NBER WORKING PAPER SERIES

HEALTH CARE IN A MULTIPAYER SYSTEM: THE EFFECTS OF HEALTH CARE SERVICE DEMAND AMONG ADULTS UNDER 65 ON UTILIZATION AND OUTCOMES IN MEDICARE

Sherry A. Glied

Working Paper 20045
http://www.nber.org/papers/w20045

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
April 2014

I thank Joshua Graff Zivin, Tal Gross, Adriana Lleras-Muney, Matt Neidell, and participants at a seminar at the Wagner School for useful advice on various parts of this paper. I thank Bisundev Mahato for research assistance. The Commonwealth Fund provided funding of a portion of this research. The views expressed herein are those of the author and do not necessarily reflect the views of the National Bureau of Economic Research.

Health Care in a Multipayer System: The Effects of Health Care Service Demand among Adults under 65 on Utilization and Outcomes in Medicare

Sherry A. Glied

NBER Working Paper No. 20045
April 2014
JEL No. I1,I11,I13

ABSTRACT

Doctors and hospitals in the United States serve patients covered by many types of insurance. This overlap in the supply of health care services means that changes in the prices paid or the volume of services demanded by one group of patients may affect other patient groups. This paper examines how marginal shifts in the demand for services among the adult population under 65 (specifically, factors that affect the uninsurance rate) affect use in the Medicare population.

I provide a simple theoretical framework for understanding how changes in the demand for care among adults under 65 may affect Medicare spending. I then examine how two demand factors–recent coverage eligibility changes for parents and the firm size composition of employment–affect insurance coverage among adults under 65 and how these factors affect per beneficiary Medicare spending. Factors that contribute to reductions in uninsurance rates are associated with contemporaneous decreases in per beneficiary Medicare spending, particularly in high variation Medicare services.

Reductions in the demand for medical services among adults below age 65 are not associated with reductions in the total quantity of physician services supplied. The increased Medicare utilization that accompanies lower demand among those under 65 has few, if any, benefits for Medicare patients.

Sherry A. Glied
Robert F. Wagner Graduate School of Public Service
New York University
295 Lafayette Street, 2nd Floor
New York, NY 10012
and NBER
sherry.glied@nyu.edu

Introduction

The demand side of the U.S. health care system is highly fragmented. Most people under 65 are covered by private, employer-sponsored insurance. Most people 65 and older receive coverage through the Federal Medicare program. Some lower income people are covered by the Federal-State Medicaid program, which operates according to rules that vary considerably among the states. During the 2000s, about 17% of adults in the U.S. were uninsured at a point in time.

There is much less fragmentation on the supply side. Hospitals typically serve all types of patients, with over half their income drawn from Medicare. Most physicians see both privately insured and Medicare patients and many see patients enrolled in Medicaid and State Child Health Insurance Program (SCHIP) managed care plans as well. This overlap in supply means that changes in demand in one group may affect others in the same healthcare marketplace.

A substantial literature, dating back at least to Roemer (1961), has examined these interactions. This literature generally finds positive associations between provider density and the volume of services used by patients (Leonard, Stordeur et al. 2009, Mulley 2009). Evidence of this point-in-time pattern evolved into studies of the relationship between changes (reductions) in physician fees and (increases in) service volume within a given health insurance program, known as supplier-induced demand (Rice 1983, Reinhardt 1985, Labelle, Stoddart et al. 1994). A further iteration of this literature expanded the theory of supplier-induced demand to encompass the case of multiple payers, demonstrating that changes in prices paid by one payer could plausibly lead to changes in the volume of services provided to patients insured by other payers (McGuire and Pauly 1991, Labelle, Stoddart et al. 1994).

The literature on supplier-induced demand has focused on the case where Medicare changes the prices it pays. The concept, however, also encompasses the situation where changes in demand occur in the population under 65. In particular, in areas with more uninsured people, providers might recoup revenue from those patients who remain insured. This could occur passively, for example through reduced competition for appointments, which would reduce the implicit total price (including waiting time) paid by insured patients (Escarce 1992, Carlsen and Grytten 1998, Carlsen and Grytten 2000). It might also occur through active changes in provider behavior, such as changes in the intensity of services provided (Green 1978, Hemenway and Fallon 1985, Reinhardt 1985, Gruber and Owings 1996).

This paper provides a simple theoretical framework, consistent with (but not dependent on) supplier-induced demand, for understanding how changes in the market for care among adults under 65 may affect Medicare per beneficiary spending, and conducts a series of tests to examine this relationship. I first examine how two factors that shift demand in the adult under 65 population–SCHIP eligibility expansions to parents and changes in the size distribution of employers–affect coverage and Medicare spending (Section II). I perform a series of sensitivity tests to assess the robustness of these results in Section III. I next turn to data on physician practice and patient experience at the community level in Section IV to understand the mechanisms underlying the observed spending patterns. In Section V, I examine the effects of under-65 demand-induced increases in utilization and outcomes for Medicare beneficiaries. Finally, I assess whether the magnitudes of the effects found in the paper are plausible and consider alternative explanations of the results.

I. The Relationship Between the Demand for Care Among Adults under 65 and Medicare Spending: Theoretical Model

Hospitals and doctors are paid nationally-established regulated fees when they care for patients with traditional Medicare coverage. They are paid state-established regulated fees for providing care to Medicaid patients not enrolled in managed care. They negotiate fees with competing private health insurers, who may also cover Medicaid or SCHIP patients, and these fees often differ across payers (public or private insurers). They may charge "usual and customary" rates to patients whose insurers have not contracted with them. They may charge less, or more, or nothing, to uninsured patients. The largest two of these markets – Medicare and private insurance – are, by virtue of their eligibility criteria, entirely distinct. While the complexity of this structure is unique to the United States, the basic framework in which the health care market consists of a large, price-regulated public insurance program and an unregulated private market is common to many OECD countries.

These two central characteristics of health insurance markets suggest a very simplified model of the health care marketplace. Providers are price-takers for Medicare patients. They have some market power in the market among those under 65 with private insurance and choose prices accordingly.

The marginal patient in this market in this simplified market is a Medicare patient.[1] The equilibrium quantity of services supplied occurs where the marginal cost is equal to the regulated Medicare price. This implies (Hypothesis 1) that incremental changes in demand among those under 65 will not affect the aggregate supply of services in the market. Rather, these changes in

[1] In practice, many providers see both Medicare and Medicaid patients, and the fees paid by Medicaid (and by Medicaid managed care plans) may be lower than Medicare fees. A more complex model might incorporate physicians' trading off the likely value of given services (in terms of patient outcome) and the prices paid for these services. In this type of model, a Medicare patient with a low marginal value of service would be the marginal patient.

demand will (Hypothesis 2) lead to changes in the allocation of services between Medicare beneficiaries and younger adult patients as long as there is sufficient demand in the Medicare market to absorb any additional supply (see Figure 1). This set up is a variant of models that examine the effect of changes in Medicare fees on physician supply (Hadley, Reschovsky et al. 2009) and that examine the effect of price ceilings abroad on US drug prices (Mujumdar and Pal 2005).[2]

Sufficient Medicare demand is likely to exist to absorb most small reductions in younger adult demand. Most Medicare beneficiaries are enrolled in the traditional, fee-for-service Medicare program, which places few restrictions on coverage (Medpac March 2009). Moreover, the vast majority of Medicare patients hold supplemental coverage, either through private insurance or Medicaid, that eliminates all or nearly all potential cost-sharing (Lemieux, Chovan et al. 2008). Finally, most Medicare beneficiaries are retired so their time costs of medical care utilization are also likely to be relatively low.

More formally, let Q_v be the quantity of (physician) services demanded by and provided to patients under age 65. Let $p(Q_v, \theta)$ be the inverse demand function of these patients, where θ is a demand shifter. Let Q_m be the quantity of services provided to Medicare patients. Health care providers (physicians) receive a fixed fee $\bar{p}$ per unit of services provided to Medicare patients. The quantity of services provided to Medicare patients cannot exceed the demand from these patients.

$$(1) \qquad Q_m \leq \bar{Q}$$

[2] Hadley, Reschovsky et al. 2009 find U.S. Medicare fees are positively related to quantity provided for select Medicare services (with varation in underlying supply elasticities) consistent with a general economic model of positively sloped supply curves for health services. Mujumdar and Pal 2005 model a monopolist who price descriminates between two markets, one of which is regulated by drug price ceilings (abroad), resulting in full demand met in this market and lowered quantity in the second market. As marginal cost increases with quantity, marginal cost and thus prices are also lowered in the unregulated market (U.S. drug prices also fall).

The total quantity of services provided by physicians will be $Q = Q_v + Q_m$ at a cost of $c(Q_m + Q_v)$. Assume that the cost of provision does not differ between the two types of patients. Assume also that the physician faces increasing marginal costs of providing services c'>0, c">0.

Physician profit is given by:

(2) $\pi(Q_m, Q_v; \theta) = Q_v\, p(Q_v; \theta) + \bar{p}\ Q_m - c(Q_m + Q_v)$

Maximizing with respect to Q_m and Q_v, the physician sets

(3) $\mu(Q_v; \theta) = p(Q_v; \theta) + Q_v\ p_1(Q_v; \theta) = c'(Q_m + Q_v)$

Where $\mu(Qv; \theta)$ is the physician's marginal revenue from patients under 65, and

(4) $\bar{p} = c'(Q_m + Q_v)$

Assuming an interior solution and condition (1) satisfied.

