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ABSTRACT

Nursing home expenditures are a rapidly growing share of national health care spending with the government functioning as the dominant payer of services. Public insurance for nursing home care is tightly targeted on income and assets, which imposes a major tax on savings; moreover, low state reimbursement for Medicaid patients has been shown to lower treatment quality, and bed supply constraints may deny access to needy individuals. However, expanding eligibility, increasing Medicaid reimbursement, or allowing more nursing home bed slots has the potential to induce more nursing home use, increasing the social costs of long term care. A problem in evaluating this tradeoff is that we know remarkably little about the effects of government policy on nursing home utilization. We attempt to address this shortcoming using multiple waves of the National Long-Term Care Survey, matched to changing state Medicaid rules for nursing home care. We find consistent evidence of no effect of Medicaid policies on nursing home utilization, suggesting that demand for nursing home care is relatively inelastic. From a policy perspective, this finding indicates that changes in overall Medicaid generosity will not have large effects on utilization.

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The provision of chronic care in nursing homes has become a major component of U.S. health care costs. In 1960, nursing home expenditures constituted roughly 3% of national health expenditures; by the year 2000, the nursing home expenditure share had increased to 7%. As the U.S. population ages, nursing home expenditures could continue to grow in importance over the coming years. Projections suggest that 43% of the population age 65 and older will use a nursing home at some point before they die (Kemper, Spillman et al. 1991). An individual turning age 65 has an expected discounted nursing home cost of roughly $65,000 (in 2005 dollars), a very large expenditure risk for most Americans. Moreover, variation around this average is high, implying that expenditures are relatively concentrated across individuals.

Despite this large risk, private insurance reimburses only about 4% of total nursing home spending.[1] The major form of insurance for nursing home utilization is instead state Medicaid programs, which now pay for roughly half of nursing home expenditures and about 70% of all bed-days. These programs provide reimbursement for nursing home costs for individuals whose income and assets are below certain thresholds. However, there is no coverage available for those who do not meet these means tests, and as a result, roughly one-third of nursing home stays are financed out-of-pocket. State Medicaid programs also set a payment rate for nursing home care, which is significantly below the private market rate in many states. Finally, a majority of states use regulatory policies designed to constrain the growth of the nursing home market and thereby control Medicaid nursing home expenditures.

These public policies raise important tradeoffs for state Medicaid programs. In particular, the means tests under Medicaid pose a large tax on the assets of the elderly, which may raise concerns both on equity and efficiency grounds, because such asset tests have been

[1] See Finkelstein and McGarry (2003) for details on the long term care market and a discussion of theories for low levels of private purchase.

shown both theoretically and empirically to lower private savings.[2] Loosening the means tests could substantially reduce the financial burden on the elderly and induce them to save more. In addition, the rate at which Medicaid reimburses nursing homes has been shown to be a significant determinant of the quality of nursing home care, with higher rates leading to measurably better outcomes for Medicaid patients.[3] Limiting the number of beds available has the potential to ration nursing care among those who would benefit from such care.

At the same time, nursing home expenditures constitute a significant portion of total Medicaid spending, consuming approximately 17% of the program's budget. Medicaid is one of the largest items in most state budgets, and Medicaid spending has increased significantly in recent years. As a result, these costs have put enormous fiscal strain on state governments, which may serve as a further incentive to tighten Medicaid income/asset tests, lower reimbursement for nursing homes, or limit access to nursing homes.

A critical question for evaluating the costs and benefits of expanding or tightening state Medicaid policies is how such changes will affect nursing home utilization. On the demand side, an open question is the elasticity of nursing home utilization with respect to public program generosity. On the one hand, nursing home care represents a significant financial risk and major changes in public policy may affect the ability to afford and use a nursing home. On the other hand, nursing home care may be viewed by individuals as an option of last resort, and as such is not responsive to public policy. On the supply side, it is possible that restricting reimbursement for Medicaid patients or limiting the number of nursing home beds available could decrease

[2] See Hubbard, Skinner and Zeldes (1995) for a model that incorporates such asset tests into a precautionary life-cycle savings model. Empirical evidence on asset tests and savings is provided in Gruber and Yelowitz (1999) and Powers (1998).

[3] An earlier literature claimed the opposite to be true, that higher Medicaid reimbursement led to *lower* quality of care for Medicaid patients, due to excess demand by Medicaid patients and the imposition of common quality of care between Medicaid and private patients. But Grabowski (2001, 2004) shows clearly that higher reimbursement leads to higher quality care for Medicaid patients. Grabowski, Angelelli and Gruber (2005) also show that there is common treatment of Medicaid and private-pay patients within a nursing home.

nursing home utilization, but only if nursing homes are capacity constrained, which may not be true in today's nursing home market.

