terms.
 Left-hand side variables are state spending and revenue categories. (Robust standard errors in parentheses.)
 The sample is 13 years (1983-1995) and 48 states (AK and HI excluded). All regressions have state and year dummies.
 Control variables include three demographic variables (percent of population under age 15, percent of population over age 65, and percent of population female between ages 15 and 44), crime rate (lagged 2 years), the unemployment rate (and three lags), and state per capita income (and three lags).
 Revenues and expenditures are expressed in real (\$1987) per capita terms, and regressions are weighted by state population.
 All three "interactions" are also included as main effects.

Table 8: Testing for the Flypaper Effect

	Coefficient on Instrumented Medical Spending	Implicit Change in Non-Medical State Spending*	-(Sum of Coefficients on Personal Income and Lags)	Probability Equal
	(1)	(2)	(3)	(4)
<i>State General Expenditures</i>				
Total	0.45 (.13)	-1.31 (.31)	-0.11 (.01)	0.0001
Public Welfare without Medicaid expenditure	-0.40 (.12)	-0.94 (.27)	-0.02 (.01)	0.0006

Each row is from a separate regression.

Instruments are Medicaid eligibility index and medical spending trend.

Left-hand side variables are state spending and revenue categories. (Robust standard errors in parentheses.)

The sample is 13 years (1983-1995) and 48 states (AK and HI excluded). All regressions have state and year dummies.

Control variables include three demographic variables (percent of population under age 15, percent of population

over age 65, and percent of population female between ages 15 and 44), crime rate (lagged 2 years),

the unemployment rate (and three lags), and state per capita income (and three lags).

Revenues and expenditures are expressed in real (\$1987) per capita terms, and regressions are weighted by state population.

* Column (2) is calculated by dividing the estimated coefficient from column (1) by the state average share of Medicaid spending, 42 percent (first subtracting one in the "total spending" row to represent the Medicaid spending itself), in order to obtain the estimated effect on state spending of a one dollar increase in total Medicaid expenditures.

Table 9: Medicaid Spending on Different Groups

Coefficients on Instrumented Medical Spending (Using two different sets of instruments)			
	IV: Eligibility Index for Children Only	IVs: Boren Amendment Suit Dummy and (Growth of Pct Over 65* Nursing Home Spending in 1983)	Probability Equal
	(1)	(2)	(3)
<i>State General Expenditures</i>			
Total	0.76 (.27)	0.62 (.13)	0.5759
Education	-0.09 (.21)	-0.05 (.08)	0.7400
Public Welfare without Medicaid expenditure	-0.39 (.13)	-0.26 (.11)	0.4285
Number of optional Medicaid services offered	-0.018 (.009)	-0.019 (.005)	0.7986
AFDC	0.11 (.05)	-0.03 (.02)	0.3898

Each coefficient comes from a separate regression. "Probability Equal" is calculated using a Hausman specification test. Left-hand side variables are state spending and revenue categories. (Robust standard errors in parentheses.) The sample is 13 years (1983-1995) and 48 states (AK and HI excluded). All regressions have state and year dummies. Control variables include three demographic variables (percent of population under age 15, percent of population over age 65, and percent of population female between ages 15 and 44), crime rate (lagged 2 years), the unemployment rate (and three lags), and state per capita income (and three lags). Revenues and expenditures are expressed in real (\$1987) per capita terms, and regressions are weighted by state population.

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APPENDIX A: A MODEL OF STATE DECISION MAKING AND FEDERAL POLICY

MODEL

Voter utility:

$$U = u(y - \tau) + \alpha(\bar{X}_j, \bar{T}_j)$$

- u is the utility from private consumption $c = y - \tau$
- $\bar{T}_j$ is the vector of transfers T_j
- $\bar{X}_j$ is the vector of $X_j = |X_M - X_{Rj}|$, the demographic distance between the median voter and the recipient of program j .
- α is the utility of transfers to others. Voters are assumed to prefer transfers to those who are more demographically similar to them. Dollars transferred to the same recipient are more substitutable in U than dollars transferred to different recipients (formalized below).