Fully differentiating these first order conditions shows how Q_v and Q_m vary with shifts in demand θ. From (3):

(5) $$\frac{dQ_v^*}{d\theta} = \frac{-\mu_\theta}{\mu_{Q_v} - c''} = \frac{-P_\theta - QP_{Q\theta}}{\mu_{Q_v} - c''}$$

The denominator of this expression is negative since $\mu_Q < 0$ at Q* and c" > 0. $P_\theta > 0$ since θ is a positive demand shift. The sign of the numerator therefore depends on $P_{Q\theta}$ and will certainly be negative if $P_{Q\theta} > 0$ (Quirmbach 1988). In this context, $P_{Q\theta}$ depends on how the price responsiveness of Q_v, the quantity of health care demanded by people under 65, varies with demand shifters; prior research suggests that $P_{Q\theta}$ is likely to be positive.[3]

[3] The quantity of health care demanded by people under 65 varies on the extensive margin with changes in the health insurance coverage rate. Prior research indicates that the effect of changes in the price of care on the demand for insurance is smaller for those with higher incomes, implying that $P_{Q\theta} > 0$ Glied, S. and K. Jack (2003). Macroeconomic Conditions, Health Care Costs, and the Distribution of Health Insurance. NBER Working Paper 10029. On the intensive margin, the RAND experiment shows that the change in the quantity of health care demanded with a given change in price is likewise smaller (less negative) for people with higher income or in worse

Thus, $\frac{dQ_v^*}{d\theta} > 0$.

Fully differentiating (4) gives:

(6) $$\frac{dQ_m}{dQ_v} = -1$$

Combining (5) and (6) implies:

(7) $$\frac{dQ_m^*}{d\theta} < 0$$

Positive shifts in demand among adults under 65 reduce the quantity supplied to Medicare patients. Declines in the quantity of services consumed by adults under 65 are fully offset by increases in the quantity supplied to Medicare patients.[4]

This simple two sector model could be combined with a model of physician utility maximization incorporating income effects, such as that in the model described by McGuire and Pauly (1991). In that case, the magnitude of changes in Medicare utilization associated with reductions in private demand would exceed those implied by this model.

---

health, again implying that $P_{Q\theta} > 0$ (Remler, D. K. and J. Greene (2009). "Cost-Sharing: A Blunt Instrument." Annual Review of Public Health 30(1): 293-311..

[4] Shifts in demand also affect the price of services consumed by those under 65.

(8) $$\frac{dP_v^*}{d\theta} = \frac{P_\theta \cdot \mu_Q - P_{Q_v}\mu_\theta - P_\theta c''}{\mu_{Q_v} - c''}$$

The sign of (8) depends on the concavity of the demand curve, which depends on the sign of the second derivative P_{QQ} Baldenius, T. and S. Reichelstein (2000). "Comparative statics of monopoly pricing." Economic Theory 16: 465-469.. In this case, the results of the RAND experiment, which showed that price responsiveness was greatest at low levels of prices (high Q), indicates that $P_Q < 0$, implying that the demand curve is concave. Thus, $\frac{dP_v^*}{d\theta} > 0$.

An increase in demand leads to an increase in the price per unit of service paid by patients under 65 and to an increase in the total volume of services used by those under 65. This increase in the volume of services is divided among those who are newly insured because of the shift in demand and those who continue to be insured. For the latter, those who were privately insured all along, the effect of an increase in demand on price may even lead to a reduction in the quantity of services used.

II. Do Increases in Demand in the Under 65 Population Reduce Medicare Spending? Evidence at the State Level

The model above suggests that (H2) factors that lead to increases in health insurance coverage in the population under 65 are likely to affect the utilization of services by those enrolled in Medicare in the same healthcare market. The appropriate unit of analysis to test this relationship is the healthcare market. In the principal analyses that follow, I examine this relationship at the state level. I examine several measures of expenditures and outcomes. In each case, I initially estimate an OLS model of the form:

$$(6)\quad Y_{it} = \alpha + \beta\, DS_{it} + \delta X_{it} + \phi G_{it} + \gamma Z_{it} + \varepsilon_{it}$$

where Y is the outcome variable of interest and DS is a demand shifter that affects insurance coverage among adults 22-64. The vector X describes the characteristics of the population aged 22-64 population in marketplace i at time t (age distribution, race, ethnicity, citizenship status, health status, household income relative to the poverty line, educational attainment, work status), of the 65 and over population (age distribution, race, ethnicity, citizenship status, household income relative to the poverty line, educational attainment, work status, information on dual Medicaid-Medicare and supplemental private-Medicare coverage), and of the marketplace (population size and density). The vector G includes three measures of geographically varying practice costs that are used to adjust payments in the Medicare Part B program (work expenses, practice-related expenses, and malpractice-related expenses). These indices are available from the Centers for Medicare and Medicaid Services (https://www.cms.gov/PhysicianFeeSched/) and (for prior years) in the Federal Register. The vector Z consists of geographic fixed effects.

The error term, ε_{it}, may be heteroskedastic and there may be autocorrelation across observations from the same site. I therefore adjust all standard errors for heteroskedasticity using the Huber-White sandwich estimator. I adjust for autocorrelation using a Newey-West adjustment as implemented in the Stata module ivreg2 (Newey and West 1987, Baum, Schaffer et al. 2007).

I consider two distinct demand shifters – SCHIP expansions to adults and the size distribution of employers. In sensitivity analyses, I also consider a third demand shifter, state marginal tax rates. To assist in comparing and interpreting these effects, I repeat the analyses using each of these demand shifters as an instrument for the uninsurance rate among adults 22-64. As they likely are identified from different subsets of the uninsured population, I also repeat the analyses using the two demand shifters in combination to test the identification restrictions.

Data

Data on Medicare spending at the state level is available from the Dartmouth Atlas group (http://www.dartmouthatlas.org/Downloads.aspx). I use data for the period 1995-2006. The Dartmouth Atlas also contains detailed information on hospital discharges for 1995-2005.

I focus on three broad measures of Medicare expenditures – the log of part B expenditures per beneficiary (mainly physician spending) and the medical and surgical hospital discharge rates per 1000 beneficiaries. I examine the hospital discharge rate rather than Medicare Part A spending because Medicare Part A payment levels are explicitly linked to Medicaid enrollment and uninsurance rates[5]. If, for example, uninsurance rates in an area are

[5] Hospitals are paid according to the Diagnosis Related Group (DRG) of their patients. The base price per DRG is established nationally, but rates do vary among hospitals. Hospitals are paid higher rates in high wage regions (based on a hospital wage index). Academic medical centers are paid a premium for their role in graduate medical education. Finally, hospitals that serve large numbers of indigent patients receive disproportionate share (DSH)

low because the state runs an expansive Medicaid program, Medicare part A payment levels to hospitals will be high.

The Dartmouth Atlas also provides data on spending broken down by type. I examine Part B spending on diagnostic and laboratory services (mostly directed by physicians), spending on physician-provided medical care services broadly, and spending on surgical services (about ½ of all physician-provided medical care services). I also examine the rate of discharge for back surgery, a procedure that exhibits high absolute and relative variation across states, and for valve replacement surgery, a procedure that exhibits low absolute and relative variation across states.

Demographic Characteristics, Practice Costs, and Uninsurance Rates

I obtain data on uninsurance rates and socioeconomic characteristics of the population at the state level from the Current Population Survey (CPS). I match these data to the corresponding CPS years (1996-2007) and to data on the geographic practice cost index for corresponding years (using 1997 expenses for 1995 and 1996)[6].

I include state area average characteristics of the population aged 22 to 64 from the Current Population Survey (age: under 35/over 54; marital status; employment status; education: less than high school/high school; health status: excellent/very good/good/fair; race/ethnicity; citizenship; income: 100-199%FPL; 200-299% FPL; 300-399% FPL; 400-499% FPL; 500%FPL+) and corresponding characteristics of the population 65 and over (except that the age group used is 75 and over), and I include controls for the share of the population with both Medicaid and Medicare and the share with both Medicare and private coverage.

---

payments. These payments are computed according to complex formulas that are based (in part) on the number of patients enrolled in the state SSI and Medicaid programs (where eligibility levels vary by state), but may, in some cases, be based directly on the number of uninsured patients seen in a facility.

[6] As the geographic practice expense locality match changed after 1996, I use 1997 expenses for 1995, 1996, and 1997.

Demand Shifters

The first demand shifter I examine is state insurance eligibility policy for parents. States vary widely in the eligibility standards they set for adults under 65 to participate in state Medicaid and SCHIP programs (Ross and Cox 2005). In many states, parents are eligible for these programs only if they fall below welfare income cutoffs (which may be as low as 11% of the poverty rate). Over the late 1990s and early 2000s, however, several states extended eligibility for SCHIP benefits (generally provided through private managed care plans) to parents at higher levels of income (Aizer and Grogger 2003, Busch and Duchovny 2005). By 2006, as many as 25% of the adults aged 22-64 in some states (DC, Indiana, Maine, Minnesota, and Rhode Island) had incomes below the cutoff for parents to participate in these programs (roughly 10% of all adults in these states met both income and parental status requirements). I obtain information on eligibility for Medicaid/SCHIP from several sources (Aizer and Grogger 2003, Ross and Cox 2003, Ross and Cox 2004, Busch and Duchovny 2005, Ross and Cox 2005, Broaddus, Blaney et al. February 2002)[7].