The purpose of this paper is to assess the impact of Medicaid policy on the utilization of nursing homes, using the substantial variation in that public policy over the past twenty years. In particular, we will look at three different policies: eligibility for Medicaid coverage, Medicaid reimbursement and nursing home capacity. We have collected a new data set of information on these policies for every available state in the U.S. over the 1982 through 1999 period. We then match this policy information to data on nursing home utilization from the National Long Term Care Survey (NLTCS), a large and repeated nationally-representative survey of community-based and institutionalized elders (and their dependents). This is a longitudinal data set with replenishment, which provides a sufficiently large sample to obtain reasonably precise estimates of the impact of public policy on nursing home utilization.

In a preview of our results, we find no evidence of increases in overall nursing home utilization when Medicaid policies become more generous. Specifically, we find that there is little effect of loosening Medicaid income or asset tests, increasing Medicaid nursing home reimbursement, or allowing more nursing home beds in a state on the odds of using a nursing home. Overall, our results are consistent with an inelastic demand for nursing home care, indicating that the large increase in total nursing home expenditures over the past few decades is not predominantly attributable to increased generosity in state Medicaid eligibility. This suggests that meeting policy goals such as increased savings or higher quality for nursing home residents by loosening Medicaid restrictions will not raise the total demand for nursing home use.

The paper is organized as follows: Part I provides background information regarding the Medicaid program rules and prior evidence regarding the effect of Medicaid coverage on the utilization of nursing home care. Part II describes the data and empirical strategy. Part III documents the effect of Medicaid program rules on nursing home utilization. Conclusions are presented in Part IV.

Part I: Background

Eligibility for Medicaid Reimbursement of Nursing Home Costs

Older individuals who demand nursing home services predominantly pay for care in one of four ways. First, if an individual is admitted to the nursing home from the hospital, Medicare (public health insurance for the elderly) will pay for the first 100 days of the stay. Specifically, Medicare offers full coverage on the first 20 days and partial coverage for days 21-100. Second, private long term care insurance purchased at younger ages can be used to cover nursing home expenditures. However, the purchase of such insurance remains relatively rare in the U.S., constituting only 4% of overall nursing home expenditures. Third, individuals can pay for their care out-of-pocket. Finally, individuals who qualify can turn to public insurance through the Medicaid program for their nursing home costs.

To qualify for Medicaid, individuals must technically be eligible for Supplemental Security Income (SSI) or have a level of income and assets that do not exceed the SSI limits. Currently, the SSI income limit for an unmarred individual is $564 and the asset limit is $2,000. However, Medicaid allows states to apply a set of special rules in determining eligibility for nursing home care. This section broadly summarizes these financial eligibility criteria and the reader is referred to a number of recent publications for more detailed descriptions of these rules

(Bruen, Wiener et al. 1999; Schneider, Fennel et al. 1999; Kassner and Shirey 2000; Bruen, Wiener et al. 2003).

The key issue in establishing Medicaid eligibility for nursing home care is that the individual meet both income and asset standards. On the income side, states have adopted two broad set of rules that expand eligibility: "medically needy" programs and special income rules. If an individual's income exceeds the state income test, a number of states have adopted medically needy programs which permit the individual to "spend down" income to qualify for Medicaid. For an individual without a spouse in the community, all income is contributed (minus a small personal needs allowance and other small deductions) and Medicaid pays the remainder of nursing home costs. Other states have enacted special income rules, which allow states to exceed the SSI income limit in determining eligibility provided they do not exceed 300% of SSI.[4]

Individuals in most states must also meet the SSI asset standard to obtain Medicaid coverage. Importantly, an individual's home is excluded in calculating total assets for Medicaid eligibility. The determination of countable assets for Medicaid coverage is quite complex, but in addition to the house, the first $2,000 of household goods or personal effects, a car used to obtain medical treatment and certain burial funds are also excluded from consideration.

Although most individuals who meet SSI income and asset tests are financially eligible for Medicaid, Congress has allowed "209(b)" states to apply more restrictive financial eligibility criteria. The tradeoff is that these eleven states must allow individuals to spend down their

[4] Historically, an individual in a state without a medically needy program who exceeded the income test by even $1 would be ineligible for Medicaid coverage. To address this situation, Congress enacted legislation permitting the establishment of Qualified Income Trusts (formerly known as Miller Trusts), which allow individuals with incomes exceeding the state threshold to place part of that income into a trust to become eligible for Medicaid coverage. The dollars put into this trust can only be used to pay for approved costs (e.g., support of a community-dwelling spouse) with the remainder paid to Medicaid either annually or at the death of the beneficiary.

income to qualify for services by either offering a medically needy program or establishing a similar "209(b) spend down" program.

