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Effects of Welfare Reform and the State Children's Health Insurance Program on Medicaid and Total Health Expenditures

Anusua Datta* and **Donald Vandegrift** [φ]

Abstract: Medicaid expenditures account for a sizeable proportion of U.S. GDP - $360.3 billion in 2009 or 2.55 percent of GDP. Despite this, the Affordable Care Act of 2010 (i.e. the new Obama healthcare initiative) further expands eligibility criteria for the Medicaid program. However, there is little literature on the effect on healthcare spending from earlier expansions of Medicaid such as the introduction of the SCHIP program. Moreover, the effect of welfare reform (i.e. Personal Responsibility and Work Opportunity Reconciliation Act of 1996) on Medicaid spending has received little attention. Using panel data from all 50 U.S. states for the period 1990-2004, we find that adding one person to the SCHIP rolls in a state that has established an SCHIP program in Medicaid raises real Medicaid spending about $4,100. However, we find evidence that additional SCHIP enrollments also affect non-Medicaid health spending. Thus, the total costs of insuring these patients are significantly higher (about $7,700). For states that have established Medicaid-combined programs, adding one person to the SCHIP rolls raises real healthcare spending about $1,800 after two years. Finally, we find that welfare reform reduced annual Medicaid expenditures by about $1.2 billion and total healthcare spending by about $2.5 billion.

JEL: I10, I18, I38
Keywords: Healthcare costs, Medicaid, SCHIP, Welfare Reform

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1. Introduction

The cost of the Medicaid program is clearly one of the most vexing contemporary budget issues. In 2009, total Medicaid spending was $360.3 billion (2.55 percent of GDP) or $7,107 per enrollee (Centers for Medicare and Medicaid Services, 2010). Truffer et al. (2010) project that these costs will rise to $794 billion by 2019. Because the federal government shares the cost of Medicaid with the states, Medicaid costs affect both state and federal budgets.For 2009, Medicaid expenditures accounted for 21.1 percent of all state government spending (National Association of State Budget Officers, 2010). Worse yet, Medicaid expenditures as a percentage of state spending more than doubled from 1992 to 2007 (Marton and Wildasin, 2007).

Beginning in 2014, the Affordable Care Act of 2010 (i.e. the new Obama healthcare law) further expands eligibility for the Medicaid program to include all people under age 65 with incomes less than 138 percent of the Federal Poverty Level. As a consequence of this expansion and added Children's Health Insurance Program (CHIP) funding, the Centers for Medicare and Medicaid Services project that Medicaid and CHIP enrollment will increase 34 percent in 2014 and total spending will rise 17.4 percent (Centers for Medicare and Medicaid Services, 2010).[1]

Given the high and rising costs associated with the program, state governments are concerned about the fiscal stress induced by rising Medicaid expenditures. According to a recent Kaiser Foundation study, states have responded by adopting various cost

[1] The federal government is expected to finance much of the costs of these added beneficiaries through a 100 percent Federal Medical Assistance Percentage (FMAP). However, this FMAP will be reduced to 90 percent in 2020 and thereafter.

containment methods such as: benefits reduction (13 states), raising the bar on eligibility (1 state), pharmacy utilization controls (30 states), provider payment cuts or freezes (36 states) [2]. However, for every dollar a state reduces in Medicaid expenditures, the state loses one to three dollars in federal matching funds. Such reductions can have adverse repercussions on the health and well-being of state residents as well as the state economies (Ku and Broaddus, 2003). A better understanding of the causes for the increase in Medicaid spending can suggest methods to cut expenditures while holding health outcomes constant.

Understanding the likely fiscal effects of prospective changes to Medicaid requires that we understand the fiscal effect of past changes to the program. Consequently, this paper will examine the impact of two key pieces of legislation on Medicaid expenditures: the Personal Responsibility and Work Opportunity Reconciliation Act (PRWORA) of 1996 and the expansions of Medicaid that occurred primarily under the Balanced Budget Act (BBA) of 1997 to extend health coverage to more low-income children and their parents under the State Children's Health Insurance Program (SCHIP).

PRWORA replaced Aid for Families with Dependent Children (AFDC) with a block grant program known as Temporary Assistance for Needy Families (TANF). One of the main goals of TANF was to move recipients of cash assistance off public assistance (welfare) and into the workforce. Policy makers feared that the tighter welfare eligibility criteria required by TANF might unintentionally cause many people to lose

[2] Kaiser Commission on Medicaid and the Uninsured, 2010. For example, Arizona's Medicaid program recently stopped paying for seven types of transplants in an effort to close a projected $1 billion program deficit (Bialik, 2010).

health insurance coverage. To prevent this, the new law effectively decoupled Medicaid from cash assistance for low-income families. Families meeting the requirements for assistance under the old AFDC eligibility criteria could continue to receive Medicaid benefits. However, there is evidence that many such families did not retain their Medicaid benefits (Garrett and Holahan, 2000). Despite a clear link between welfare and Medicaid as wee as evidence that suggests PRWORA cut the welfare rolls, the effect of PRWORA on Medicaid spending has received little attention in the literature.

Likewise, there is little economic literature on the impact of BBA on Medicaid spending. The most significant provision of the BBA from Medicaid's perspective is that it established the State Children's Health Insurance Program (SCHIP) to provide health coverage to low income children who did not qualify for Medicaid. States could use SCHIP funds to cover children through expansions of their Medicaid programs or through separate State programs. At present, about 40 percent of SCHIP funds are being spent under Medicaid. The earliest changes to Medicaid extended coverage to all children under 6 years in families with income below 133 percent of the federal poverty line (FPL) and to all children in families with incomes below 100 percent of the FPL.

Later, the BBA provided states with grants to expand coverage further and create SCHIP. Additional policy changes expanded coverage to low income adults.[3] For both Medicaid and SCHIP, states have some autonomy to determine income eligibility

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[3] This expansion of coverage to low-income adults occurred as a result of three changes. First, Congress severed the link between TANF/AFDC and Medicaid and created a new family coverage category that required states to extend Medicaid eligibility to children and adults who were eligible for AFDC as of July 1996. Congress also permitted states to further expand eligibility by raising income limits and asset disregards. Second, as of August 1998, the federal government permitted states to relax the 100-h rule. The 100-h rule restricted Medicaid eligibility for two-parent households to households where the primary earner worked fewer than 100 hours a week. Third, as of July 2000, the federal government permitted states that covered children up to 200 percent of the FPL (and met other conditions) to use unspent SCHIP funds to insure low-income adults.

standards and the scope of coverage. However, flexibility is greater for states that chose to establish separate SCHIP programs. The federal government permitted these states to design new procedures and benefit packages.

Of course, factors other than changes in legislation will impact Medicaid expenditures. On the demand side, factors such as increases in the number of elderly and disabled, and a rise in obesity rates are likely to have a significant impact on Medicaid spending. On the supply side, advances in medical technology, hospital/nursing home market structure, introduction of new drugs, and HMO coverage also affect Medicaid costs. Since Medicaid is a means-tested program, variations in income and unemployment rates are likely to affect Medicaid spending as well.

Most empirical studies on healthcare costs are based on survey data, such as the MEPS data. While this data allows us to control for a number of individual characteristics they ignore macroeconomic and state-level cost factors. Indeed, the 2008 Actuarial Report on the Financial Outlook for Medicaid notes that a key limitation of their analysis and the existing literature is the "unavailability of demographic, macroeconomic, healthcare, and program assumptions specific to each state. Because these state-specific assumptions are not available, it is not possible to project Medicaid spending or enrollment separately by state" (Truffer et al., 2008, p. 5). The present research addresses these gaps in the literature. In this study, we use panel data for US states for the period 1990-2004 to analyze the effects of welfare reform and SCHIP on Medicaid spending, while controlling for various public health, demographic, income and other factors. To determine whether these factors simply shift spending between Medicaid and other payers or raise total heath care spending, we will also examine how each of the factors affect total healthcare spending.

2. Background

In contrast to the relatively voluminous literature on Medicare spending, there are relatively few recent studies that examine Medicaid spending (Buchanan et al., 1996; Baicker, 2001; Hadley and Holahan, 2003; Holahan and Ghosh, 2005; Marton and Wildasin, 2007; RAND, 2008; Gruber, 2008). Hadley and Holahan (2003) use Medical Expenditure Panel Survey (MEPS) data to determine whether Medicaid is in fact more costly than private insurance for comparable populations. This is an important question as the percentage of Americans with private insurance is declining while the percentage of Americans with public insurance (e.g., Medicare or Medicaid) is rising. Answering the question is complicated by the fact that the adult population covered by Medicaid is less likely to report excellent or very good health and more likely to report fair or poor health than the privately insured. In addition, the Medicaid population has significantly higher rates of chronic medical conditions such as diabetes, hypertension, heart disease, and digestive disorders. In contrast to adults, the health differences between children insured through Medicaid and children with private insurance are relatively modest.

Because healthcare costs are higher for individuals with fair or poor health regardless of the type of insurance coverage, an accurate comparison between Medicaid and private coverage must correct for population health characteristics. To account for these differences, Hadley and Holahan predict expenditures for hypothetical people who are representative of the average individual covered by either Medicaid or private insurance. They show that if the average adult with Medicaid was given private coverage, expenditures would be higher. Conversely, if the average adult with private coverage was given coverage under Medicaid, expenditures would fall. For children, switching from Medicaid to private coverage has no effect on expenditures. These basic results hold regardless of whether the authors allow underlying behaviors to differ.