I use two measures of eligibility expansions. First, I use a measure of simulated eligibility (based on income and household status only) estimated across the entire CPS for each year (Currie and Gruber 1996). In several states, eligibility expansions were subsequently scaled back, often grandfathering in those already enrolled who qualified under the earlier eligibility standard. Variation in (and weak documentation of) grandfathering practices makes it difficult to use rollbacks in eligibility to identify changes in coverage. Where there were discrepancies or substantial changes in reported eligibility across years, I investigated on state Medicaid

[7] I repeated the analyses using both income and parenthood rather than income only to construct/simulate simulated eligibility. The results were virtually identical to those reported here.

eligibility websites. To minimize the impact of rollbacks in coverage and inconsistent eligibility thresholds, my preferred measure of eligibility expansions is the experience of states that undertook large scale expansions of health insurance coverage to parents over the 1995 to 2006 period, as part of their SCHIP programs. I define a significant expansion as a sustained expansion (excluding states that expanded and then rolled back coverage), to a level that includes over 20% of the simulated population (corresponding to an income threshold of about 133% of the Federal Poverty Line), and that is more than 5 percentage points above the previous standard. Nine states conducted significant expansions by my definition over this period (Appendix Table 1 provides a list of states that conducted such expansions). Eligibility expansions may occur at any point during a calendar year. I therefore match spending and uninsurance to the eligibility indicator (or simulated eligibility measure) for the prior year[8].

The second factor I examine is the share of local establishments with 20 or more workers, obtained from County Business Patterns (CBP). The loading costs of private health insurance vary significantly with firm size (Congressional Budget Office December 2008). In consequence, observably comparable workers employed in small firms are much less likely to hold health insurance than are those in larger firms. The size distribution of local firms, however, seems unlikely to be correlated directly with medical spending in the Medicare population[9]. For this reason, firm size has been used as an instrument for private insurance coverage in several prior analyses of the health effects of coverage (Goldman and et al. 2001, Bhattacharya, Goldman et al. 2003, Dor, Sudano et al. 2003).

[8] There is no a priori reason to expect that patterns in Medicare spending should influence State decisions to expand or contract Medicaid and SCHIP eligibility. State governments bear no responsibility for Medicare expenditures. Nonetheless, to control for the possibility that some feedback might exist, I repeat the analyses of significant eligibility expansions including the growth rate of part B spending (hospital spending) over the 3 prior years. The inclusion of this measure reduces the magnitude of the results only slightly and they remain statistically significant.

[9] One possible avenue of such correlation would be through firm retiree medical policies. All analyses therefore include a direct measure of the proportion of the Medicare population holding supplemental private insurance coverage.

These demand shifters are distinct and affect quite different segments of the adult population under 65. State eligibility expansions affect coverage for low-income parents. Most states formally prohibit people with access to employer-sponsored coverage from participating in these programs. The size distribution of employment is most likely to affect coverage for low-wage workers and their families. These two demand shifters are also empirically distinct–the correlation between state public insurance eligibility for parents and the share of establishments with 20 or more workers is 0.05.

Descriptive statistics for all variables used in the analyses are reported in Appendix Table 2.

Results

Table 1 reports results of regressions of uninsurance rates, Medicare spending and Medicare discharges on each of the demand shifters described above. Panel A provides results for the eligibility expansion indicator variable.

In states that conducted substantial insurance coverage expansions, uninsurance rates post-expansion fell by 1.2 percentage points. In these same states, Medicare part B spending per beneficiary was about 3.2% lower, and there were about 3 fewer surgical discharges per 1000 Medicare beneficiaries (a reduction of about 2.7%). Medical discharges were also very slightly lower in these states.

Panel B repeats the eligibility expansion analysis using the continuous simulated eligibility measure. Consistent with the analyses using the dichotomous measure of substantial sustained expansions, increasing public insurance eligibility from none of the population to the full population would be associated with a 6 percentage point reduction in the uninsurance rate,

and a 12.8% reduction in Medicare Part B spending. It would be associated with a reduction in surgical discharges and a small increase in medical discharges, neither statistically significant.

Panel C of Table 1 focuses on the second demand shifter, the firm size distribution of employment. As expected, increases in the share of establishments with 20 or more workers have large and statistically significant effects on uninsurance rates. A one standard deviation increase in the share of such establishments (0.017) would reduce the uninsurance rate by 1.68 percentage points. As was the case for eligibility expansions, this demand shifter moves Medicare spending in the same direction as it does uninsurance. A one standard deviation increase in the share of larger establishments would reduce Medicare Part B spending by 5.8%, and would be associated with 3.9 fewer surgical discharges and 9 fewer medical discharges per 1000 Medicare beneficiaries.

Panel D of Table 1 includes both the substantial coverage expansion and share of large establishments indicators. As these two variables are not highly correlated, the estimates are not much affected by including both together.

The final row in each panel of Table 1 provides IV estimates that put the estimates in the four panels into a comparable scale. The instruments are reasonably strong (F-tests over 10) in analyses of the log of Medicare spending, and moderate in analyses of discharges (where the panel is shorter). In each case, the IV coefficient reflects the change in the dependent variable associated with a 1 percentage point increase in the uninsurance rate achieved through the relevant demand shifter. The results for Medicare Part B spending and surgical discharges are quite consistent across the demand shifters. A one percentage point increase in the uninsurance rate is associated with an increase in Medicare part B spending of between 2.1% and 3.4%. It is associated with between 1.4 and 2.9 additional surgical discharges per 1000 Medicare

beneficiaries, an increase of between 1.4 and 2.9% (the baseline surgical discharge rate is about 98 per 1000 beneficiaries). The results for medical discharges are much more variable and have large standard errors. When both instruments are included simultaneously, the overidentification restriction test fails to reject the hypothesis that both are exogenous for both Medicare Part B spending and surgical discharges. The estimate for medical discharges fails the exogeneity test because the large expansion indicator is not highly correlated with medical discharges.

A different way to look at the effect of these demand shifters is through an event study style analysis (Gross, Notowidigdo et al. 2013). I treat substantial coverage expansions as events and examine the pattern of uninsurance and of the log of Medicare part B spending in the years preceding and following these events. I estimate equations of the form of (6) above, but include indicator variables for years preceding passage of a substantial expansion and years following passage of a substantial expansion. In Figures 2 and 3, I graph these indicator variables (and 95% confidence intervals around them). I omit the year of passage of legislation because it is not clear when in the year an expansion actually occurred. Figure 2 shows the trend in uninsurance rates. The passage of a substantial coverage expansion is associated with a statistically significant decline in the uninsurance rate immediately following the expansion, sustained throughout the period. Figure 3 shows the trend in the log of part B spending. The results suggest a change in the pattern of Medicare part B spending in the years following an expansion, with reductions in spending increasing over time.

Robustness

I next perform a series of robustness checks [Table 2]. The first column in Table 2 repeats the baseline estimate for the log of Medicare part B spending per capita from Table 1.

Column 2 omits state fixed effects, which reduces the magnitude of the estimated effect by about 1/3. Column 3 omits all demographic and geographic controls, which has very little effect on the estimates. Column 4 adds state specific trends, which reduces the magnitude of the estimate by nearly 2/3 and increases the standard errors, but the coefficient remains within the error bounds of the baseline estimate.

The Dartmouth Atlas also contains information on Medicare spending at the Hospital Referral Region level. I match the Dartmouth HRRs to Current Population Survey counties to repeat the estimates at the HRR level. Note that estimates of demographic controls and uninsurance rates are not very reliable given the small samples and imperfect matching. Nonetheless, the results at the HRR level (including HRR fixed effects) are quite similar to those at the state level, suggesting about a 2.2% reduction in Medicare Part B spending with a 1% reduction in the uninsurance rate.

Next, I consider estimates using an alternative instrument: the state's maximum marginal income tax rate, obtained from the National Bureau of Economic Research Taxsim model for 1995-2006 (Feenberg and Coutts 1993). Higher marginal income tax rates are expected to increase coverage rates because employer-paid health insurance premiums are not treated as income for tax purposes (Gruber and Poterba 1994). Marginal tax rates vary little over time, and analyses including these rates are never robust to the inclusion of state fixed effects. Unlike eligibility expansions and the share of employment in small firms, this demand shifter is most likely to affect coverage for higher income workers. The correlation between eligibility and the maximum marginal tax rate is 0.10; and the correlation between the maximum marginal tax rate and the share of establishments with 20 or more workers is 0.01.

The sixth column of Table 2 provides IV estimates without fixed effects using the maximum marginal state tax rates as an instrument. Higher marginal rates are associated with significant reductions in uninsurance rates. A one standard deviation increase in a state's marginal tax rate would reduce uninsurance by ½ of a percentage point (not shown). This increase in marginal rates would be associated with a 3.7% reduction in Medicare Part B spending, 1.6 fewer surgical discharges and 6.5 fewer medical discharges per 1000 Medicare beneficiaries. The IV estimate of the effect of uninsurance on the Medicare Part B spending using marginal tax rates as an instrument suggests that a 1% increase in the uninsurance rate is associated with a 6.8% increase in part B spending. This estimate is not statistically significantly different from the baseline estimate of 3.4%. When I include both the maximum marginal tax rate and public insurance eligibility expansion as instruments (excluding fixed effects), I fail to reject the null hypothesis that the equation is correctly specified.