Subject to:

$$\tau N_M \geq \tau N_M \geq \sum_j N_{Rj} (T_j) T_j (1 - s_j) = \sum_j E_j (1 - s_j)$$

- s_j is the federal subsidy for spending on program j , between 0 and 1.
- N_{Rj} is the number of recipients of transfer program j and is a function of T_j .
- τ is the maximum tax legally imposed.

With additional cost:

$$F(\bar{T}_j - T^*)$$

- F is a twice differentiable function with non-negative first and second derivatives and cross-derivatives, where T^* is derived from previous spending levels and changes in federal grants.

Voters maximize utility minus costs by choosing the T_j s, subject to the budget constraint.

Some programs are subject to mandated federal spending floors, and are thus not choice variables. These programs are indexed by k . Call η_j the sensitivity of spending choice programs E_j to spending on (non-choice) mandated programs E_k , or $\eta_j = \frac{\partial E_j}{\partial E_k}$.

PROPOSITION

The solution to this maximization problem produces the following comparative statics:

(1) The sign of $\frac{\partial \eta_j}{\partial |X_M - X_{Rj}|}$ depends on concavities of α , F and u , and is positive if u is linear.

(2) $(\eta_j | \bar{\tau} = \tau) > (\eta_j | \bar{\tau} > \tau)$

(3) The sign of $\frac{\partial \eta_j}{\partial \varepsilon_{NRj}}$ depends on concavities of α , F and u , and is positive if u is linear.

(4) If $F(\bar{T}_j - T^*) = 0$ then $-\frac{\partial E_3}{\partial E_1} > -\frac{\partial E_2}{\partial E_1}$ and $-\frac{\partial E_3}{\partial E_1} \geq \frac{\partial E_3}{\partial Y}$

where programs 1 and 3 are more substitutable in the utility function than programs 1 and 2 are.

PROOF

For simplicity, assume $N_j(T_j) = N_j T_j$, where N_j is a positive constant. Call $p_j = -(1-s_j)/N_j$.

Maximize utility w.r.t. T_j to get first order conditions:

$$-2p_j N_j T_j \frac{\partial u}{\partial c} + \frac{\partial \alpha}{\partial T_j} - \frac{\partial F}{\partial T_j} = 0 \quad \forall j \neq k$$

$$\text{where } c = y - \tau = y - \sum_j p_j N_j T_j^2 \quad \text{and} \quad \frac{\partial c}{\partial T_j} = -2p_j N_j T_j$$

Now differentiate the first order condition with respect to changes in E_k (no longer a choice variable), and solve.

$$\eta_j = \frac{\partial E_j}{\partial E_k} = \frac{\partial E_j}{\partial T_j} \frac{\partial T_j}{\partial E_k} = \frac{2T_j N_j (1-s_j) \left(\frac{\partial^2 \alpha}{\partial T_j \partial E_k} - \frac{\partial^2 F}{\partial T_j \partial E_k} + 2p_j p_k N_j T_j \frac{\partial^2 u}{\partial c^2} \right)}{-\left(2p_j N_j T_j\right)^2 \frac{\partial^2 u}{\partial c^2} + 2N_j p_j \frac{\partial u}{\partial c} - \frac{\partial^2 \alpha}{\partial T_j^2} + \frac{\partial^2 F}{\partial T_j^2}} < 0$$

If j and k are substitutes in α , the numerator will be negative and the denominator will be positive, with η_j negative. (The terms *[numerator]* and *[denominator]* below will refer to the numerator and denominator of this expression.)