By contrast, Holahan and Ghosh (2005) analyze spending Medicaid spending growth for 2000 - 2003 by disaggregating Medicaid spending by category (e.g., acute care, nursing home care) and decomposing the growth in spending into growth in enrollment and growth in spending per enrollee. They find that over the period total Medicaid spending grew at 11.4 percent per year while enrollment grew at 8.0 percent a year. They attribute much of the enrollment growth to the economic downturn. After accounting for caseloads, they find that spending per enrollee increased only 3.1 percent a year - well below the private sector rate of increase. Though growth in spending was relatively uniform across Medicaid spending categories, there were exceptions. Prescription drug spending, acute care services, and long-term care grew at 17.1, 13.4 and 8.4 percent, respectively over the period. In fact, growth in acute care spending accounted for nearly 70 percent of the total spending growth over the period.

In addition to variation in Medicaid spending across categories, there is also substantial variation in spending among the states. State Medicaid expenditures as a share of total state budgets varied anywhere from 13 percent (Utah and Wyoming) to 30 percent (New York, Tennessee, and Maine) in 2005. Welfare spending also varies widely by state. Thus while California had one of the most “generous” state welfare plans, its Medicaid spending as a share of the state’s budget is relatively low. A large portion of

Medicaid spending supports healthcare for the elderly. About one quarter of Medicaid enrollees are elderly, or disabled, but these groups account for about two thirds of spending (Marton and Wildasin, 2007).

2.1 PRWORA, SCHIP and Medicaid

Despite the significant documented effects of PRWORA, there is little literature on the effects of the subsequent decline in number of welfare recipients on Medicaid costs. While PRWORA severed the link between welfare and Medicaid eligibility, Medicaid policy was subsequently reformed to expand participation, with state determined eligibility criteria. Ku and Bruen (1999) report that, between 1995 and 1997 Medicaid enrollment of adults and children declined by 5.3 percent, implying that the loss of welfare recipients was not fully offset by the increase in participation by non-welfare families.

A series of recent studies (Ellwood and Ku, 1998; Ellwood and Irvin, 2000; Garrett and Holahan, 2000 and Garret et al., 2002) explore the association between Medicaid enrollment and the welfare caseloads reductions following PRWORA. All studies find significant declines in Medicaid participation of women and children between 1995 and 1997. Ellwood and Irvin (2000) also find that Medicaid programs have lost low-cost welfare leavers while continuing to cover those with higher costs.

Baicker (2001), on the other hand, finds substitution between Medicaid and welfare expenditures. The mandated Medicaid expansions of the late 1980s caused increased Medicaid spending but the increases were almost exactly offset by decreases in other welfare expenditures. Thus, the Medicaid mandates shifted only the composition of welfare benefits not their overall level. Due to these offsetting factors, the net effect of PRWORA on state Medicaid expenditures can only be determined empirically.

While there are few studies that examine the cost implications of SCHIP on Medicaid, a recent RAND (2008) study uses micro-simulation modeling to assess the government cost of each newly insured adult and child. The simulations are based on a set of assumptions about Medicaid/SCHIP take up rates, rate of "crowding out", utilization rates etc. The study estimates that a Medicaid/SCHIP expansion will increase government spending \$17.9 to \$89.0 billion, about a 6 to 28 percent increase in program spending. The government cost for each *net newly insured* person is estimated to range from \$4,420 to \$6,420, for individuals with incomes 100 to 300 percent of Federal Poverty Level (FPL). A related study by Gruber (2008), also based on simulations, estimates the cost of extending free public insurance to all individuals with incomes below 100 and 185 percent of FPL, to be around \$5000 and \$9000 respectively.

Much of the remaining literature on Medicaid focuses on the effect of Medicaid/SCHIP expansions on the insurance coverage rates for both adults (Busch and Duchovny, 2005; Aizer and Grogger, 2003; and Kronick and Gilmer 2001) and children (Ham and Shore-Sheppard, 2005; LoSasso and Buchmueller, 2004). Two basic effects determine the impact of the SCHIP expansions on the percentage of uninsured. First, not all the newly eligible individuals enroll in the government insurance program. A series of papers show that take-up rates for means-tested public health insurance for children (Cutler and Gruber, 1996; Currie and Gruber, 1996; Dubay et al., 2001) and adults (Busch and Duchovny, 2005) are low. Second, newly eligible individuals may drop private insurance and add public insurance. This will cause enrollments in government health insurance programs to rise but there will be no change in the percentage of uninsured (i.e., a crowd-out effect).

Estimates of the "crowd-out" effect of public insurance vary. In general, public insurance enrollments rise as a result of the eligibility expansions. Kronick and Gilmer (2001) show that there is almost no crowd out for expansions to adults who have income below the FPL. However, there is substantial crowd out (up to 55 percent) for expansions that cover adults with income levels between 100 percent and 200 percent of the FPL. Card and Shore-Sheppard (2003) show that raising the income eligibility standard yields diminishing additions to the ranks of the insured. LoSasso and Buchmueller (2004) find that SCHIP caused a small but significant reduction in the percentage of uninsured children. Also, there is some evidence that take up is higher in states with a separate SCHIP program.

2.2 Public Health and Healthcare Costs

Studies on the role of public health in healthcare costs have mostly been limited to Medicare expenditures or total healthcare expenditures. Some papers have considered more direct causes of Medicare expenditures or medical care consumption (e.g., heart attack and stroke), while others have focused on key predictors of health status that have a larger behavioral component (e.g., obesity and smoking) (Skinner and Wennberg, 2000b; Sturm, 2002; Finkelstein et al. 2003; Finkelstein et al. 2004; Thorpe et al., 2004; Wee et al., 2005). Sturm (2002) employs data from the 1997-98 Healthcare for Communities national telephone survey and finds that obesity is associated with a $395 annual increase in healthcare costs (per person) while smoking raised annual healthcare costs by $230.

Using the 1998 Medical Expenditure Panel Survey (MEPS), Finkelstein et al. (2003) find that obesity is associated with increases in medical spending even after controlling for income, education, insurance status, sex, race, marital status, and location. In their data, obesity status is associated with a 37 percent increase in medical spending ($732) with Medicare and Medicaid recipients showing increases of 36 percent ($1,486) and 39 percent ($864), respectively. Thorpe et al. (2004) finds that obesity increases over the period 1987-2001 account for 27 percent of the increase in expenditures over the period. About half of this rise was the result of higher obesity prevalence while half was the result of higher relative spending among the obese.

3. Data and Methods

To analyze Medicaid expenditures in the U.S., we employ state-level data from the National Health Expenditure Accounts (NHEA) on Medicaid expenditures and total personal healthcare expenditures for the period 1990-2004. The data is compiled by the U.S. Department of Health and Human Services (HHS). HHS identifies all final consumption of healthcare goods and services for a given year and state (by residence) that is purchased or provided by direct or third-party payments. In addition, the data include healthcare related investments for a given year and state. The data are not dependent on patient reports. By contrast, most empirical studies on healthcare costs are based on individual-level survey data such as the MEPS or CPS data. However, Hadley and Holahan (2003) note that the MEPS data suffers from systematic underreporting and that as a consequence MEPS data report expenditures that are about 24 percent lower than the NHEA data.

Because the MEPS defines expenditures as "payments made for healthcare services," it does not include expenditures that cannot be linked to a particular patient (except for Medicaid payments to public hospitals and clinics). Thus, MEPS fails to include Medicaid overhead expenses associated with capitated health plans and payments from Medicaid to hospitals that serve a large number of low-income patients (i.e., disproportionate share payments). Finally, Hadley and Holahan (2003) note that MEPS respondents often fail to report Medicaid expenditures or misreport Medicaid coverage as private coverage. At the most basic level, respondents may simply fail to recall some healthcare utilization. The misreporting of Medicaid coverage as private coverage occurs because Medicaid contracts with private insurance plans. Consequently, providers may mistakenly believe that the source of funds is private insurance when in fact it is Medicaid.

Aside from avoiding the underreporting problems associated with MEPS, the CMS data allow us to account for various macroeconomic factors that affect Medicaid spending. The CMS 2008 Actuarial Report on the Financial Outlook for Medicaid notes that a key limitation of the existing literature is the lack of "demographic, macroeconomic, healthcare, and program assumptions specific to each state" which makes it impossible "to project Medicaid spending or enrollment by state" (Truffer et al., 2008). To capture these effects on Medicaid expenditures, we employ a fixed-effects panel-data model of the following form:

(1) $$Medicaid_{it} = \gamma_i\, Policy + X_{it}\, \Gamma + \delta_i + u_{it}$$

$i = 1,\ldots,N$ (states); $t = 1990,\ldots,2004$ (years).

In equation (1) $Medicaid_{it}$ represents real per-capita Medicaid expenditure in state *i* and year *t*; *Policy* measures the effects of PRWORA and SCHIP; X_{it} is a vector of variables which control for public health, demographic and income factors; δ_i accounts for state fixed effects; and u_{it} is the transitory error term that varies across states and time-periods.