As a final robustness check, I perform a falsification test. Only providers who see both Medicare and privately-insured patients will shift resources to Medicare patients when private insurance demand falls and uninsurance rates rise. One group of providers who do not see many privately insured patients are Medicare-reimbursed nursing homes, known as skilled nursing facilities (SNFs) (Hartman, Catlin et al. 2008). I examine patterns for skilled nursing facility spending (reimbursed through Medicare Part A) as a falsification test. Expansions in public insurance eligibility and in the proportion of establishments with 20 or more workers are associated with statistically insignificant increases, rather than reductions, in Medicare SNF spending. The IV estimates are not statistically significant.

Components of Spending

Table 3 reports the results of regressions on elements of Medicare spending, using the demand shifters above. The first three columns describe components of part B spending. Expansions in eligibility and a greater share of larger establishments are each associated with reductions in all 3 components of Part B spending. Diagnostic and laboratory spending increases between 4% - 5% with a one percentage point increase in the area uninsurance rate, medical services spending rises by 2.4% - 6.2%, and the surgical spending subcomponent rises by 1.3% - 4.1%. The next two columns examine the relationship between demand shifters and high and low variation surgical procedures. The signs of the coefficients for back surgery are as expected and a one percentage point increase in uninsurance is associated with between 0.1 and 0.28 additional back surgeries per 1000 beneficiaries. The results for valve replacement surgery, a procedure where there is much less variability across the country, are tiny, of the wrong sign, and always statistically insignificant.

III. How Do Shifts in Demand in the Population Under 65 Affect the Supply of Physician Services?

In a standard supply-demand framework, a reduction in demand leads to a new equilibrium price where a reduced quantity of services is supplied. In the health care context, the standard framework implies that the total quantity of medical services supplied should similarly decline with an increase in the uninsurance rate. By contrast, the results above imply that health care providers compensate for at least part of a decline in demand among patients under 65 by increasing the level of service provided to Medicare patients. That is, the results suggest that the

total quantity of medical services supplied does not decline with an increase in the uninsurance rate. Which is the case here? I examine this question directly using information collected on physician supply. I use the Robert Wood Johnson's Community Tracking Household Surveys (1996, 1998, 2000, and 2003; http://www.hschange.com/index.cgi?data=02) to obtain site level characteristics and uninsurance rates and the restricted use version of the Physician Surveys (1996, 1998, 2000, and 2004; http://www.hschange.com/index.cgi?data=04) conducted by the Center for Health System Change to obtain data on physician supply. These surveys provide representative samples of the population of households and physicians (respectively) across 60 sites in the United States (51 metropolitan areas and 9 non-metropolitan areas). I use data for the 48 metropolitan areas that can be matched to Dartmouth Atlas Hospital Referral Regions (excluding Dothan, Killeen, and Terre Haute).

I collapse data on household characteristics by year and CTS site (using the CTS-provided weights). Descriptive statistics for the household sample are in Appendix Table 2. They are quite comparable to the State estimates. I collapse the CTS physician data by site, year, and physician type (adult primary care physicians and adult care specialists). On average, physicians spent about 45 hours a week in patient care (slightly more for specialists; slightly less for primary care doctors). They worked about 47 weeks in the prior year. The average age of surveyed physicians was about 47%. Average income was $139,147 ($2006 dollars) in primary care and $212,082 in specialty care. The CTS household survey data and the CTS physician survey data were matched across sites by year (the CTS household survey data from 2003 was matched with the CTS physician survey data from 2004-5)[10].

[10] To put the results that follow into context, I first compute the effect on a physician's practice of a 1 percentage point increase in the uninsurance rate, assuming that the entire effect of this reduction in demand is experienced through a reduced quantity of services provided. In these data, Medicare patients make roughly 40% more physician visits each year than do privately insured patients. There are about five times as many patients in the 22-

Physician supply could respond to a reduction in private demand associated with an increase in uninsurance rates on either the extensive margin (through a reduction in the number of physicians), or on the intensive margin (through a reduction in hours worked by practicing physicians). To study the extensive margin, I match the CTS data to information on primary care and specialty physician to population ratios from the AMA (Center for Health Services Research and Development (American Medical Association) various). Physician to population ratios averaged 103.7 per 100,000 population for generalists and 168.1 per 100,000 population for specialists. To study the intensive margin, I examine total physician patient hours (constructed as weekly patient care hours times weeks worked per year), physician age, and physician income. Physician income is censored in the CTS. To adjust for censoring, I construct mean income using Tobit regressions by site and year.

I examine the effects of two demand shifters – simulated eligibility rates and establishment size – on physician supply. I match state level simulated eligibility and CBP data to CTS sites using the CTS-Census county crosswalk and weighting counties according to their population in the 2000 Census. The limited geographic variation in the CTS and the timing of the CTS surveys means that there is much less variation in the eligibility variable in these data (and the significant expansion set is almost empty). The panel is too short to support site fixed effects. Instead, I include 6 division dummies (combining census divisions 3 and 4 and census divisions 5 and 6). The standard errors are adjusted for heteroskedasticity and first-order autocorrelation.

---

64 age category as in the over 65 category. Uninsured patients aged 22-64 make about 55% as many visits each year as do privately insured patients. Under these assumptions, a one percentage point increase in the uninsurance rate would be associated with a 0.36% reduction in the quantity of physician services supplied. If this effect occurred through a reduction in hours worked per year, physicians would be expected to work about 7.5 hours less per year in an area with a one percentage point higher uninsurance rate.

Results

Results of the analyses of physician supply are reported in Table 4. I report first stage estimates using both eligibility and employer size, and IV estimates of the effect of uninsurance using the two instruments combined and independently for each of the dependent variables of interest. Expanding eligibility to the full simulated population would result in uninsurance rates about 16 percentage points lower than if none of the population were eligible for public coverage. Moving all employment from small to large firms would reduce the uninsurance rate by 64 percentage points.

Turning to the IV estimates, I find that increases in the uninsurance rate are, if anything, associated with increases in the physician/population ratio. Primary care and specialist incomes do not fall with an increase in uninsurance. Taken together, the estimates provide no evidence in support of the hypothesis that changes in coverage rates lead to changes on the physician supply side of the health care market.

IV. Effects on Patient Experience and Outcomes

The results above suggest that factors that shift demand and lead to increases in uninsurance generate increased spending and more use of services among the Medicare population and the privately insured. Does this extra spending do any good? To assess this, I examine three dimensions of well-being: patient experience of care; ambulatory-care sensitive admissions; and mortality.

First, using the CTS household data, I examine how demand shifters in the under 65 population affect (a) the proportion of Medicare patients who obtain an appointment in less than a week; (b) whether Medicare patients report their care as excellent; (c) the number of physician

visits Medicare patients make annually; (d) the share who saw a specialist at their prior visit; and (e) the patient's assessment of whether he or she received unnecessary care at their last visit. As above, I report results using simulated eligibility and the share of establishments with 20 or more workers. The results are reported in the left hand columns of Table 5.

Focusing on the IV estimates with the combined instruments, uninsurance rates are not significantly related to time to get an appointment or to satisfaction with care for Medicare patients. Consistent with the spending results above, Medicare beneficiaries make slightly more physician visits where uninsurance rates are lower. The IV estimates imply that Medicare beneficiaries make a little over 1% more physician visits annually in areas with a one percentage point higher uninsured rate. Beneficiaries in areas where uninsurance rates are higher are slightly more likely to have seen a specialist (rather than a generalist) at their prior visit. They are also more likely to perceive that the care received at their last visit was unnecessary. Overall, these results suggest that higher uninsurance is not associated with improvements in the self-perceived quality of care received by Medicare patients but is associated with increases in the quantity of care received.

Second, I examine how demand shifters affect the rate of ambulatory care sensitive (ACS) admissions at the state level, using the same specification as in Table 1 above (including fixed effects). Hospital admissions are classified as ACS if they are sensitive to the use of ambulatory care. If increases in uninsurance rates lead to improvements in outpatient services for Medicare patients, ACS admission rates should decline. These results are reported in the sixth column Table 5. Higher uninsurance rates are associated with statistically significant increases in ACS admissions, suggesting that the increased service use in areas with higher uninsurance rates is not providing care that keeps people out of hospitals. There are about 1.7

more ACS admissions per 1000 population in states with a one percentage point higher uninsurance rate. In the analyses that separate the two instruments, both eligibility expansions and more employment in large firms reduce ACS admissions.

Finally, I examine mortality rates. The Dartmouth Atlas group provides tables of the age-sex-race adjusted death rate of Medicare beneficiaries by state for 1999-2004. I follow the same empirical strategy as in table 1. The results suggest that mortality rates for Medicare beneficiaries are not significantly different in areas with higher uninsurance rates. Curiously, eligibility expansions are associated with lower mortality rates, but more employment in large firms seems to be associated with marginally (though insignificantly) higher mortality rates.

V. Alternative Explanations

The results above document a strong and consistent association between higher uninsurance rates and the use of services by Medicare beneficiaries. But is this result driven by an offset effect or by something else? One alternative explanation is that lack of coverage in the pre-65 population engenders a pent-up demand for services when the uninsured reach Medicare age(McWilliams, Meara et al. 2007, Card, Dobkin et al. 2009, McWilliams, Meara et al. 2009, Polsky, Doshi et al. 2009). These explanations imply that Medicare spending is correlated not with the number currently uninsured, but with the number uninsured in the past.