If we make the simplifying assumption that u is linear, the second-order terms in u drop out, leaving

$$\eta_j = \frac{2T_j N_j (1-s_j) \left(\frac{\partial^2 \alpha}{\partial T_j \partial E_k} - \frac{\partial^2 F}{\partial T_j \partial E_k} \right)}{2N_j p_j \frac{\partial u}{\partial c} - \frac{\partial^2 \alpha}{\partial T_j^2} + \frac{\partial^2 F}{\partial T_j^2}} < 0$$

- (1) Differentiate η_j w.r.t. $|X_M - X_{Rj}| = X_j$ and assume all third derivatives are 0. In the case where u is quadratic and concave:

$$\frac{\partial \eta_j}{\partial X_j} = \frac{[\text{deriv of num}][\text{denom}] - [\text{deriv of denom}][\text{num}]}{[\text{denom}]^2}$$

where *[denom]* is positive, *[num]* is negative (from above), and

$$\frac{\partial T_j}{\partial X_j} = \frac{\frac{\partial^2 \alpha}{\partial T_j \partial X_j} - \frac{\partial^2 F}{\partial T_j \partial X_j}}{-\left(2p_j T_j N_j\right)^2 \frac{\partial^2 u}{\partial c^2} + 2N_j p_j \frac{\partial u}{\partial c} - \frac{\partial^2 \alpha}{\partial T_j^2} + \frac{\partial^2 F}{\partial T_j^2}} < 0$$

$$\text{deriv of num} = 2N_j(1-s_j) \frac{\partial T_j}{\partial X_j} \left[\frac{\partial^2 \alpha}{\partial T_j \partial E_k} - \frac{\partial^2 F}{\partial T_j \partial E_k} + 2N_j T_j p_j p_k \frac{\partial^2 u}{\partial c^2} \right] > 0$$

$$\text{deriv of denom} = -4p_j N_j T_j \frac{\partial T_j}{\partial X_j} \frac{\partial^2 u}{\partial c^2} (1 + p_j N_j) < 0$$

The sign of the expression $\frac{\partial \eta_j}{\partial X_j}$ depends on the sign of its numerator, which in turn depends on the

size of the second-order terms in u , α and F . If $\frac{\partial^2 u}{\partial c^2}$ is small enough, $\frac{\partial \eta_j}{\partial X_j}$ will be positive.

To see this more clearly, consider the case where u is linear:

$$\frac{\partial \eta_j}{\partial X_j} = \frac{2N_j(1-s_j) \frac{\partial T_j}{\partial X_j} \left(\frac{\partial^2 \alpha}{\partial T_j \partial E_k} - \frac{\partial^2 F}{\partial T_j \partial E_k} \right) \left(2N_j p_j \frac{\partial u}{\partial c} - \frac{\partial^2 \alpha}{\partial T_j^2} + \frac{\partial^2 F}{\partial T_j^2} \right)}{\left(2N_j p_j \frac{\partial u}{\partial c} - \frac{\partial^2 \alpha}{\partial T_j^2} + \frac{\partial^2 F}{\partial T_j^2} \right)^2}$$

$$\text{where } \frac{\partial T_j}{\partial X_j} = \frac{\frac{\partial^2 \alpha}{\partial T_j \partial X_j} - \frac{\partial^2 F}{\partial T_j \partial X_j}}{2N_j p_j (1-s_j) - \frac{\partial^2 \alpha}{\partial T_j^2} + \frac{\partial^2 F}{\partial T_j^2}} < 0$$

Here $\frac{\partial \eta_j}{\partial X_j}$ is unambiguously positive, which tells us that transfers to program j are *more* sensitive to mandatory spending on k when the recipients are more demographically different.

- (2) If there is no binding limit on τ , then voters will choose transfer levels such that the marginal value of private consumption is equal to the marginal value of additional transfers. Any mandatory increase in transfers will be financed partially by decreases in other transfers and partially by a decrease in private consumption (assuming consumption and all transfers are normal goods). If there a binding limit on τ is imposed, then voters would prefer to spend more on transfers in total than they are, so the marginal value of private consumption is less than the marginal value of transfers. Any mandatory increase in

transfers must be financed wholly by a decrease in other transfers, despite the fact that unconstrained voters would choose to decrease private consumption. Therefore, transfers will be decreased by more than in the unconstrained state, so the sensitivity of transfers to shocks will be greater.