Because we wish to examine the extent to which the policy initiatives shift costs between Medicaid and other payers we also estimate the following equation:

$$(2) \qquad Health\ Spending_{it} = \lambda_i\ Policy + X_{it}\ \beta + \omega_i + e_{it}$$

$$i = 1,\ldots,N\ (states);\ t = 1990,\ldots,2004\ (years).$$

In equation (2) $Health\ Spending_{it}$ is total health spending in state *i* and year *t*. The *Policy* measures and control variables are the same as those in the Medicaid equation. ω_i and e_{it} account for the state fixed effects and the random error. Policy initiatives may increase Medicaid spending but total health spending may either rise or fall. This may occur even though all Medicaid spending is counted within total healthcare spending. For instance, covering additional children through a CHIP expansion of Medicaid may lower healthcare costs if the cost of the coverage is less than the cost of the coverage in the private system. Even if the CHIP recipient would have otherwise had no coverage at all, uninsured individuals often receive care in emergency rooms. If the avoided cost of the emergency room visits is greater than the cost of the Medicaid coverage, then total healthcare spending will fall even though Medicaid spending rises. Thus, policies that raise Medicaid spending may be effective means to control total healthcare costs.

Similarly, policies that cut Medicaid spending may cause total healthcare spending to rise or leave total spending unchanged.

In addition, the impact of the CHIP program on Medicaid and total healthcare spending will likely vary depending on whether the CHIP is funded entirely by Medicaid. As noted above, states have some autonomy to determine income eligibility standards and the scope of coverage under their CHIP but the flexibility is greater for states that chose to establish separate SCHIPs. SCHIP enrollment is used to measure the effect of the state children health insurance program on per capita state Medicaid costs. Since all states do not administer SCHIP through Medicaid, we include separate SCHIP enrollment variables to capture differences in spending for states that administer their programs through Medicaid (SCHIP-M); through a combination of Medicaid and a separate agency (SCHIP-C); and through a separate agency (SCHIP-O).[4]. To account for differences in state size, we divide the variable by population in year *t* where appropriate.

3.1 Endogeneity Issues

Many of the key variables in equations (1) and (2) are likely to be endogenous. For example, while higher enrollment in SCHIP and increases in welfare caseloads are expected to increase state healthcare costs. Rising healthcare costs may also motivate states to cut back on these programs. Both PRWORA and SCHIP, give states autonomy to determine the scope of coverage. To prevent endogeneity from biasing our results, we transform all of the variables in the equations above into changes (in cases where the

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[4] Source: HCFA – The State Children's Health Insurance Program Annual Enrollment Report Oct.1, 1998-Sept.30, 1999 In 42.9 percent of states in 1999 the SCHIP program was under Medicaid, about 26.4 percent were under separate SCHIP plans while 30.4 percent had combination plans (i.e., administered through Medicaid and through separate plans)

original variable is measured as a percentage) or growth rate and then lag the independent variables in equations (1) and (2). Because the effects of policy changes emerge over time - lagging the variables allows us to capture the effects over a 1 to 3 year period.

Substituting the policy variables into equations (1) and (2) and transforming the variables to capture changes over time we have:

$$(3)\quad \Delta\, RMEDICAIDPC_{it} = \gamma_1 \Delta\, SCHIP\text{-}M_{it-k} + \gamma_2 \Delta\, SCHIP\text{-}C_{it-k} + \gamma_3 \Delta\, SCHIP\text{-}O_{it-k} + \gamma_4\, \Delta WCASEPC_{it-k} + X_{it-k}\, \Gamma + \delta_i + u_{it}$$

$$(4)\quad \Delta\, RTOTHEALTHPC_{it} = \lambda_1 \Delta\, SCHIP\text{-}M_{it-k} + \lambda_2 \Delta\, SCHIP\text{-}C_{it-k} + \lambda_3 \Delta\, SCHIP\text{-}O_{it-k} + \lambda_4\, \Delta WCASEPC_{it-k} + X_{it-k}\, \beta + \omega_i + e_{it}$$

$$i = 1,\ldots,N \text{ (states)};\ t = 1990,\ldots,2004 \text{ (years)};\ k = 1,2,3.$$

In equations (3) and (4), $\Delta WCASEPC$ accounts for the effect of changes in the number of per-capita welfare cases on Medicaid and healthcare spending. We should expect the sign for γ_4 and λ_4 to be positive. When welfare caseloads rise we would expect Medicaid expenditures to go up and vice-versa, if caseloads fall (e.g. due to PRWORA) Medicaid costs should decline. Our hypothesis about the effect of welfare reform is that PRWORA reduced the number of welfare caseloads and as a result contributed to a decline in state Medicaid expenditures. One way to assess the effects of PRWORA on Medicaid and total healthcare costs is to simply take the reductions in welfare enrollments that occurred after PRWORA was passed and use that figure along with the estimates for γ_4 and λ_4 to derive the reductions in Medicaid and healthcare costs from PRWORA. However, this assumes that all of the changes in welfare caseloads were due to PRWORA, which is likely not the case. In fact, evidence suggests that much of the change in caseload is not due to policy (Blank, 2002), but due to other factors such as unemployment rate, etc. It is important therefore to distinguish the effects of these factors from those due to policy.

To capture the effects of the change in welfare policy (i.e., PRWORA) and avoid collinearity and endogeneity problems, we estimate a separate equation for welfare caseloads. We include a dummy variable to capture the effects of the change in policy (TANFDUM). The policy dummy TANFDUM*,* takes the value of 1 starting in the year PRWORA went into effect (1997) and zero otherwise. This specification allows us to take the estimated value for TANFDUM (β_1) and then use it in equations 3 and 4 to determine the impact of welfare reform on Medicaid and total healthcare spending.

$$(5)\ \Delta WCASEPC_{it} = \beta_0 + \beta_1\, TANFDUM_{\,t\text{-}1} + \beta_2\, \Delta SCHIP\text{-}M_{it\text{-}1} + \beta_3\, \Delta SCHIP\text{-}C_{it\text{-}1} + \beta_4\, \Delta SCHIP\text{-}O_{it\text{-}1} + Z_{it\text{-}1}\psi + \phi_i + \varepsilon_{it}$$

where $Z_{it\text{-}1}$ is a vector of variables which control for public health, demographic and income factors.

The control variables used in the models above include: Δ*HPROF* or the year-over-year change in the percentage of hospitals that are for profit, Δ*NHPROF* or the year-over-year change in the percentage of nursing homes that are for profit, Δ*OBESE* or the year-over-year change in the percentage of the population over 18 years of age that is obese (BMI $\geq$ 30), Δ*SMOKE* or the year-over-year change in the percentage of the population over 18 years of age that smokes, $\Delta URATE$ or the year-over-year change in the percentage of the labor force that is unemployed, $\Delta RINCPC$ or the growth rate of real per-capita income, $\Delta POVRATE$ or the year-over-year change in the percentage of population living below the poverty line, ΔHMO or the year-over-year change in the percentage of the population that is enrolled in HMOs, ΔNME or the year-over-year change in the number of FDA approvals of new molecular entities, $\Delta POP65PC$ or the year-over-year change in the percentage of the population that is over 65 years of age, and $\Delta BRATE$ or the year-over-year change in the number of live births per 1,000 of the population.

Data for the control variables were collected from *The Statistical Abstract of the U.S*. (per-capita income, percentage of the population over 65, poverty rate). Real per-capita income is state personal income per capita in 1996 dollars. To correct for inflation, we use the GDP deflator (1996 dollars) on dollar denominated variables. Data on unemployment rates are taken from the Bureau of Labor Statistics' Local Area Unemployment Statistics. Data on hospital ownership is from the American Hospital Association (AHA Hospital Statistics, annual editions 1990-2004). Data on nursing home ownership were supplied by the Center for Medicare and Medicaid Services (CMS). Welfare caseloads data were drawn from the Department of Health and Human Services website.

Data on obesity rates and the percentage of the population 18 years and older that smokes were taken from the Centers for Disease Control and Prevention's (*CDC*) Behavioral Risk Factor Surveillance System (*BRFSS).* Obesity is based on Body Mass Index (BMI) where BMI is weight in kilograms divided by height in meters squared. An individual with a BMI $\geq$ 30 is considered obese. Inter-study Competitive Edge *HMO Industry Report* provides HMO enrollment rates and data on New Molecular Entities is collected from the U.S. Food and Drug Administration Center for Drug Evaluation and Research. The data contains annual observations on each variable across the 50 U.S. states for each year during the period 1990-2004 (15 years and 50 cross sections).

4. Results

Table 1a reports the summary statistics for the levels of dependent and independent variables. Because the independent variables in our analysis are lagged, we analyze the dependent variables over the period 1991-2004. Over this period, real per-capita Medicaid spending varies rather dramatically across states. Mean real per-capita Medicaid spending across the entire data set is $552 and the standard deviation is $218. The mean value of real per-capita Medicaid spending is $363 in 1991 and $786 in 2004. For 2004, New York, Maine and Rhode Island had the highest real per-capita Medicaid spending at $1,780, $1,331, and $1,202, respectively. The low spending states for 2004 were Nevada, Virginia, and Utah at $361, $434, and $436, respectively. Real per-capita total healthcare spending also varies rather dramatically across states.

Mean real per-capita healthcare spending across the entire data set is $3,601 and the standard deviation is $677. The mean value of real per-capita healthcare spending is $2825 in 1991 and $4598 in 2004. For 2004, Massachusetts, Maine, and New York had the highest real per-capita healthcare spending at $5,728, $5,633, and $5,600, respectively. The low spending states for 2004 were Utah, Arizona, and Idaho at $3,380, $3,515, and $3,822, respectively.