The results above using that focus on eligibility expansions argue against this explanation – these expansions focused on parents and took place at most 10 years before the most recent year of my data. Very few parents would have reached Medicare eligibility within the time period. To further test this hypothesis, I repeat the analyses of simulated eligibility and

establishment size composition including both current and lagged (5 years) demand shifters[11]. Both current uninsurance rates and current Medicare part B spending are much more strongly related to current demand shifters than to historic demand shifters (not shown). These results suggest that the current marketplace, and not lagged health, is the proximate cause of the observed association between spending and coverage.

A second alternative explanation is that reductions in coverage affect Medicare spending through their effect on managed care. Prior research has shown that managed care generates behavioral spillovers onto practice patterns in the Medicare population (Baker 2003, Bundorf, Schulman et al. 2004). If an increase in uninsurance rates reduces the proportion of physician revenue derived from managed care, the resulting change in behavior could generate higher physician spending.

The CTS data include information on the share of medical practice revenue that comes from managed care. On average, primary care physicians report that 47% of their revenue comes from managed care and specialist physicians report that 42% of their revenue comes from managed care. I merge data on Medicare Part B spending at the Hospital Referral Region level (from the Dartmouth Atlas) with corresponding CTS sites and examine whether inclusion of the physician managed care revenue variables affects the relationship between demand shifters (simulated eligibility and firm size) and Part B spending reported above. Without including managed care penetration, the relationship between these demand shifters and Medicare part B spending at the CTS site level is very similar to that found in the state data, suggesting that the state level results reported above also obtain at the health referral region level. Factors that increase demand for care are associated with significantly higher managed care penetration. The inclusion of measures of managed care penetration in the analysis of the relationship between

[11] These analyses do not include state fixed effects.

demand shifters and Medicare spending, however, has little effect on the basic results (not shown).

VI. Discussion

The results reported in Tables 1-5 are quite consistent. I find, as the theoretical model presented above predicts, that at the market level, providers offset reductions in private demand associated with higher uninsurance rates with increased Medicare spending. A one percentage point increase in the adult uninsurance rate is associated with about a 2-3% increase in part B spending and with about 1.4-3 additional hospital surgical discharges per 1000 Medicare beneficiaries. The effects are spread across types of outpatient spending and occur primarily among high-variation surgical discharges. By contrast, spending on SNFs tends to fall, rather than rise, with demand factors that increase uninsurance rates. The Medicare offset results found here are consistent with the findings of Kowalski and Kolstad (Kowalski and Kolstad May 2010), in their analyses of hospital spending before and after the Massachusetts universal coverage experience (which occurred after the period studied here). In contrast to the Medicare patterns, private insurance premiums do not rise, and may even fall with increases in uninsurance rates.

Consistent with these spending patterns, in data on health service utilization, Medicare beneficiaries report making about 1%-3% more physician visits in areas with higher uninsured rates and are more likely to report that their most recent visit was to a specialist in these areas. The total supply of primary care and specialty physician services does not fall as the proportion of the adult population uninsured rises.

To get a sense of whether the estimates above are realistic, I simulate the magnitude of changes implied by Medicare offsets using existing data [Table 6]. Consider a change in market-level demand from privately insured patients that occurs because of an increase in the number uninsured. Suppose that the entire reduction in utilization were offset by an increase in Medicare spending. How large would the effects of such a change be on Medicare spending? I use data on service use by provider and insurer type from the 2001 Medical Expenditure Panel Survey (MEPSnet.ahrq.gov) to get a rough estimate of this change[12]. In 2001, reallocating the spending associated with a one percentage point increase in uninsurance to Medicare patients would lead to about a 1.5% increase in Medicare office-based physician spending, about a 1.1% increase in Medicare inpatient physician spending, and about a 0.4% increase in Medicare facility spending. The effects are somewhat larger when repeated in later years of the MEPS. The estimated results reported above are quite close to these simulated effects.

The increased Medicare utilization that accompanies higher uninsurance rates has few benefits for Medicare patients. The number of Medicare discharges for ambulatory sensitive conditions, which should decline with use of appropriate medical care, is higher in areas with higher uninsurance rates. Medicare patients do not seem to have an easier time getting appointments in areas with higher uninsurance rates nor are they more satisfied with care. Intriguingly, Medicare patients are more likely to report that they received care that they perceived was unnecessary in areas with higher uninsurance rates.

[12] I examine the spending behavior by service type of four groups: adults aged 22-64 with any private health insurance during the year, adults aged 22-64 with any public health insurance during the year, adults aged 22-64 who are uninsured all year, and Medicare beneficiaries aged 65-80. I simulate the effects of a 1 percentage point increase in the uninsurance rate by moving one percent of the adult 22-64 population from private insurance to uninsurance and adjusting spending accordingly. I then distribute the reduction in spending among Medicare recipients.

The results above are consistent with the idea that where cost-sharing is low and there are few other constraints on health care utilization, the aggregate quantity of health care services consumed is largely dependent on the supply side of the health care market. In this environment, changes on the demand side are important – they affect individual use of services and the composition of utilization. At least in the short run, however, such changes have limited effects on aggregate spending, as they may be offset in other sectors of the health care market.

Aizer, A. and J. Grogger (2003). Parental Medicaid Expansions and Health Insurance Coverage, National Bureau of Economic Research, Inc, NBER Working Papers: 9907.

Baker, L. C. (2003). "Managed care spillover effects." Annu Rev Public Health **24**: 435-456.

Baldenius, T. and S. Reichelstein (2000). "Comparative statics of monopoly pricing." Economic Theory **16**: 465-469.

Baum, C. F., M. E. Schaffer and S. Stillman (2007). ivreg2: Stata module for extended instrumental variables/2SLS, GMM and AC/HAC, LIML, and k-class regression. Statistical Software Components S425401. B. C. D. o. Economics.

Bhattacharya, J., D. P. Goldman and N. Sood (2003). "The Link Between Public and Private Insurance and HIV-Related Mortality." Journal of Health Economics **22**: 1101-1122.

Broaddus, M., S. Blaney, A. Dude, J. Guyer, L. Ku and J. Peterson (February 2002). Expanding Family Coverage: States' Medicaid Eligibility Policies for Working Families in the Year 2000. Center on Budget and Policy Priorities. Washington, DC.

Bundorf, M. K., K. A. Schulman, J. A. Stafford, D. Gaskin, J. G. Jollis and J. J. Escarce (2004). "Impact of managed care on the treatment, costs, and outcomes of fee-for-service Medicare patients with acute myocardial infarction." Health Serv Res **39**(1): 131-152.

Busch, S. H. and N. Duchovny (2005). "Family coverage expansions: Impact on insurance coverage and health care utilization of parents." Journal of Health Economics **24**(5): 876-890.

Card, D., C. Dobkin and N. Maestas (2009). "Does Medicare Save Lives?" Quarterly Journal of Economics **124**(2): 597-636.

Carlsen, F. and J. Grytten (1998). "More physicians: improved availability or induced demand?" Health Econ **7**(6): 495-508.

Carlsen, F. and J. Grytten (2000). "Consumer satisfaction and supplier induced demand." J Health Econ **19**(5): 731-753.

Center for Health Services Research and Development (American Medical Association) (various). Physician distribution and medical licensure in the U.S. Chicago,, Center for Health Services Research and Development**:** 6 v.

Congressional Budget Office (December 2008). Key Issues in Analyzing Major Health Insurance Proposals.

Currie, J. and J. Gruber (1996). "Saving babies: The efficacy and cost of recent changes in the Medicaid eligibility of pregnant women." Journal of Political Economy **104**(6): 1263-1296.

Dor, A., J. Sudano and D. W. Baker (2003). The Effects of Private Insurance on Measures of Health: Evidence from the Health and Retirement Study, National Bureau of Economic Research, Inc, NBER Working Papers: 9774.

Escarce, J. J. (1992). "Explaining the association between surgeon supply and utilization." Inquiry **29**(4): 403-415.

Feenberg, D. R. and E. Coutts (1993). "An Introduction to the Taxsim Model." Journal of Policy Analysis & Management **12**(1; Winter): 189-194.

Glied, S. and K. Jack (2003). Macroeconomic Conditions, Health Care Costs, and the Distribution of Health Insurance. NBER Working Paper 10029.

Goldman, D. P. and et al. (2001). "Effect of Insurance on Mortality in an HIV-Positive Population in Care." Journal of the American Statistical Association **96**(455): 883-894.

Green, J. (1978). "Physician-induced demand for medical care." J Hum Resour **13 Suppl**: 21-34.

Gross, T., M. J. Notowidigdo and J. Wang (2013). "Liquidity Constraints and Consumer Bankruptcy: Evidence from Tax Rebates." Review of Economics and Statistics.

Gruber, J. and M. Owings (1996). "Physician financial incentives and cesarean section delivery." Rand J Econ **27**(1): 99-123.

Gruber, J. and J. Poterba (1994). "Tax Incentives and the Decision to Purchase Health-Insurance - Evidence from the Self-Employed." Quarterly Journal of Economics **109**(3): 701-733.

Hadley, J., J. Reschovsky, C. Corey and S. Zuckerman (2009). "Medicare fees and the volume of physicians' services." Inquiry **46**(4): 372-390.

Hartman, M., A. Catlin, D. Lassman, J. Cylus and S. Heffler (2008). "U.S. Health Spending By Age, Selected Years Through 2004." Health Aff **27**(1): w1-12.