More formally (using linear u for ease - this finding generalizes to the case of quadratic u):

When $\bar{\tau}$ is not binding, we have

$$(\eta_j | \bar{\tau} > \tau) = \frac{2T_j N_j (1-s_j) \left(\frac{\partial^2 \alpha}{\partial T_j \partial E_k} - \frac{\partial^2 F}{\partial T_j \partial E_k} \right)}{2N_j p_j \frac{\partial u}{\partial c} - \frac{\partial^2 \alpha}{\partial T_j^2} + \frac{\partial^2 F}{\partial T_j^2}}$$

When $\bar{\tau}$ is binding, the maximization problem simplifies to

$$\max \alpha(\bar{X}_j, \bar{T}_j) - F(\bar{T}_j) \quad \text{s.t. } \bar{\tau} = \sum_j p_j N_j T_j^2$$

The first order condition is

$$\frac{\partial \alpha}{\partial T_j} - \frac{\partial F}{\partial T_j} - \lambda 2p_j N_j T_j = 0$$

where λ is the shadow price of the binding constraint. Differentiating with respect to E_k now yields:

$$(\eta_j | \bar{\tau} = \tau) = \frac{2T_j N_j (1-s_j) \left(\frac{\partial^2 \alpha}{\partial T_j \partial E_k} - \frac{\partial^2 F}{\partial T_j \partial E_k} - 2p_j N_j T_j \frac{\partial \lambda}{\partial E_k} \right)}{-\frac{\partial^2 \alpha}{\partial T_j^2} + \frac{\partial^2 F}{\partial T_j^2} + 2p_j N_j \lambda}$$

Since the constraint is binding, $\lambda > \frac{\partial u}{\partial c}$ (voters would like to consume less and transfer more, but the constraint prohibits that), so the denominator is now larger. The shadow price increases as the constraint becomes more binding (with increases in mandatory spending), so the numerator is now smaller. Thus,

$$(\eta_j | \bar{\tau} = \tau) > (\eta_j | \bar{\tau} > \tau)$$

(3) Differentiate ϵ_{jk} w.r.t. N_j . Again, the sign of $\frac{\partial \eta_j}{\partial N_j}$ is ambiguous in the case where u is quadratic:

$$\frac{\partial \eta_j}{\partial N_j} = \frac{[\text{deriv of num}][\text{denom}] - [\text{deriv of denom}][\text{num}]}{[\text{denom}]^2}$$

where $[\text{denom}]$ is positive, $[\text{num}]$ is negative (from above), and

$$\frac{\partial T_j}{\partial N_j} = \frac{\frac{\partial^2 \alpha}{\partial T_j \partial X_j} - \frac{\partial^2 F}{\partial T_j \partial X_j} - 2p_j T_j \frac{\partial u}{\partial c}}{-(2p_j T_j N_j)^2 \frac{\partial^2 u}{\partial c^2} + 2N_j p_j \frac{\partial u}{\partial c} - \frac{\partial^2 \alpha}{\partial T_j^2} + \frac{\partial^2 F}{\partial T_j^2}} < 0$$

$$\text{deriv of num} = 2N_j(1-s_j) \left(T_j + \frac{\partial T_j}{\partial N_j} N_j \right) \left[\frac{\partial^2 \alpha}{\partial T_j \partial E_k} - \frac{\partial^2 F}{\partial T_j \partial E_k} + 4N_j T_j p_j p_k \frac{\partial^2 u}{\partial c^2} \right] > 0$$

$$\text{deriv of denom} = 2p_j \frac{\partial u}{\partial c} - 4p_j N_j T_j \frac{\partial^2 u}{\partial c^2} \left(\frac{\partial T_j}{\partial N_j} N_j (1+p_j) + T_j \right) < 0$$

The sign of the expression $\frac{\partial \eta_j}{\partial T_j}$ depends on the sign of its numerator, which in turn depends on the

size of the second-order terms in u , α and F . If $\frac{\partial^2 u}{\partial c^2}$ is small enough, $\frac{\partial \eta_j}{\partial T_j}$ will be positive.