Table 1b shows that average annual year-over-year growth in real per-capita Medicaid spending was 6.1 percent over the period 1992 to 2004 and the growth rates show a large amount of variation (0.0658). Average annual year-over-year growth in per-capita healthcare spending was somewhat lower at 3.8 percent over the period 1992 to 2004 and the growth rates also show less variation than the Medicaid growth rates (0.0197). Neither the growth in Medicaid spending nor healthcare spending exhibits a trend.

Table 2a shows regression results for growth of real per-capita Medicaid spending. Columns 2 and 3 (Specification 1) report the results of fixed-effects regression based on equation (4) above.[5] To correct for the heteroskedasticity and autocorrelation we run a fixed effects generalized least squares regression that corrects for heteroskedasticity in the panels and employs a panel-specific autoregressive procedure. The results of this regression are reported in columns 4 and 5 of Table 2a. Because the effects of some of the variables on growth in real per-capita Medicaid spending may only emerge over time, we run an additional specification that adds lags of 2 and 3 years for each independent variable. This regression is reported in columns 2 and 3 of Table 3.

We employ a similar set of specifications and corrections for our estimates of growth in real per-capita healthcare spending.[6] Columns 2 and 3 (Specification 1) of Table 2b report the results of fixed-effects regression based on equation (5) above.

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[5] A fixed effects model was chosen over a random effects, because a Hausman test indicates systematic differences in random- and fixed-effects estimates ($\chi^2 = 54.5$, $p < 0.0001$). Moreover, a modified Wald test for groupwise heteroskedasticity in a fixed-effects regression indicates the presence of heteroskedasticity ($\chi^2 = 544.25$, $p < 0.0001$). In addition, a Wooldridge test for autocorrelation in panel data indicates the presence of autocorrelation ($F = 43.6$, $p < 0.0001$).

[6] The Hausman test rejects the random effects model in favor of the fixed-effects estimates ($\chi^2 = 60.4$, $p < 0.0001$). The modified Wald test indicates the presence of heteroskedasticity ($\chi^2 = 504.1$, $p < 0.0001$). In addition, the Wooldridge test indicates the presence of autocorrelation ($F = 13.38$, $p = 0.0007$).

Columns 4 and 5 of Table 2b report the results for the GLS regression corrected for heteroskedasticity and autocorrelation. Columns 4 and 5 of Table 3 report the results with 1, 2 and 3-year lags.

4.1 Policy Effects: SCHIP

Because individuals added to the Medicaid rolls would likely have incurred healthcare costs outside the Medicaid system if they did not enroll in Medicaid, it is important to examine the effect of the expansions of Medicaid under SCHIP and welfare reform on total healthcare spending. In addition, Medicaid is known to undercompensate for services. If this is the case, then total healthcare spending may rise more than Medicaid spending as the costs of the Medicaid patients are shifted to other payers. Given this, we will examine effect of SCHIP and welfare reform on Medicaid and total healthcare spending.

We find four main results on the impact of SCHIP and welfare reform. First, our results show adding one person to the SCHIP rolls in a state that has established an SCHIP program in Medicaid raises real Medicaid spending about $4,100. However, we find evidence that additional SCHIP enrollments also affect non-Medicaid health spending. Thus, the total costs of insuring these patients are significantly higher (about $7,700. Second, adding one person to the SCHIP rolls in a state that has instituted a combined program raises real healthcare spending about $1,800 after two years. Third, welfare reform cut Medicaid spending by $1.2 billion and total health care spending by $2.5 billion.

As expected, the coefficient for changes in the percentage of the population enrolled in SCHIP-Medicaid is positive and significant ($\Delta SCHIP\text{-}M$). From columns 4 and 5 of Table 2a, we can see that on average, a one percentage-point increase in the percentage of the total population that is enrolled in SCHIP-Medicaid raises per-capita spending on Medicaid about 2.9 percent. As average annual real Medicaid spending is about $160 billion for this data set, this implies an increase of $4.6 billion. If we divide this figure by the population size at the midpoint of the data set (272 million), we see that real per capita Medicaid spending rises about $16.90 for a one percentage-point increase in the percentage of the population insured through SCHIP-M. Thus, adding one person to the rolls raises Medicaid spending costs about $1,690 after one year.[7]

From columns 4 and 5 of Table 2b, we can see that on average, a one percentage-point increase in the percentage of the total population that is enrolled in SCHIP-Medicaid reduces per-capita healthcare spending by about 1.3 percent. As average annual real healthcare spending is about $997 billion for this data set, this implies a decrease of $13 billion. Following the calculation above and dividing by the population size at the midpoint of the data set (272 million), we see that real per capita healthcare spending falls about $47 for a one percentage-point increase in the percentage of the population insured through SCHIP-M[8]. Thus, adding one person to the rolls lowers total healthcare spending about $4,700 after one year.

While SCHIP-combined programs have no statistically significant impact on Medicaid spending (see columns 4 and 5 of Table 2a), we can see from columns 4 and 5 of Table 2b that SCHIP-combined programs have an effect similar to SCHIP-Medicaid on real per-capita healthcare spending. A one percentage-point increase in the percentage of the total population that is enrolled in SCHIP-Combined reduces per-capita healthcare

[7] 0.029*$160= $4.64; 4.60bill/272mill= 0.0169*1000=$16.90.
[8] 0.0127*$997=12.66; 12.66bill/272mill = $46.55.

spending by about 1.3 percent (or about $13 billion) after one year. Dividing by the population size at the midpoint of the data set (272 million), we see that real per-capita healthcare spending falls about $47 for a one percentage-point increase in the percentage of the population insured through SCHIP-C. Thus, adding one person to the rolls lowers total per-capita healthcare spending about $4,700 after one year. Interestingly, SCHIP-other programs do not exert a significant effect on either Medicaid or total healthcare spending.

But the costs (and cost reductions) from the SCHIP programs are measured only over a one-year time frame in Tables 2a and 2b. Because costs may change if measured over a longer period, we estimate equations (4) and (5) over a three-year period using the generalized least squares process described above. The results are reported in Table 3. From columns 2 and 3 of Table 3 we can see that across years one and two (the year three estimate is not significant) a one percentage-point increase in SCHIP-M enrollment raises real per-capita Medicaid spending by about 3.5 percent in the first year and 3.5 percent in the second or 7.0 percent ($11.2 billion). Dividing by the population size at the midpoint of the data set (272 million), we see that real Medicaid spending rises about $41 for a one percentage-point increase in the percentage of the population insured through SCHIP-M. Thus, adding one person to the rolls raises real Medicaid spending about $4,100 after two years (1996 dollars).

But once again, some of those costs would likely have fallen elsewhere. Those now insured through Medicaid would likely have incurred healthcare costs outside the Medicaid system had they not enrolled and Medicaid may not cover all costs related to treating Medicaid recipients. From columns 4 and 5 of Table 3 we can see that across years one and two (the year three estimate is not significant) a one percentage-point increase in SCHIP-M enrollment decreases real per-capita healthcare spending by about 0.8 percent in the first year and increases spending by 2.9 percent in the second implying a net increase of 2.1 percent ($21 billion). Dividing by the population size at the midpoint of the data set (272 million), we see that real-per capita healthcare spending rises about $77 for a one percentage-point increase in the percentage of the population insured through SCHIP-M. Thus, adding one person to the SCHIP-M rolls raises real healthcare spending about $7,700 after two years (1996 dollars). Because real healthcare spending includes real Medicaid spending, the $4,100 is included in the $7,700 figure and the full social cost of adding someone to the SCHIP-M rolls is $7,700. The difference between the total increase in costs and the increase in Medicaid costs ($7,700 - $4,100 = $3,600) likely reflects Medicaid under compensation.

Our estimates of the effect of SCHIP on Medicaid costs are generally consistent with the only other study to assess the cost implications of SCHIP on Medicaid (Rand 2008). The Rand (2008) study uses micro-simulation modeling to assess the cost of SCHIP and finds that federal and state government Medicaid expenditures increase from $4,420 to $6,420 for each additional SCHIP enrollee. A similar study by Gruber (2008), based on simulations, estimated the cost of extending free public insurance to all individuals with incomes below 100 and 185 percent of FPL, to be around $5000 and $9000 respectively.

From columns 4 and 5 of Table 3, we can see that the net effect of an increase in SCHIP-combined is small. A one percentage-point increase in SCHIP-C enrollment reduces real per-capita healthcare spending by 1.2 percent in the first year and raises real per-capita costs 1.7 percent in the second implying a net increase of 0.4 percent ($5 billion). Dividing by the population size at the midpoint of the data set (272 million), we see that real per-capita healthcare spending rises about $18 for a one percentage-point increase in the percentage of the population insured through SCHIP-M. Thus, adding one person to the SCHIP-M rolls raises real healthcare spending about $1,800 after two years. SCHIP-C shows the same pattern as SCHIP-M but the final effect on costs is much lower. This difference is likely the result of the greater flexibility that SCHIP-C allows. Finally, we note that the estimates for SCHIP-Other, while positive, are small in magnitude and cannot be statistically bounded from zero. Therefore, SCHIP-other appears to be lowest cost option of all.