Hemenway, D. and D. Fallon (1985). "Testing for physician-induced demand with hypothetical cases." Med Care **23**(4): 344-349.

Kowalski, A. E. and J. T. Kolstad (May 2010). The Impact of an Individual Health Insurance Mandate On Hospital and Preventive Care: Evidence from Massachusetts. National Bureau of Economic Research Working Paper. Cambridge, MA, National Bureau of Economic Research.

Labelle, R., G. Stoddart and T. Rice (1994). "A re-examination of the meaning and importance of supplier-induced demand." J Health Econ **13**(3): 347-368.

Lemieux, J., T. Chovan and K. Heath (2008). "Medigap Coverage And Medicare Spending: A Second Look." Health Aff **27**(2): 469-477.

Leonard, C., S. Stordeur and D. Roberfroid (2009). "Association between physician density and health care consumption: a systematic review of the evidence." Health Policy **91**(2): 121-134.

McGuire, T. G. and M. V. Pauly (1991). "Physician response to fee changes with multiple payers." J Health Econ **10**(4): 385-410.

McWilliams, J. M., E. Meara, A. M. Zaslavsky and J. Z. Ayanian (2007). "Use of health services by previously uninsured Medicare beneficiaries." N Engl J Med **357**(2): 143-153.

McWilliams, J. M., E. Meara, A. M. Zaslavsky and J. Z. Ayanian (2009). "Medicare spending for previously uninsured adults." Ann Intern Med **151**(11): 757-766.

Medpac (March 2009). Report to the Congress: Medicare Payment Policy. Washington, MedPac.

Mujumdar, S. and D. Pal (2005). "Do Price Ceilings Abroad Increase U.S. Drug Prices?" Economics Letters **87**(1): 9-13.

Mulley, A. G. (2009). "Inconvenient truths about supplier induced demand and unwarranted variation in medical practice." BMJ **339**: b4073.

Newey, W. K. and K. D. West (1987). "A Simple, Positive Semi-definite, Heteroskedasticity and Autocorrelation Consistent Covariance Matrix." Econometrica **55**(3): 703-708.

Polsky, D., J. A. Doshi, J. Escarce, W. Manning, S. M. Paddock, L. Cen and J. Rogowski (2009). "The health effects of Medicare for the near-elderly uninsured." Health Serv Res **44**(3): 926-945.

Quirmbach, H. C. (1988). "Comparative Statics for Oligopoly: Demand Shift Effects." International Economic Review **29**(3): 451-459.

Reinhardt, U. E. (1985). "The theory of physician-induced demand: reflections after a decade." J Health Econ **4**(2): 187-193.

Remler, D. K. and J. Greene (2009). "Cost-Sharing: A Blunt Instrument." Annual Review of Public Health **30**(1): 293-311.

Rice, T. H. (1983). "The impact of changing medicare reimbursement rates on physician-induced demand." Med Care **21**(8): 803-815.

Ross, D. C. and L. Cox (2003). Preserving Recent Progress on Health Coverage for Children and Families: New Tensions Emerge. Menlo Park, Calif., Kaiser Family Foundation.

Ross, D. C. and L. Cox (2004). Beneath the Surface: Barriers Threaten to Slow Progress on Expanding Health Coverage to Children and Families. Menlo Park, Calif., Kaiser Family Foundation.

Ross, D. C. and L. Cox (2005). In a Time of Growing Need: State Choices Influence Health Coverage Access for Children and Families. Menlo Park, Calif, Kaiser Family Foundation.

Table 1: Effect of Demand Shifters on Medicare Spending and Fixed Effects IV Estimates of Effects of Uninsurance on Medicare Spending (Instrumented Using Demand Shifters)

		Adult 18-64 Uninsurance Rate	Log Medicare Part B spending	Surgical Discharges	Medical Discharges
A	Large expansions	-1.242	-0.032	-3.069	-1.281
		[0.327]***	[0.010]***	[0.943]***	[2.193]
	Unins IV		0.026	2.857	1.192
	F-test 11.9/7.5		[0.011]**	[1.257]**	[2.125]
B	Eligibility standard for parents	-6.083	-0.128	-7.344	4.667
		[1.651]***	[0.060]**	[4.921]	[10.490]
	Unins IV		0.021	1.407	-0.894
	F-test 14.5/9.9		[0.011]*	[1.030]	[1.972]
C	Share of Establishments with 20 or More Workers	-98.954	-3.384	-228.404	-537.478
		[25.419]***	[0.816]***	[67.453]***	[190.333]***
	Unins IV		0.034	2.857	6.724
	F-test 12.7/7.2		[0.012]***	[1.304]**	[3.327]**
D	Large Expansions	-1.21	-0.028	-2.287	0.041
		[0.38]***	[0.010]***	[1.115]**	[2.234]
	Share of Establishments with 20 or More Workers	-82.32	-3.711	-207.308	-537.857
		[25.31]***	[0.77]***	[64.174]***	[191.474]**
	Unins IV		0.034	2.504	3.536
	F-test 9.2/6.3		[0.011]***	[0.961]***	[1.965]*
	Hausman Test		0.277	0.664	0.094*

Notes: Current Population Survey, 1995-2006 matched to Dartmouth Atlas. For uninsurance and part B analyses, n=561 for eligibility expansions and 612 for employment distribution and tax rates. For hospitalization analyses, n=510. All regressions include age distribution, race/ethnicity/citizenship, income distribution, and education distribution of the population under 65 and the population 65 and older; health status and employment distribution of the population under 65; supplemental and dual coverage status of the population 65 and over; and geographic practice cost indices. All regressions include year dummies. Standard errors in parentheses are heteroskedasticity robust and adjusted for second order autocorrelation. First F-test is for uninsurance and Part B spending; second is for hospital discharges. * significant at 10%; ** at 5%; *** at 1%.

Table 2. Robustness Tests

	Log of Medicare Part B Spending						SNF Spending
	Baseline Estimate	No State Fixed Effects	State Fixed Effects and no Demographic Controls	State trends	HRR level[a]	No State Fixed Effects	Baseline Estimate
Large expansions and Share 20 or more	0.034	0.022	0.031	0.014	0.022		-0.374
	[0.011]***	[0.005]***	[0.009]***	[0.019]	[0.014]		[0.025]
State Maximum Marginal Tax Rate						0.068	
						[0.031]**	

a. HRR level analyses include 1620 observations. CPS data aggregated to HRR by county.

Table 3. Effect of Demand Shifters on Components of Medicare Spending and Fixed Effects IV Estimates of Effects of Uninsurance on Medicare Spending (Instrumented Using Demand Shifters)

	Log Diagnostic and Lab Part B	Log Physician Part B	Log Surgical Part B	Back Surgery Discharges	Valve Surgery Discharges
Large expansions	-0.064	-0.045	-0.016	-0.298	0.016
	[0.012]***	[0.014]***	[0.008]**	[0.065]***	[0.030]
Unins IV	0.052	0.036	0.013	0.277	-0.015
F-test 11.9/7.5	[0.017]***	[0.013]***	[0.007]*	[0.114]**	[0.028]
Eligibility standard for parents	-0.241	-0.143	-0.096	-1.304	0.077
	[0.065]***	[0.082]*	[0.038]**	[0.392]***	[0.167]
Unins IV	0.04	0.024	0.016	0.25	-0.015
F-test 14.5/9.9	[0.014]***	[0.014]*	[0.008]**	[0.103]**	[0.033]
Share of Establishments with 20 or More Workers	-4.852	-6.173	-4.026	-9.127	0.062
	[0.843]***	[0.992]***	[0.611]***	[9.096]	[2.563]
Unins IV	0.049	0.062	0.041	0.102	-0.001
F-test 12.7/7.2	[0.015]***	[0.019]***	[0.012]***	[0.103]	[0.029]
Large expansions	-0.061	-0.041	-0.015	-0.192	0.026
	[0.013]***	[0.015]***	[0.009]**	[0.077]***	[0.041]
Share of Establishments with 20 or More Workers	-5.163	-6.567	-3.97	-2.089	0.023
	[0.738]***	[0.921]***	[0.599]***	[7.619]	[2.445]
Unins IV	0.056	0.056	0.03	0.156	-0.013
F-test 12.7/7.2	[0.015]***	[0.015]***	[0.009]***	[0.075]**	[0.028]
Hausman test	0.68	0.15	0.05*	0.11	0.62

Notes: See Table 1. Categories of spending and hospital use as classified by the Dartmouth group. Part B is divided into diagnostic and laboratory and medical professional services. Surgical services are a component of medical professional services. Hospital discharges are classified as medical or surgical according to principal diagnosis. First F test is for spending, second is for discharges.