When we assume u is linear, the sign of $\frac{\partial \eta_j}{\partial N_j}$ is again unambiguously positive:

$$\frac{\partial \eta_j}{\partial N_j} = \frac{\left(2(1-s_j) \left(\frac{\partial^2 \alpha}{\partial T_j \partial E_k} - \frac{\partial^2 F}{\partial T_j \partial E_k} \right) \left(T_j + N_j \frac{\partial T_j}{\partial N_j} \right) \right) [\text{denom}] - 2p_j \frac{\partial u}{\partial c} [\text{numerator}]}{[\text{denom}]^2}$$

where
$$\frac{\partial T_j}{\partial N_j} = \frac{-T_j}{N_j + \left(-\frac{\partial^2 \alpha}{\partial T_j^2} + \frac{\partial^2 F}{\partial T_j^2} \right) \left(2p_j \frac{\partial u}{\partial c} \right)^{-1}} < 0$$

$\left(T_j + N_j \frac{\partial T_j}{\partial N_j} \right)$ is thus positive, so $\frac{\partial \eta_j}{\partial N_j}$ is also positive. This tells us that that transfers to program j are *more* sensitive to mandatory spending on k when the number of recipients is more sensitive to the transfer level.

- (4) It is assumed that dollars transferred to the same recipient are more substitutable in the voter utility function than dollars transferred to different recipients, or, for example

$$\frac{\partial^2 U}{\partial T_1 \partial T_2} > \frac{\partial^2 U}{\partial T_1 \partial T_3}$$

where T_1 and T_2 serve different populations but T_1 and T_3 serve the same population (but may be in different budget categories).

This substitutability implies that if F is zero,

$$-\frac{\partial E_3}{\partial E_1} > -\frac{\partial E_2}{\partial E_1} \quad \text{and} \quad -\frac{\partial E_3}{\partial E_1} \geq \frac{\partial E_3}{\partial Y}$$

The only way these relationships could be reversed is if the cost F of shifting funds between programs 1 and 3 is much greater than the cost of shifting funds between 1 and 2.

More formally (using linear u for ease - the results generalize to the quadratic case), recall the expression

$$\eta_j = \frac{2T_j N_j (1 - s_j) \left(\frac{\partial^2 \alpha}{\partial T_j \partial E_k} - \frac{\partial^2 F}{\partial T_j \partial E_k} \right)}{2N_j p_j \frac{\partial u}{\partial c} - \frac{\partial^2 \alpha}{\partial T_j^2} + \frac{\partial^2 F}{\partial T_j^2}} < 0$$

We have already assumed that program k is the mandated program (program 1 in the example above). Assume that program 3 is more substitutable than program 2 in voter utility. Assuming that in equilibrium $\frac{\partial U}{\partial T_j} = \frac{\partial U}{\partial T_i}$ (and because we have assumed that private consumption and transfers are additively separable in the utility function), if there were no cost F ,

$$\eta_3 > \eta_2 \Leftrightarrow \frac{\frac{\partial c}{\partial T_3} \frac{\partial^2 \alpha}{\partial T_3 \partial E_1}}{\frac{\partial u}{\partial T_3} + \frac{\partial^2 \alpha}{\partial T_3^2}} > \frac{\frac{\partial c}{\partial T_2} \frac{\partial^2 \alpha}{\partial T_2 \partial E_1}}{\frac{\partial u}{\partial T_2} + \frac{\partial^2 \alpha}{\partial T_2^2}} \Leftrightarrow \frac{\partial^2 \alpha}{\partial T_3 \partial E_1} > \frac{\partial^2 \alpha}{\partial T_2 \partial E_1}$$