4.2 Policy Effects: PRWORA

Next, we turn to the impact of PRWORA on per-capita Medicaid spending. In general, the estimates show that higher welfare enrollments cause both higher Medicaid and higher total healthcare spending. The estimates also suggest that the welfare reform law caused a significant decline in both Medicaid and total healthcare spending. From Table 2a we see that a one percentage-point increase in the percentage of the population on welfare raises Medicaid expenditures about 3.1 percent. As average annual real Medicaid spending is about $160 billion (1996 dollars) for this data set, this implies an increase of $5 billion. If we divide this figure by the population size at the midpoint of the data set (272 million), we see that real per-capita Medicaid spending rises about $18 for a one percentage-point increase in the percentage of the population on welfare. Thus, adding one person to the rolls raises Medicaid spending costs about $1,800 after one year.

From Table 2b, we see that a one percentage-point increase in the percentage of the population on welfare raises total healthcare expenditures about 0.6 percent. Multiplying by average annual healthcare spending ($997 billion) yields a $6 billion increase and dividing by the population size (272 million), we see that real per-capita healthcare spending rises about $22 for a one percentage-point increase in the percentage of the population on welfare. Thus, adding one person to the welfare roll raises total healthcare spending about $2,200 after one year.

We see similar effects of welfare enrollments on Medicaid and total healthcare spending for the estimates reported in Table 3. Increases in welfare enrollments increase Medicaid spending in the first year (2.4 percent) and total spending in the second year (0.8 percent). These increases imply spending increases of $4 and $8 billion for Medicaid and total healthcare spending, respectively. Converting to a per-capita basis, the figures are $15 and $29.

To disentangle the effects of welfare reform policy from other factors (e.g. business cycles) that affect welfare caseloads and therefore Medicaid costs, we run an additional set of regressions on per-capita welfare enrollment following the specification shown in equation 5 above. These estimates reported in Table 4. The first set of estimates in Table 4 (columns 2 and 3) reports the results of a fixed-effects regression[9]. We run a fixed-effects generalized least squares regression that corrects for heteroskedasticity in the panels and employs a panel-specific autoregressive procedure. The results of this regression are reported in columns 4 and 5 of Table 4. Because the effects of some of the variables on changes in per-capita welfare enrollments may only emerge over time, we

[9] However, once again, a modified Wald test for groupwise heteroskedasticity indicates the presence of heteroskedasticity ($\chi^2 = 1729.3$, $p < 0.0001$) and a Wooldridge test for autocorrelation in panel data indicates the presence of autocorrelation ($F = 63.7$, $p < 0.0001$).

run an additional specification that adds lags of 2 and 3 years for each independent variable. This regression is reported in columns 6 and 7 of Table 4.

From columns 4 and 5, we see that the one-year effect of the welfare reform variable (TANFDUM) on welfare enrollments is -0.115. That is, per-capita welfare enrollments fell 0.115 percentage points as a result of welfare reform. If we use the mean value of percentage of the population on welfare for 1996 (3.82), this suggests that welfare enrollments fell about 3 percent as a result of welfare reform. However, the three-year estimates reported in columns 6 and 7 suggest a much larger impact from welfare reform. The cumulative effect across years one and two (the year three estimate is not significant) suggests that per-capita welfare enrollments fell 0.32 percentage points as a result of welfare reform. If we use the mean value of the percentage of the population on welfare for 1996 (3.82), this suggests that welfare enrollments fell about 8.5 percent as a result of welfare reform.

To determine the effect on Medicaid and total healthcare spending from welfare reform, we return to our estimates for spending in Tables 2 and 3. From the one-year estimates in Table 2a, we see that a one percentage-point reduction in the percentage of the population enrolled in welfare reduces growth in Medicaid expenditures about 3.1 percent. Thus, the 0.11 percentage point reduction in Medicaid enrollments (see column 4 of Table 4) associated with welfare reform causes a 0.34 percent reduction in Medicaid expenditures ($0.031 \times 0.11 = 0.0034$) and multiplying by the annual real Medicaid spending of $160 billion (1996 dollars), yields an estimate of $550 million in Medicaid savings from welfare reform.

However, the three-year estimate of the effect of welfare reform on Medicaid spending is larger. From the three-year estimates in Table 3, we see that a one percentage-point reduction in the percentage of the population enrolled in welfare reduces growth in Medicaid expenditures about 2.4 percent. From column 6 of Table 4, we see that welfare reform caused welfare enrollments to fall 0.32 percentage points. Thus, Medicaid expenditures fell 0.768 percent as a consequence of welfare reform ($0.024 \times 0.32 = 0.00768$) and multiplying by the annual real Medicaid spending of $160 billion (1996 dollars), yields an estimate of $1.2 billion in Medicaid savings from welfare reform. Using a similar procedure, we find that effect of welfare reform on total healthcare spending was a $670 million spending reduction using the one-year estimates and $2.5 billion spending reduction using the three-year estimates.[10] These estimates however do not account for the increase in total healthcare spending that may have resulted from covering welfare leavers who were uninsured. To that extent the overall saving in total healthcare spending is likely to be a smaller number.

4.2 Control Variables

The estimates of the control variables produce several noteworthy results. First, increases in the percentage of for-profit nursing homes increase Medicaid and total healthcare expenditures but the effect only appears after a three-year lag. Second, for-profit hospitals initially increase total healthcare spending but, in subsequent years cause spending to fall. Third, changes in obesity rates have only a small impact on Medicaid spending over a three-year time frame. Fourth, HMOs cause modest reductions in Medicaid and total healthcare spending. Fifth, there is evidence that new drugs initially

[10] Calculation for the one-year estimates: 0.11 × 0.0062 × $997 billion = $670 million. Calculation for the three-year estimates: 0.32 × 0.008 × $997 billion = $2.5 billion.

substitute for less cost effective therapies in Medicaid spending. However, after a two to three year lag, new drugs raise both Medicaid and total healthcare spending.

While for-profit hospitals have a modest negative effect on Medicaid costs for the one-year equation shown in columns 4 and 5 of Table 2a, the effect disappears in the three-year equation reported in columns and 2 and 3 of Table 3. The one-year equation reported in columns 4 and 5 of Table 2a shows no effect from for-profit nursing homes on Medicaid costs but the three-year Medicaid equation shown in columns 2 and 3 of Table 3 shows that for-profit nursing homes raise Medicaid costs after a three-year lag. After 3 years, a one percentage-point increase in the percentage of nursing homes that are for-profit increases Medicaid spending about 0.31 percent.

This result may occur for two reasons. First, nursing home patients tend to stay in nursing homes for relatively long periods (unlike hospital patients) and face moving costs (e.g., lost friends) to relocate to another nursing home. Second, Medicaid requires that nursing home patients exhaust their personal assets before they will cover nursing home expenses. Each of these factors suggests that nursing home patients will initially be sensitive to the cost of care initially but that sensitivity will diminish over time. As price sensitivity diminishes, for-profit homes exploit the diminishing sensitivity by raising prices. The effect of for-profit nursing homes on total healthcare costs shown in Table 3 is consistent with the results on the effect of nursing homes on Medicaid costs (i.e., negative at first and then positive). However, the results are statistically significant only in the one-year equation reported columns 4 and 5 of Table 2b and the last year of three-year estimates reported in Table 3.

For-profit hospitals show the opposite pattern on total healthcare spending. From Tables 2b and 3, we see that the initial effect of a one percentage-point increase in the percentage of for-profit hospitals is to raise costs a small amount (0.076 to 0.1 percent). However, over time, increases in the percentage of hospitals that are for-profit cause total healthcare costs to fall. From columns 4 and 5 of Table 3, we see that a one percentage-point increase in for-profit hospitals raises healthcare costs about 0.17 percent over the first two years. In the third year, total healthcare costs fall about 0.12 percent as a result of a one percentage-point increase in the percentage of hospitals that are for-profit. This is consistent with the view that initially for-profit hospitals attempt to exploit their market position but that over time competition restrains such behavior.

Changes in smoking and obesity show only modest effects on Medicaid and total healthcare costs. Neither obesity nor smoking show effects on Medicaid or total healthcare costs in the one-year equations reported in Tables 2a and 2b. In the three-year equations reported in Table 3, obesity has a small positive effect on Medicaid spending in the second year; a one percentage-point increase in the obesity rate raises Medicaid spending about 0.25 percent. This amounts to about $400 million in additional spending ($160 billion*0.0025). If we use the obesity level from the midpoint of the data (18 percent), we estimate that obesity raises Medicaid costs by $7.2 billion or about 4.5 percent of total Medicaid spending. This is well below the 39 percent figure that Finkelstein et al. (2003) derive. However, existing studies of the effect of obesity on healthcare spending correlate obesity levels (or obesity status) with spending. Here, we examine the effect of changes in obesity on changes in spending and obesity-related morbidities (e.g., diabetes) may take time to develop. While smoking has a small positive effect (0.08 percent) on total healthcare costs in the second year, it has a negative effect on Medicaid costs in years one and two for a cumulative effect of 0.7 percent. This difference in outcomes may be the result of differences in the population of Medicaid smokers and smokers in general.

Increases in the unemployment rate exert a positive effect on both Medicaid and total healthcare spending in the one-year estimates reported in Tables 2a and 2b. A one-percentage-point increase in the unemployment rate raises Medicaid and total healthcare costs 1.1 percent and 0.65 percent, respectively. However, these positive effects disappear in the three-year estimates reported in Table 3. The effect of changes in income on Medicaid and total healthcare spending is more clear. While neither set of one-year estimates (Tables 2a and 2b) shows any effect from per-capita income on Medicaid or total healthcare spending, the effect of income on Medicaid and total healthcare spending becomes apparent in years two and three. From Table 3, we can see that a one-percent increase in per-capita income causes a 0.3 percent increase in real per-capita Medicaid spending and a 0.3 percent increase real per-capita healthcare spending.