Table 4. Effect of Demand Shifters on Physician Supply and Income IV Estimates of Effects of Uninsurance on Physician Supply and Income (Instrumented Using Demand Shifters)

	Adult 18-64 Uninsurance Rate	Primary Care Phys/Pop	Specialty Physician/Pop	Annual Hours Primary Care	Annual Hours Specialists	Income Primary Care	Income Specialists
Eligibility	-16.21						
	[5.14]***						
Share of Establishments 20+	-64.37						
	[20.67]***						
IV		2.976	3.633	13.033	-13.660	0.008	0.002
F-test 7.2		[1.160]**	[2.408]	[12.114]	[10.868]	[0.006]	[0.007]
Hausman Test		0.13	0.29	0.05**	0.21	0.80	0.63
Eligibility	-12.19	-16.798	-66.814	-437.436	13.874	-0.086	0.002
	[4.395]***	[13.410]	[31.534]**	[166.306]***	[131.885]	[0.099]	[0.097]
IV		1.378	5.481	35.884	-1.138	0.007	-0.0002
7.4		[1.171]	[2.990]*	[21.577]*	[10.915]	[0.009]	[0.008]
Share of Establishments with 20 or more workers	-70.825	-261.93	-124.463	-20.25	1,354.97	-0.882	-0.517
	[20.641]***	[93.466]***	[208.718]	[962.839]	[914.038]	[0.547]	[0.595]
IV		3.698	1.757	0.286	-19.131	0.012	0.007
9.7		[1.638]**	[2.937]	[13.594]	[14.960]	[0.008]	[0.008]

Notes: CTS data are drawn from the Robert Wood Johnson's Community Tracking Household (1996, 1998, 2000, and 2003; http://www.hschange.com/index.cgi?data=02) and the restricted use version of the Physician (1996, 1998, 2000, and 2004; http://www.hschange.com/index.cgi?data=04) Surveys conducted by the Center for Health System Change. N=192, across 48 CTS sites and 4 survey years. Regressions include demographic and health system variables (listed in full in Table 1): age distribution, race/ethnicity, income distribution, and education distribution of the population under 65 and the population 65 and older; employment distribution of the population under 65; supplemental and dual coverage status of the population 65 and over; and geographic practice cost indices. All regressions include year dummies. Standard errors are heteroskedasticity robust and adjusted for first order autocorrelation. * significant at 10%; ** at 5%; *** at 1%. Physician to population ratios obtained from AMA (Center for Health Services Research and Development (American Medical Association) various). Annual patient care hours is the product of weekly hours in patient care and weeks worked. Annual mean income computed using Tobit regressions at the site/year level to correct for top-coding of income. All figures in 2006$.

Table 5. Effect of Demand Shifters on Measures of Medicare Beneficiary Outcomes and IV Estimates of Effects of Uninsurance on Outcomes (Instrumented Using Demand Shifters)

	Appoint-ment w/in 7 days	High Satisfaction	MD Visits	Specialist Share	Unnecessary Care	ACS Discharges (fixed effects)	Mortality (fixed effects)
Eligibility standard (large expansion) and share>20	-0.003	0.004	0.098	0.008	0.003	1.67	-0.011
	[0.004]	[0.004]	[0.049]**	[0.005]	[0.002]*	[0.73]**	[0.012]
F-test 7.2/6.3(mort) Hausman test	0.15	0.14	0.59	0.31	0.14	0.62	0.16
Large expansions						-1.607	-0.033
						[0.738]**	[0.017]*
Unins IV						1.497	0.034
F-test 4.0 (mort)						[0.836]*	[0.026]
Eligibility standard for parents	0.099	-0.127	-0.922	-0.157	-0.005	-3.586	-0.052
	[0.065]	[0.067]*	[0.751]	[0.078]**	[0.023]	[3.464]	[0.084]
Unins IV	-0.008	0.01	0.076	0.013	0.0004	0.687	0.015
F-test 1.8 (mort)	[0.006]	[0.006]*	[0.059]	[0.007]*	[0.002]	[0.708]	[0.027]
Share of Establishments 20 or More Workers	-0.038	0.138	-8.924	-0.284	-0.347	-161.412	3.35
	[0.295]	[0.375]	[4.431]**	[0.465]	[0.147]**	[66.893]**	[2.415]
Unins IV	0.001	-0.002	0.126	0.004	0.005	2.019	-0.039
F-test 4.2 (mort)	[0.004]	[0.005]	[0.065]*	[0.006]	[0.002]**	[1.130]*	[0.031]

Notes: * significant at 10%; ** at 5%; *** at 1%. All standard errors are heteroskedasticity robust and adjusted for first order autocrrelation. F test results listed for mortality analyses. F tests for ACS discharges are in Table 1, those for CTS analyses are in Table 4. CTS outcome measure regressions use CTS data and include covariates in Table 1 and 6 division dummies..
Ambulatory Care Sensitive (ACS) Discharges and Mortality analyses use data and strategy described in Table 1. N for mortality analyses is 357. Analyses of mortality and discharges use large expansions and large establishments as instruments; analyses of CTS variables use eligibility standard and large establishments as instruments.

Table 6: Simulated Medicare Offset Effects of Increasing Uninsurance Rates by One Percentage Point

	2001 Population Count	Office-Based	Inpatient Physician	Inpatient Facility
Privately insured 22-65	124,310,773	462.86	122.50	523.95
Publicly insured 22-64	11,438,965	911.34	224.02	1559.56
Uninsured all year	23,325,474	176.17	38.46	278.18
Medicare 65+	35,530,062	837.84	326.94	2593.52
Medicare Offset from Moving 1% of Privately Insured to Uninsured		1.5%	1.2%	0.4%
	2006 Population Count	Office-Based	Inpatient Physician	Inpatient Facility
Privately insured 22-65	127,131,055	675.00	160.99	780.95
Publicly insured 22-64	14,313,634	959.55	225.93	1712.53
Uninsured all year	29,629,969	175.56	50.76	193.45
Medicare 65+	37,359,412	1265.05	348.78	2926.33
Medicare Offset from Moving 1% of Privately Insured to Uninsured		1.8%	1.4%	0.9%

Source: Calculations based on data in AHRQ-MEPS-Net for 2001 and 2006.

Figure 1.

Figure 1: Effect of a Reduction in Private Demand for Health Services on Total Quantity Supplied and on Quantity in the Private Market

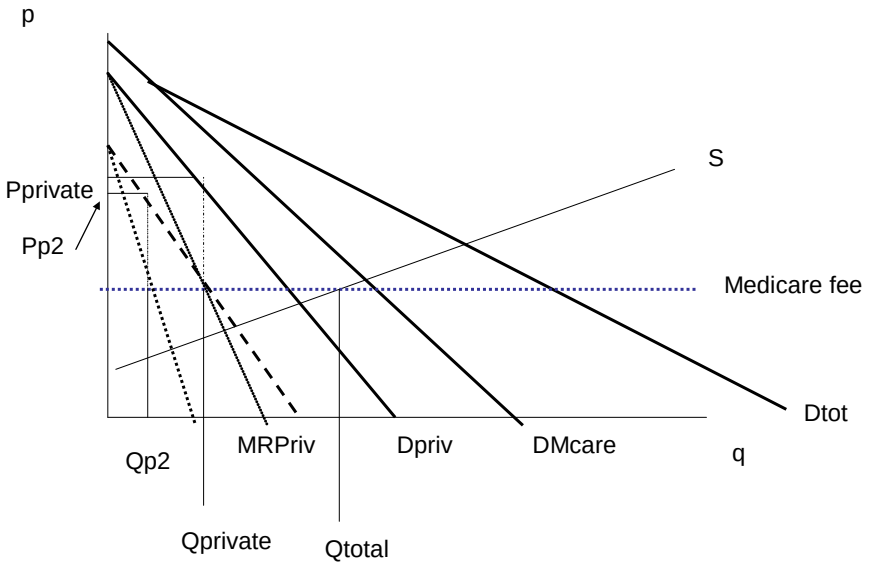
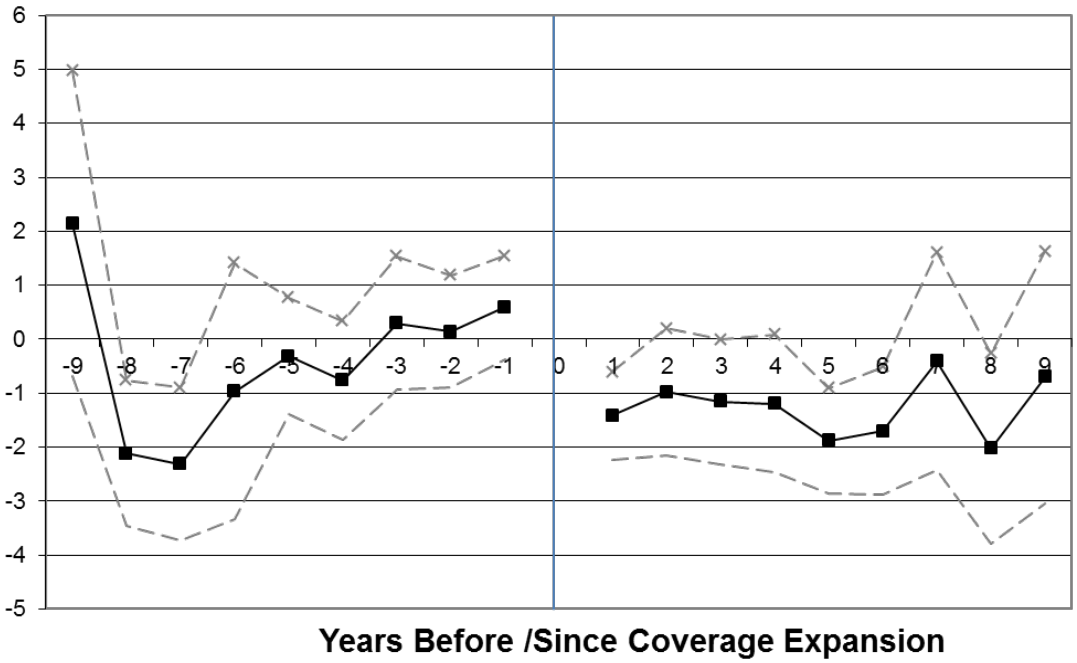
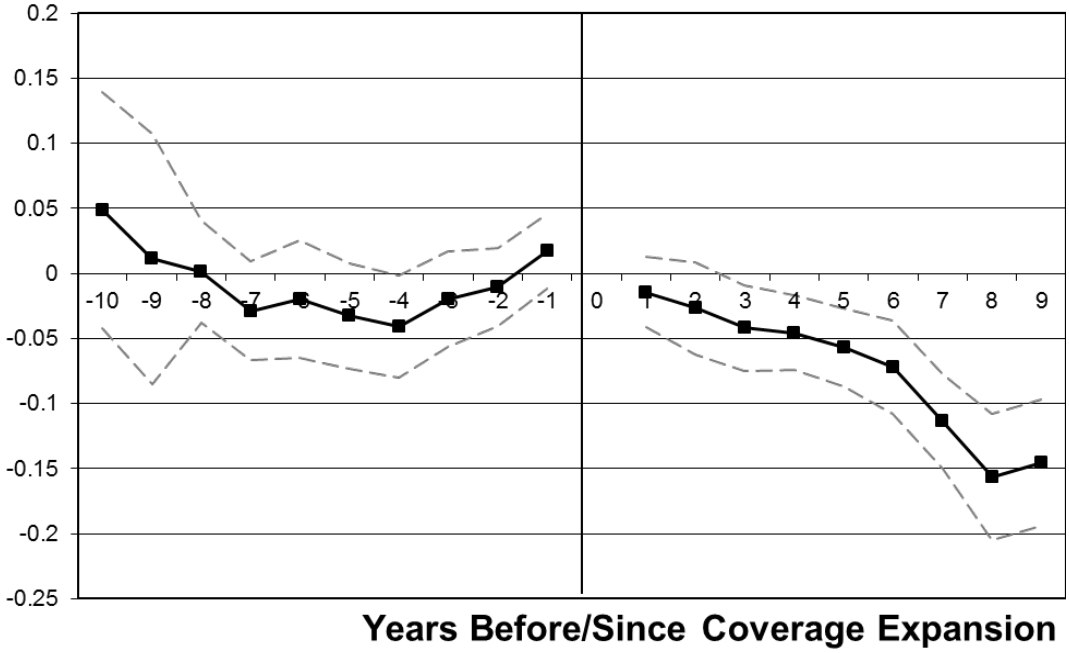