However, with the introduction of the F function,

$$\eta_3 > \eta_2 \Leftrightarrow \left(\frac{\partial^2 \alpha}{\partial T_3 \partial E_1} - \frac{\partial^2 F}{\partial T_3 \partial E_1} \right) > \left(\frac{\partial^2 \alpha}{\partial T_2 \partial E_1} - \frac{\partial^2 F}{\partial T_2 \partial E_1} \right)$$

Thus, even if 3 and 1 are more substitutable in α , if the cross-term in F is much greater for 2 and 1 than it is for 3 and 1 (such as if 2 and 1 are in the same budget category but 3 and 1 are in different budget categories), then η_2 could still be greater than η_3 .

Differentiating the first order condition with respect to income, y , yields

$$\frac{\partial T_j}{\partial y} = \frac{\frac{\partial^2 \alpha}{\partial T_j \partial y} - \frac{\partial^2 F}{\partial T_j \partial y}}{2N_j p_j \frac{\partial u}{\partial c} - \frac{\partial^2 \alpha}{\partial T_j^2} + \frac{\partial^2 F}{\partial T_j^2}} < 0$$

In the absence of F ,

$$\frac{\partial T_j}{\partial E_k} > \frac{\partial T_j}{\partial y} \Leftrightarrow \frac{\frac{\partial^2 \alpha}{\partial T_j \partial E_k}}{2N_j p_j \frac{\partial u}{\partial c} - \frac{\partial^2 \alpha}{\partial T_j^2}} > \frac{\frac{\partial^2 \alpha}{\partial T_j \partial y}}{2N_j p_j \frac{\partial u}{\partial c} - \frac{\partial^2 \alpha}{\partial T_j^2}} \Leftrightarrow \frac{\partial^2 \alpha}{\partial T_j \partial E_k} > \frac{\partial^2 \alpha}{\partial T_j \partial y}$$

Similarly, in the presence of F

$$\frac{\partial T_j}{\partial E_k} > \frac{\partial T_j}{\partial y} \Leftrightarrow \left(\frac{\partial^2 \alpha}{\partial T_j \partial E_k} - \frac{\partial^2 F}{\partial T_j \partial E_k} \right) > \left(\frac{\partial^2 \alpha}{\partial T_j \partial y} - \frac{\partial^2 F}{\partial T_j \partial y} \right)$$

For a large enough value of $\frac{\partial^2 F}{\partial T_j \partial E_k}$, we could see $\frac{\partial T_j}{\partial E_k} < \frac{\partial T_j}{\partial y}$.

APPENDIX B: DATA SOURCES

STATE EXPENDITURES AND REVENUES

Variables: Total expenditures, expenditures on education, public welfare, transportation, etc.
Total revenues, intergovernmental revenues, revenues from taxes, charges, etc.

Source: *State Government Finances*, Bureau of the Census

Notes: Divided by population, scaled by CPI (1987 = 100) (see below)

Only general expenditures and revenues used: excludes liquor stores, utilities and insurance trust funds.

For some categories, expenditures were divided into direct and intergovernmental.

LOCAL EXPENDITURES AND REVENUES

Variables: Direct expenditures on education and public welfare.
Own general taxes and charges (excluding liquor, utilities, insurance trusts)
Intergovernmental revenues

Source: *State Government Finances*, Bureau of the Census

Notes: Divided by population, scaled by CPI (1987 = 100).

Available only through 1992.

Combined state and local expenditure created (when possible) by adding together state and local spending within a category and subtracting intergovernmental transfers. Combined state and local revenues from own sources created by adding together state and local own taxes and charges.

MEDICAID VARIABLES

Variables: Medicaid spending by state, federal medical assistance percentage,
Medicaid spending on nursing facilities by state, optional services offered

Sources: *Medicare and Medicaid Data Book*, Health Care Financing Administration (pre-1990)
Medicaid Source Book, Congressional Research Service (for post 1990 data)

Notes: Spending divided by population, scaled by CPI (1987 = \$100).