Like income, poverty shows a lagged effect on both Medicaid and total healthcare spending. The effect of poverty on Medicaid is theoretically indeterminate. While higher poverty should increase the number of Medicaid recipients and Medicaid spending, higher poverty may also reduce tax collections and therefore Medicaid spending may fall. The estimates in Table 3 show that after three years increases in the poverty rate decrease Medicaid spending. A one percentage-point increase in the poverty rate will reduce real per-capita Medicaid spending 0.4 percent after 3 years. The effects of higher poverty on total healthcare spending are by contrast more immediate but significantly smaller. A one percentage-point increase in the poverty rate will reduce real per-capita healthcare spending 0.15 percent after 2 years.

Our estimates suggest that HMOs produce modest cost savings. The one-year estimates reported in Tables 2a and 2b show that a one percentage-point increase in HMO enrollments reduces Medicaid and total healthcare spending 0.13 and 0.03 percent, respectively. The three-year estimates in Table 3 show that a one percentage-point increase in the percentage of the population insured through an HMO will reduce Medicaid spending 0.24 percent after 3 years and total healthcare spending 0.08 percent after 2 years.

New drug introductions (ΔNME) show an interesting pattern. The one-year estimates reported in Tables 2a and 2b show that new drug introductions cut costs. A one-unit increase in new drugs reduces Medicaid spending 0.13 percent and total healthcare spending 0.02 percent after one year. For the three-year estimates in Table 3, we see that in year three a one-unit increase in the number of new drugs increases Medicaid spending 0.05. Likewise, the second and third year estimates of the effect of new drug introduction on total healthcare spending are also positive. A one-unit increase in the number of new drugs increases total healthcare spending about 0.075 percent over years two and three.

Taken together, the estimates suggest that new drugs initially save money by substituting for more expensive treatment options. This effect persists for Medicaid spending. However, the effect does not persist for total healthcare spending. The effect may reverse because some of these drugs are so-called “lifestyle” drugs like Prozac, Viagra, and Paxil taken primarily by wealthier individuals (and not Medicaid recipients). As these drugs have limited ability to substitute for more costly treatment, costs rise. The effect takes some time emerge because sales of lifestyle drugs drug companies are much more responsive to marketing effort than a drug designed to treat hepatitis C.

Somewhat surprisingly, changes in the percentage of the population that is over 65 have a negative impact on total healthcare costs. The one-year estimates reported in Table 2b show that a one percentage-point increase in the percentage of the population over 65 reduces total healthcare spending 1.6 percent. From the estimates reported in Table 3, we see a similar result - a one percentage-point increase in the relative size of the over-65 population decrease total healthcare costs 1.6 percent after a two-year lag.

This result may occur because states that exhibit larger changes in the relative size of the over-65 population may be healthier. The relative size of the over-65 population may grow from births, migration, the number of state residents that turn 65 in a given year, and the mortality of the over 65 population. While older people typically have higher healthcare costs, people are more likely to reach the age of 65 if they are healthier, mortality is lower among healthier over-65 populations, and healthier over-65 individuals may be more likely to migrate. The estimates in Table 3 also show that a one percentage-point increase in the percentage of the population over 65 will decrease Medicaid costs 3.7 percent after a three-year lag. However, the results show an initial positive effect of 2.9 percent in the first year.

Increases in the birthrate increase Medicaid spending but exert competing effects on total healthcare costs. A one-unit increase in births per 1,000 population raises Medicaid costs 3.0 percent after a one-year lag and 6.0 percent after a three-year lag. By contrast, a one-unit increase in births per 1,000 of population reduces total healthcare costs about 1.3 percent after a two-year lag but raises costs in the third year about 1 percent. Thus, the net effect after three years is a reduction in total healthcare costs of about 0.3 percent. Finally, the sign on the time trend variable differs between Medicaid and total healthcare costs. The growth rate of Medicaid spending declines about 0.18 percent per year after controlling for all other factors. By contrast, growth rate of total healthcare spending rises about 0.07 percent per year after controlling for all other factors.

5. Conclusion

Medicaid expenditures account for a significant proportion of U.S. GDP (2.55 percent) – nearly as much as we spend on defense (3.7 percent of GDP). Moreover, this percentage is projected to rise, thereby exacerbating budget problems at both the federal and state levels. In this paper, we examine the effect of two major policy initiatives on Medicaid spending: the Personal Responsibility and Work Opportunity Reconciliation Act (PRWORA) and the State Children's Health Insurance Program (SCHIP). We also examine the factors driving Medicaid expenditures in the U.S. using panel data for 50 states for the years 1990 through 2004.

We find that a one percentage-point increase in the percentage of the total population enrolled in SCHIP in a state that provides SCHIP through an existing Medicaid program (SCHIP-M) raises real per-capita Medicaid spending by 3.4 percent in the first year and 3.6 percent in the second or 7.0 percent ($11.2 billion). Thus, real Medicaid spending rises about $41 for a one percentage-point increase in the percentage of the population insured through SCHIP-M and therefore adding one person to the

SCHIP rolls in an SCHIP-Medicaid state raises real Medicaid spending about $4,100 after two years.

But new SCHIP enrollees on the Medicaid rolls would likely have incurred healthcare costs outside the Medicaid system even if they did not enroll in Medicaid. Consequently, we examine the effect of the expansions of Medicaid under SCHIP and welfare reform on total healthcare spending. In addition, Medicaid is known to undercompensate for services. If Medicaid undercompensates, then total healthcare spending may rise more than Medicaid spending as the costs of the Medicaid patients are shifted to other payers.

Indeed, we find that total healthcare spending rises more than Medicaid spending as a result of expansions of Medicaid under SCHIP. A one percentage-point increase in the percentage of the total population enrolled in SCHIP in a state that provides SCHIP through an existing Medicaid program decreases real per-capita healthcare spending by about 0.8 percent in the first year and increases spending by 2.9 percent in the second implying a net increase of 2.1 percent ($21 billion). Thus, real per capita healthcare spending rises about $77 for a one percentage-point increase in the percentage of the population insured through SCHIP-M and therefore adding one person to the SCHIP-M rolls raises real healthcare spending about $7,700 after two years. Because real healthcare spending includes real Medicaid spending, the $4,100 is included in the $7,700 figure and the full social cost of adding someone to the SCHIP-M rolls is $7,700. The difference between the total increase in costs and the increase in Medicaid costs ($7,700 - $4,100 = $3,600) likely reflects Medicaid under compensation.

We find no significant impact on Medicaid spending for expansions of SCHIP programs in states that adopted a hybrid program of providing care through both Medicaid and a newly established program (SCHIP-combined) nor do we find any impact on Medicaid spending for expansions of SCHIP programs that established separate programs unconnected with Medicaid (SCHIP-other).

In addition, states that established these hybrid and separate programs showed smaller effects on total healthcare spending than states that established SCHIP in an existing Medicaid program. A one percentage-point increase in SCHIP-combined enrollment reduces real per-capita healthcare spending by 1.2 percent in the first year and raises real per-capita costs 1.7 percent in the second implying a net increase of 0.5 percent ($5 billion). This implies that real per-capita healthcare spending rises about $18 for a one percentage-point increase in the percentage of the population insured through SCHIP-M and therefore adding one person to the SCHIP-C rolls raises real healthcare spending about $1,800 after two years. The estimates for SCHIP-other, while positive, are small in magnitude and cannot be statistically bounded from zero. Therefore, SCHIP-other appears to be lowest cost option of all.

The estimates also suggest that the welfare reform law caused a significant decline in both Medicaid and total healthcare spending. To capture the effects of welfare reform, we regress per-capita welfare enrollments on a series of macroeconomic, demographic and public health variables as well as a dummy variable to capture the effect of the welfare reform law. We find that welfare reform reduced welfare enrollments by 0.32 percentage points or about 8.5 percent. This reduction in welfare enrollments from welfare in turn decreased both Medicaid and total healthcare spending.

In the case of Medicaid, welfare reform reduced annual expenditures by about $1.2 billion. In the case of total healthcare spending, welfare reform reduced annual expenditures by about $2.5 billion.

Among the control variables, we find noteworthy results on the effect of for-profit nursing homes, for-profit hospitals, new drug introductions, and HMOs. After a two and three-year lag, for-profit nursing homes raise Medicaid costs. After 3 years, a one percentage-point increase in the percentage of hospitals that are for-profit increases Medicaid spending about 0.31 percent. This result may occur because nursing home patients tend to stay in nursing homes for relatively long periods and face switching costs (e.g., lost friends) to move to another nursing home. Thus, for-profit nursing homes may raise prices over time to take advantage of these switching costs.

While for-profit hospitals show no impact of Medicaid spending, they exert interesting effects on total healthcare spending. A one percentage-point increase in for-profit hospitals raises healthcare costs about 0.17 percent over the first two years. However, in the third year total healthcare costs fall about 0.12 percent as a result of a one percentage-point increase in the percentage of hospitals that are for-profit. This is consistent with the view that initially for-profit hospitals attempt to exploit their market position but that over time competition restrains such behavior.