Figure 2. Event Study Analysis: Uninsurance Rates Before and After Coverage Expansion



See Table 1 for specification.

Figure 3. Event Study Analysis: Log Medicare Part B Spending Before and After Coverage Expansion



See Table 1 for specification.

Appendix Table 1: States with Significant Expansions of Coverage to Parents

State	Year	Prior	New
Connecticut	2001	107%	150%
DC	1998	66%	200%
Illinois	2003	83%	192%
Maine	2000	107%	157%
Massachusetts	1997	90%	133%
New York	2001	81%	133%
Rhode Island	1998	86%	192%
Vermont	2001	150%	192%
Wisconsin	2000	74%	192%

Note: New Jersey also expanded coverage significantly, but subsequently scaled back its expansion. (Aizer and Grogger 2003, Ross and Cox 2003, Ross and Cox 2004, Busch and Duchovny 2005, Ross and Cox 2005, Broaddus, Blaney et al. February 2002)

Appendix Table 2: Descriptive Statistics

Variable	State Mean	State Std. Dev.	Community Tracking Survey Mean	Community Tracking Survey Std. Dev.
Observations	612; 510 for hospital discharges; 489 for premiums; 357 for mortality		192; 172 matched to Medicare Part B.	
CHARACTERISTICS OF THE POPULATION 22-64				
Uninsurance rate	0.179	0.455	0.151	0.665
Medicaid rate	0.04	0.02		
Proportion under 35	0.29	0.03	0.21	0.04
Proportion over 54	0.28	0.03	0.23	0.05
Proportion married	0.63	0.06	0.63	0.06
Proportion working full time	0.71	0.031	0.61	0.05
Proportion with < high school	0.1	0.04	0.43	0.08
Proportion high school graduates	0.34	0.05		
Proportion excellent health	0.31	0.04		
Proportion very good health	0.34	0.03		
Proportion good health	0.24	0.03		
Proportion fair health	0.08	0.02		
Proportion Black	0.10	0.11	0.09	0.09
Proportion Hispanic	0.07	0.09	0.1	0.13
Proportion Non-citizen	0.06	0.05		
Proportion 100 - <200% FPL	0.16	0.03	0.17	0.05
Proportion 200 - <300% FPL	0.17	0.02	0.16	0.04
Proportion 300 -<400% FPL	0.15	0.02	0.14	0.04
Proportion 400 - <500%FPL	0.11	0.02	0.11	0.03
Proportion >=500%FPL	0.27	0.06	0.27	0.09
CHARACTERISTICS OF THE POPULATION 65 AND OVER				
Proportion 75 and over	0.46	0.05	0.42	0.08
Proportion married	0.56	0.05	0.55	0.08
Proportion with less than high school	0.28	0.08	0.6	0.11
Proportion high school graduates	0.37	0.06		
Proportion Black	0.08	0.11	0.07	0.08
Proportion Hispanic	0.03	0.06	0.05	0.09
Proportion Non citizen	0.02	0.02		
Proportion100 - <200% FPL	0.3	0.05	0.24	0.07
Proportion200 - <300% FPL	0.2	0.04	0.17	0.06
Proportion300 -<400% FPL	0.12	0.03	0.13	0.06
Proportion400 - <500%FPL	0.07	0.02	0.08	0.04
Proportion>=500%FPL	0.16	0.05	0.18	0.09
Proportion with both Medicaid and Medicare	0.09	0.04		
Proportion with both Medicare and Private	0.62	0.09		
AREA CHARACTERISTICS				
GPCI work	0.99	0.05	0.99	0.02

GPCI practice	0.95	0.1	0.97	0.08
GPCI malpractice	0.82	0.31	0.84	0.32
DEMAND SHIFTERS				
Simulated eligibility (proportion)	0.13	0.1	0.13	0.08
Significant expansion	0.1	0.3		
Share of establishments with 20 or more workers	0.13	0.02	0.13	0.02
Maximum marginal tax rate (%)	42.36	2.83		
OUTCOMES				
Medicare Part B spending ($2006)	2813.93	619.54		
Log Medicare Part B	7.92	0.23	7.99	0.24
Log Part B Diagnostic and Lab	5.82	0.32		
Log Part B Surgical	5.93	0.14		
Log Part B Medical	6.57	0.31		
Log Skilled Nursing Facility	6.17	0.34		
Ambulatory Care Sensitive Discharges per 1000 beneficiaries	75.67	16.74		
Medical discharges per 1000 beneficiaries	233.72	41.32		
Surgical discharges per 1000 beneficiaries	98.76	10.83		
Back surgery discharges per 1000 beneficiaries	3.73	1.29		
Valve replacement discharges per 1000 beneficiaries	1.31	0.23		
Mortality per 1000 beneficiaries	5.22	0.42		
Premium for single employee coverage ($2006)	3388.89	647.01		
Proportion 65+ reporting unnecessary care			0.04	0.03
Proportion 65+ with appt within 7 days			0.17	0.12
Proportion 65+ with excellent satisfaction			0.71	0.08
Physician visits per person 65+			5.02	0.78
Last visit was to a specialist			0.32	0.08
PHYSICIAN PRACTICE CHARACTERISTICS				
% revenue from mgd. Care – primary care MDs			46.91	10.23
% revenue from mgd. Care – primary care specialists			41.58	8.73
Annual hours seeing patients primary care			2106.9	182.61
Annual hours seeing patients, specialists			2170.5	187.52
Annual hours seeing patients, pediatricians			1933.4	275.57
Physician/pop'n ratio – primary care			105.2	25.5
Physician/pop'n ratio – specialists			170.4	52.23
Ln income, primary care ($2006)			11.83	0.11
Ln income, specialists ($2006)			12.25	0.13

Sources: State data are for 1995-2006. All demographic variables are drawn from the Current Population Survey (CPS) Data on geographic practice costs (GPCI) are from the Centers for

Medicare Services https://www.cms.gov/PhysicianFeeSched/ and the Federal Register. The GPCI match to localities changed in 1997. I use the 1997 values for 1995- 1997. Simulated eligibility for Medicaid in a state is constructed by estimating the share of the entire US population 22-64 that would be eligible for Medicaid based on the income eligibility threshold for parents in that state in that year (Currie and Gruber 1996). The income eligibility threshold for parents was obtained from various sources (Aizer and Grogger 2003, Ross and Cox 2003, Ross and Cox 2004, Busch and Duchovny 2005, Ross and Cox 2005, Broaddus, Blaney et al. February 2002). Medicare spending data is as above. Premium data is from the Medical Expenditure Panel Survey Insurance Component 1996-2006 (http://www.meps.ahrq.gov/mepsweb/data_stats/quick_tables.jsp) and is the combined employer and employee premium payment for single coverage.

CTS data are drawn from the Robert Wood Johnson's Community Tracking Household (1996, 1998, 2000, and 2003; http://www.hschange.com/index.cgi?data=02) and the restricted use version of the Physician (1996, 1998, 2000, and 2004; http://www.hschange.com/index.cgi?data=04) Surveys conducted by the Center for Health System Change.