Medicaid spending and FMAP available all years.

Optional services available 1983, 1986, 1989, 1991.

DEMOGRAPHICS

- Variables:** Population, fraction of population under age 15 by race, fraction of population over age 65 by race, fraction of population female and between age 15 and age 44
- Source:** Census Bureau (electronically available)
- Notes:** Created by aggregating individual state-year-age-race-gender bins.

AFDC AND SSI VARIABLES

- Variables:** Expenditures on and recipients of SSI and AFDC, AFDC need standard, AFDC maximum payments, and AFDC take-up rates
- Sources:** *Green Books*, House Ways and Means
Statistical Abstract of the US, Bureau of Statistics
Current Population Survey, March
- Notes:** Expenditures and recipients from *Statistical Abstract*. Expenditures divided by population and scaled by CPI (1987 = 100).

AFDC expenditures unavailable in 1995.

AFDC program parameters (need standard and max payments) from *Green Books*.

Take-up rates imputed by using March CPS to create potentially eligible population (single women with children earning below their state's income cut-off) and dividing the total number of recipients by this potentially eligible population.

INTERACTION TERMS

- Variables:** Tax and expenditure limit indicator, "neighbor" AFDC need standard, demographic fragmentation
- Sources:** Bureau of the Census
Significant Features of Fiscal Federalism, ACIR
Green Books, House Ways and Means
- Notes:** Tax and expenditure limit indicator is 1 if such a limit exists in a state.

"Neighbor" AFDC need standard is the population-weighted average of the need standard in geographically contiguous states.

Demographic fragmentation is the fraction of population under age 15 and black minus the fraction of population over age 65 and black (following Poterba 1996)

OTHER

- Variables:** CPI, unemployment, crimes per 100,000 pop (lagged by 2 years), personal income
- Sources:** *Economic Report of the President* (CPI)
Employment and Earnings, BLS, Department of Labor (unemployment)

Survey of Current Business, BEA, Department of Commerce (personal income)
Uniform Crime Reports, Department of Justice (crimes)

Notes: Personal income divided by population and scaled by CPI (1987=100)

INSTRUMENTS

Variables: Medicaid eligibility index, medical spending trend, Boren Amendment suit indicator, Medicaid eligibility index for children, nursing facility spending trend

Sources: *American Health Care Association* (internal memo summarizing Boren Amendment litigation)
Medicare and Medicaid Data Book, Health Care Financing Administration (pre-1990)
Medicaid Source Book, Congressional Research Service (for post 1990 data)
Statistical Abstract of the US, Bureau of Statistics
Cutler and Gruber (1996b)

Notes: Medicaid eligibility index is modified from Cutler and Gruber index. C&G take national sample of women and children across age and income distributions, determine who is eligible for Medicaid under current state laws, and weight each eligible person by average national Medicaid expenditures for that type of person. (See Currie and Gruber (1996) for details of the Medicaid eligibility expansions.) Here this index is multiplied by health expenditures in each state over national health expenditures in the initial period (1983, drawn from the *Statistical Abstract*).

Medicaid eligibility index for children is the child portion of the Medicaid eligibility index, above.

Nursing facility trend created by multiplying 1983 levels (expressed in real 1987 dollars) of Medicaid nursing facility expenditures by the growth in the state's over-65 population.

Boren Amendment indicator is positive if there has been a successful lawsuit for higher reimbursement by nursing facilities in the state (at any time in the past), created by reading of findings in relevant lawsuits. The dates used are: Wisconsin: 1986; New York: 1989; Ohio: 1990; Oregon: 1986; Illinois: 1991; Pennsylvania: 1991; West Virginia: 1990; Colorado: 1990; Nebraska: 1985; California: 1983; Oklahoma: 1993; Kansas: 1993; Connecticut: 1992; Massachusetts: 1992; Michigan: 1990; Washington: 1991; Missouri: 1989.