We find some evidence that new drug introductions initially reduce Medicaid spending. However, the lagged effect of the new drug introductions in years two and three raises both Medicaid and total healthcare spending. A one-unit increase in the number of new drugs reduces Medicaid spending 0.1 percent over following year. In the second and third years following the introduction the new drugs raise both Medicaid and total healthcare spending. A one-unit increase in the number of new drugs increases total healthcare spending about 0.075 percent over years two and three. A one-unit increase in the number of new drugs increases Medicaid spending about 0.05 percent in year three.

Taken together, the estimates suggest that new drugs save money by substituting for more expensive treatment options as in the case of Medicaid spending. However, the effect does not persist for total healthcare spending. The net effect may differ because some of these drugs are so-called “lifestyle” drugs like Prozac, Viagra, and Paxil taken primarily by wealthier individuals (and not Medicaid recipients). As these drugs have limited ability to substitute for more costly treatment, costs rise. The effect takes some time emerge because sales of lifestyle drugs drug companies are much more responsive to marketing effort than a drug designed to treat hepatitis C.

Finally, our estimates suggest that HMOs produce modest cost savings; a one percentage-point increase in the poverty rate will reduce Medicaid spending 0.12 percent after 3 years and total healthcare spending 0.08 percent after 2 years.

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Table 1a. Means and Standard Deviations – Variable Levels

Variable	Mean	Standard Deviation	Minimum	Maximum	n
RMEDICAIDPC	551.93	218.42	200.65	1782.72	700
RTOTHEALTHPC	3600.87	677.38	2150.17	5728.43	700
SCHIP-M	0.0797	0.307	0	2.052	700
SCHIP-C	0.103	0.337	0	2.74	700
SCHIP-O	0.101	0.320	0	2.43	700
WCASEPC	3.18	1.71	0.126	8.49	700
HPROF	11.74	11.56	0	47.52	700
NHPROF	62.01	17.77	0	84.98	700
SMOKE	23.14	2.98	11.9	32.6	687
OBESE	16.97	4.2	6.9	28.4	687
URATE	5.24	1.47	2.2	11.4	700
RINCPC	23.92	4.08	15.06	39.34	700
POVRATE	12.51	3.76	4.51	27.66	700
HMO	17.72	12.33	0	54.2	700
NME	29.28	8.11	21	53	700
POP65PC	12.62	1.98	3.98	18.56	700
BRATE	14.58	1.83	10.4	21.9	700

$RMEDICAIDPC_{it}$: Real per-capita Medicaid spending (in 1996 dollars) for state i in year t.
$RTOTHEALTHPC_{it}$: Real per-capita healthcare spending (in 1996 dollars) for state i in year t.
$SCHIP\text{-}M_{it}$: Percentage of the population enrolled in a SCHIP-Medicaid program for state i in year t.
$SCHIP\text{-}C_{it}$: Percentage of the population enrolled in a SCHIP-Combined program for state i in year t.
$SCHIP\text{-}O_{it}$: Percentage of the population enrolled in a SCHIP-Other program for state i in year t.
$WCASEPC_{it}$: Percentage of the population enrolled in either AFDC (1996 and earlier) or TANF (1997 and later) for state i in year t.
$HPROF_{it}$: Percentage of hospitals that are for-profit hospitals for state i in year t.
$NHPROF_{it}$: Percentage of nursing homes that are for-profit nursing homes for state i in year t.
$SMOKE_{it}$: Percentage of the population 18 years of age and over in state i that smokes in year t.
$OBESE_{it}$: Percentage of the population 18 years of age and over in state i that is obese (BMI $\geq$ 30) in year t.
$RINCPC_{it}$: Real per-capita income (in thousands of 1996 dollars) for state i in year t.
$URATE_{it}$: Percentage of the labor force that is unemployed for state i in year t.
$POVRATE_{it}$: Percentage of the total population below the poverty line for state i in year t.
HMO_{it}: Percentage of the total population enrolled in an HMO for state i in year t.
NME_t: Number of new molecular entities approved by the FDA in year t.
$POP65PC_{it}$: Percentage of the total population 65 years and older for state i in year t.
$BRATE_{it}$: Live births per 1000 in population for state i in year t.

Table 1b. Means and Standard Deviations – Variable Changes

Variable	Mean	Standard Deviation	Minimum	Maximum	n
Δ RMEDICAIDPC	0.0615	0.0658	-0.15	0.494	650
Δ RTOTHEALTHPC	0.0382	0.0197	-0.034	0.111	650
Δ SCHIP-M	0.0250	0.125	-0.106	1.66	650
Δ SCHIP-C	0.0287	0.124	-0.246	1.93	650
Δ SCHIP-O	0.0302	0.118	-0.110	1.54	650
ΔWCASEPC	-0.187	0.403	-2.13	1.12	650
Δ HPROF	0.223	1.45	-6.80	10.85	650
Δ NHPROF	-0.0203	1.48	-7.97	20.00	650
Δ SMOKE	-0.0954	1.65	-5.90	5.40	635
Δ OBESE	16.97	4.2	6.9	28.4	635
Δ URATE	5.24	1.47	2.2	11.4	650
Δ RINCPC	0.0185	0.0210	-0.0342	0.0959	650
Δ POVRATE	-0.102	1.92	-7.22	6.44	650
Δ HMO	0.540	3.32	-23.70	18.00	650
Δ NME	-0.154	9.43	14.0	25.0	650
Δ POP65PC	0.0067	0.127	-1.14	0.422	650
Δ BRATE	-0.181	0.308	-1.50	0.900	650

$\Delta RMEDICAIDPC_{it} = (RMEDICAIDPC_{it} - RMEDICAIDPC_{it-1}) / RMEDICAIDPC_{it-1}$.
$\Delta RTOTHEALTHPC_{it} = (RTOTHEALTHPC_{it} - RTOTHEALTHPC_{it-1}) / RTOTHEALTHPC_{it-1}$.
$\Delta.SCHIP\text{-}M_{it} = SCHIP\text{-}M_{it} - SCHIP\text{-}M_{it-1}$.
$\Delta.SCHIP\text{-}C_{it} = SCHIP\text{-}C_{it} - SCHIP\text{-}C_{it-1}$
$\Delta SCHIP\text{-}O_{it} = SCHIP\text{-}O_{it} - SCHIP\text{-}O_{it-1}$
$\Delta WCASEPC_{it} = WCASEPC_{it} - WCASEPC_{it-1}$.
$\Delta HPROF_{it} = HPROF_{it} - HPROF_{it-1}$.
$\Delta NHPROF_{it} = NHPROF_{it} - NHPROF_{it-1}$.
$\Delta SMOKE_{it} = SMOKE_{it} - SMOKE_{it-1}$.
$\Delta OBESE_{it} = OBESE_{it} - OBESE_{it-1}$.
$\Delta RINCPC_{it} = (RINCPC_{it} - RINCPC_{it-1}) / RINCPC_{it-1}$.
$\Delta URATE_{it} = URATE_{it} - URATE_{it-1}$.
$\Delta POVRATE_{it} = POVRATE_{it} - POVRATE_{it-1}$.
$\Delta HMO_{it} = HMO_{it} - HMO_{it-1}$.
$\Delta NME_{t} = NME_{it} - NME_{it-1}$.
$\Delta POP65PC_{it} = POP65PC_{it} - POP65PC_{it}$
$\Delta BRATE_{it}: = BRATE_{it} - BRATE_{it-1}$.

Table 2a. Fixed Effects Regression Results for Growth in Real Per Capita Medicaid Expenditures

	1		2	
	ΔRMEDICAIDPC		ΔRMEDICAIDPC	
	Coefficient	Std. Err.	Coefficient	Std. Err.
Constant	8.41***	1.73	7.26***	1.27
Δ.SCHIP-M_Lag1	0.0477**	0.0214	0.0290**	0.0127
Δ SCHIP-C_Lag1	0.0248	0.0216	0.0127	0.0149
Δ.SCHIP-O_Lag1	0.0492**	0.0228	0.0235	0.0154
Δ WCASEPC_Lag1	0.0337***	0.00785	0.0312***	0.00590
Δ HPROF_Lag1	-0.00237	0.00173	-0.00295**	0.00123
Δ NHPROF_Lag1	-0.000838	0.00178	-0.000062	0.00146
Δ SMOKE_Lag1	-0.000319	0.00150	-0.00104	0.00102
Δ OBESE_Lag1	0.00122	0.00182	0.000115	0.00125
Δ.URATE_Lag1	0.0162***	0.00367	0.0114***	0.00267
Δ RINCPC_Lag1	-0.0333	0.147	-0.0635	0.101
Δ.POVRATE_Lag1	0.00126	0.00129	0.000832	0.000882
Δ HMO_Lag1	-0.00161**	0.000804	-0.00135***	0.000568
Δ NME_Lag1	-0.00118***	0.000272	-0.00130***	0.000186
Δ POP65PC_Lag1	0.0173	0.0253	-0.00640	0.0186
Δ BRATE_Lag1	0.0406***	0.0101	0.0323***	0.00688
YEAR	-0.00417***	0.000863	-0.00358***	0.000634
	Fixed Effects		Fixed Effects	
			Corrected for AR1 and heteroscedasticity	
R^2 - within	0.19			
Wald-χ^2			272.62	
n	635		635	

*** = significant at 0.01, ** = significant at 0.05, * = significant at 0.1.
All cross-section estimates are suppressed.

Table 2b. Fixed Effects Regression Results for Growth in Real Per Capita Health Expenditures.

	1		2	
	ΔRTOTHEALTHPC		ΔRTOTHEALTHPC	
	Coefficient	Std. Err.	Coefficient	Std. Err.
Constant	-1.70***	0.512	-1.51***	0.377
Δ SCHIP-M_Lag1	-0.00657	0.00635	-0.0128**	0.00501
Δ SCHIP-C_Lag1	-0.0126**	0.00640	-0.0169***	0.00366
Δ SCHIP-O_Lag1	-0.00185	0.00679	-0.00306	0.00528
Δ WCASEPC_Lag1	0.00492***	0.00233	0.00615***	0.00172
Δ HPROF_Lag1	0.000450	0.000513	0.000957**	0.000431
Δ NHPROF_Lag1	-0.00138***	0.000530	-0.00118**	0.000495
Δ SMOKE_Lag1	-0.000208	0.000445	0.000111	0.000370
Δ OBESE_Lag1	-0.000119	0.000541	0.000166	0.000435
Δ URATE_Lag1	0.00592***	0.00109	0.00653***	0.000839
Δ RINCPC_Lag1	0.0382	0.0437	0.0393	0.0353
Δ POVRATE_Lag1	0.000051	0.000383	-0.000356	0.000316
Δ HMO_Lag1	-0.000324	0.000238	-0.000342**	0.000198
Δ NME_Lag1	-0.000215***	0.000081	-0.000208***	0.0000615
Δ POP65PC_Lag1	-0.0118	0.00750	-0.0166***	0.00627
Δ BRATE_Lag1	-0.000679	0.00298	-0.00149	0.00247
YEAR	0.000871***	0.000256	0.000781***	0.000188
R2 - within	0.15			
Wald-χ^2				401.6
n	635		635	

*** = significant at 0.01, ** = significant at 0.05, * = significant at 0.1.
All cross-section estimates are suppressed.

Table 3. Fixed Effects Regression Results for Growth in Real Per Capita Medicaid Expenditures and Real Per Capita Health Expenditures.

	1		2	
	ΔRMEDICAIDPC		ΔRTOTHEALTHPC	
	Coefficient	Std. Err.	Coefficient	Std. Err.
Constant	4.54**	2.17	-1.33*	0.715
Δ SCHIP-M_Lag1	0.0348***	0.0124	-0.00792*	0.00474
Δ.SCHIP-M_Lag2	0.0346**	0.0166	0.0293***	0.00610
Δ SCHIP-M_Lag3	-0.000382	0.0172	0.00167	0.00618
Δ.SCHIP-C_Lag1	-0.00124	0.0138	-0.0123***	0.00486
Δ.SCHIP-C_Lag2	0.00807	0.0143	0.0172***	0.00493
Δ SCHIP-C_Lag3	0.00690	0.0146	0.00125	0.00510
Δ SCHIP-O_Lag1	0.0149	0.0138	0.00648	0.00555
Δ SCHIP-O_Lag2	0.0194	0.0141	0.00451	0.00569
Δ SCHIP-O_Lag3	0.00789	0.0150	0.00210	0.00572
Δ WCASEPC_Lag1	0.0240***	0.00736	0.00155	0.00234
Δ WCASEPC_Lag2	0.00242	0.00760	0.00799***	0.00237
Δ WCASEPC_Lag3	0.00724	0.00719	-0.00297	0.00225
Δ HPROF_Lag1	0.000577	0.00106	0.000763**	0.000390
Δ.HPROF_Lag2	0.000371	0.00110	0.00104**	0.000423
Δ.HPROF_Lag3	0.000502	0.00111	-0.00123***	0.000419
Δ.NHPROF_Lag1	0.0000393	0.00125	-0.000403	0.000459
Δ NHPROF_Lag2	0.00167	0.00150	0.000494	0.000523
Δ.NHPROF_Lag3	0.00316**	0.00143	0.000816*	0.000500
Δ.SMOKE_Lag1	-0.00352***	0.00124	-0.000308	0.000426
Δ.SMOKE_Lag2	-0.00361***	0.00133	0.000783*	0.000461
Δ.SMOKE_Lag3	-0.000581	0.00113	0.0000013	0.000396
Δ.OBESE_Lag1	0.00175	0.00135	0.000203	0.000458
Δ.OBESE_Lag2	0.00258*	0.00144	-0.000011	0.000510
Δ.OBESE_Lag3	0.0000434	0.00125	0.000496	0.000449
Δ.URATE_Lag1	-0.00645*	0.00373	0.000840	0.00125
Δ.URATE_Lag2	-0.00158	0.00300	-0.00136	0.00104
Δ URATE_Lag3	-0.00548**	0.00271	-0.000750	0.000928
Δ RINCPC_Lag1	-0.140	0.122	-0.0229	0.0401
Δ RINCPC_Lag2	0.123	0.110	0.0640**	0.0358
Δ RINCPC_Lag3	0.336***	0.113	0.234***	0.0362

Δ POVRATE_Lag1	0.000152	0.000951	-0.000660**	0.000322
Δ POVRATE_Lag2	-0.00194**	0.00101	-0.000805**	0.000342
Δ POVRATE_Lag3	-0.00228***	0.000900	-0.000176	0.000310
Δ HMO_Lag1	0.000568	0.000569	-0.000307*	0.000188
Δ HMO_Lag2	-0.00142***	0.000545	-0.000108	0.000187
Δ HMO_Lag3	-0.000543	0.000481	-0.000783***	0.000173
Δ NME_Lag1	-0.000993***	0.000230	0.0000075	0.000077
Δ NME_Lag2	-0.000310	0.000210	0.000300***	0.0000721
Δ NME_Lag3	0.000533**	0.000249	0.000453***	0.0000860
Δ POP65PC_Lag1	0.0291*	0.0172	-0.00162	0.00613
Δ POP65PC_Lag2	-0.0196	0.0172	-0.0166***	0.00600
Δ POP65PC_Lag3	-0.0374**	0.0175	0.00563	0.00618
Δ BRATE_Lag1	0.0300***	0.00765	-0.00576**	0.00265
Δ.BRATE_Lag2	-0.000122	0.00754	-0.00781***	0.00258
Δ BRATE_Lag3	0.0296***	0.00822	0.0104***	0.00289
YEAR	-0.00224**	0.00109	0.000689**	0.000357
Wald-χ^2	368.1		873.5	
N	533		533	

*** = significant at 0.01, ** = significant at 0.05, * = significant at 0.1.
All cross-section estimates are suppressed.

Table 4. Fixed Effects Regression Results for Change in Per Capita Welfare Enrollments.

	1		2		3	
	Δ WCASEPC		Δ WCASEPC		Δ WCASEPC	
	Coefficient	Std. Err.	Coefficient	Std. Err.	Coefficient	Std. Err.
Constant	-4.03	13.85	-8.66	8.90	-16.72*	9.35
TANFDUM_Lag1	-0.143***	0.0536	-0.115***	0.0330	-0.260***	0.0267
TANFDUM_Lag2					-0.0595**	0.0302
TANFDUM_Lag3					-0.0483	0.0312
Δ SCHIP-M_Lag1	0.191*	0.113	0.0990	0.0720	0.109*	0.0594
Δ SCHIP-M_Lag2					0.212**	0.0895
Δ SCHIP-M_Lag3					0.233***	0.0903
Δ SCHIP-C_Lag1	0.104	0.115	0.143	0.0866	0.0297	0.0759
Δ SCHIP-C_Lag2					0.163***	0.0801
Δ.SCHIP-C_Lag3					0.0312	0.0778
Δ SCHIP-O_Lag1	0.568***	0.121	0.290***	0.0831	0.289***	0.0755
Δ SCHIP-O_Lag2					0.243***	0.0769
Δ SCHIP-O_Lag3					0.118	0.0802
Δ SMOKE_Lag1	-0.0170**	0.00780	-0.0108***	0.00425	-0.00920**	0.00476
Δ SMOKE_Lag2					0.000809*	0.00526
Δ SMOKE_Lag3					-0.00806*	0.00439
Δ OBESE_Lag1	0.00315	0.00971	0.00109	0.00537	0.00481	0.00561
Δ OBESE_Lag2					-0.00325	0.00620
Δ OBESE_Lag3					0.00115**	0.00554
Δ URATE_Lag1	0.152***	0.0182	0.117***	0.0115	0.0311**	0.0144
Δ URATE_Lag2					0.0736***	0.0131
Δ URATE_Lag3					0.1068***	0.0106
Δ RINCPC_Lag1	-3.12***	0.771	-2.42***	0.411	-1.33***	0.454
Δ RINCPC_Lag2					1.17**	0.484
Δ RINCPC_Lag3					0.745*	0.447
Δ POVRATE_Lag1	0.00903	0.00684	0.00567	0.00391	-0.00193	0.00401
Δ POVRATE_Lag2					-0.00520	0.00445
Δ POVRATE_Lag3					0.00489	0.00388
Δ POP65PC_Lag1	-0.012	0.133	-0.110	0.0735	-0.147**	0.0767
Δ POP65PC_Lag2					-0.0934	0.0786
Δ POP65PC_Lag3					0.115	0.0807
Δ BRATE_Lag1	-0.00308	0.0541	0.0300	0.0307	-0.0685**	0.0297
Δ BRATE_Lag2					0.0396	0.0298

Δ BRATE_Lag3					0.118***	0.0310
YEAR	0.00195	0.00694	0.00426	0.00445	0.00829*	0.00467
R^2 - within	0.26					
Wald-χ^2			880.4		980.1	
n	635		635		533	