A final set of features that influence eligibility are the spousal protection rules, which are largely an outgrowth of the Medicare Catastrophic Care Act (MCCA) of 1989. Before this act, when a married individual entered a nursing home, their spouse was allowed to keep only assets in the spouse's name (as of two years before nursing home entry, to avoid asset shifting) plus $2000 of jointly held assets. The MCCA changed these rules by computing the total value of all assets belonging to either spouse at the point of nursing home entry and attributing half of that total value to each spouse. The MCCA then provided that the community-dwelling spouse must be allowed to keep at least $16,392 in assets (in 1999) even if this is more than half the assets, but not more than $81,960. Importantly, some states have set their minimum protection level above $16,392. Thus, unless assets happened to be concentrated in the name of the community-dwelling spouse, this policy change substantially increased the assets available to a couple when one spouse entered a nursing home.

Moral Hazard and Nursing Home Utilization: Conceptual Framework

Elderly individuals in the U.S. who are unable to live independently have a variety of care options other than a nursing home including home health care, assisted living facilities, or informal care from family and friends. The incentives to choose these other options rather than nursing home care relates to many factors including the individual's health, family dynamics and income and wealth. However, the generosity of Medicaid coverage for nursing home care may also explain entry into a nursing home.

In order to generate predictions regarding the effect of state Medicaid policy on nursing home use, it is useful to begin with a standard theoretical model with market clearing in the nursing home sector. Individuals desire nursing home care, but they also value bequests for their children. If individuals enter a nursing home, there is some chance they will spend through their assets and have to rely on Medicaid, greatly reducing their bequest amount.

Loosening the eligibility restrictions for Medicaid payment of nursing home stays in such a model has two effects on nursing home utilization. The first is a mechanical effect: for any given distribution of income and wealth, more individuals will become eligible for Medicaid payment of their nursing home stays. This will increase Medicaid's share of nursing home costs, but will not affect total nursing home utilization. The second is a behavioral effect: allowing individuals to quality for Medicaid while retaining more of their assets for bequests will raise total demand for nursing home care.

Likewise, raising the amount that Medicaid pays for nursing home stays can have two effects. First, higher Medicaid reimbursement will make the marginal Medicaid admit more attractive relative to the marginal private pay admit, raising Medicaid's share of nursing home beds. Second, higher Medicaid reimbursement will make the marginal patient more profitable, so that nursing homes may raise their total number of admitted patients.

Two complications to the standard model make these predictions less clear. First, state certificate-of-need (CON) and construction moratorium regulation have historically been thought to constrain the growth of the nursing home market and create excess demand for beds (Scanlon 1980; Nyman 1989). A CON law constrains the growth of beds by employing a need-based evaluation of all applications for any new bed construction. A home must show a clinically legitimate rationale for additional beds to a state CON board. A construction moratorium is even

more stringent in that it effectively prevents any expansion within the nursing home sector. If these policies are binding, then more generous Medicaid eligibility standards or payment rates will affect the mix of payers (i.e., a greater Medicaid share), but not overall nursing home utilization. Only an increase in the state-controlled supply of beds will lead to greater utilization.

Although the nursing home market has historically operated under this excess demand model, more recent work suggests that occupancy rates have fallen in many nursing home markets and CON and moratoria are no longer binding in most instances (Bishop 1999; Grabowski, Ohsfeldt et al. 2003). It is unclear how close we have moved to a market clearing model in which the behavioral effects discussed above may operate.

The second complication to the standard model involves the elasticity of demand for nursing home care. Nursing homes are the destination of last resort for many individuals, implying that demand is quite inelastic. If this is the case, public policies should have only a limited effect on overall nursing home utilization. If demand is inelastic, increased Medicaid eligibility or more generous payment rates would once again only change the payer mix (i.e., increased Medicaid share), not overall utilization.

Related Work Examining Medicaid Rules and Nursing Home Utilization

A series of studies have examined the effects of Medicaid policies on nursing home utilization, with mixed results.[5] Cutler and Sheiner (1994) exploited cross-state variation in Medicaid policies to examine nursing home entry across the 1982 and 1984 waves of the

[5] There is also research examining the effect of Medicare payment policy on post-acute nursing home use. The structure of the Medicare nursing home benefit requires an increasing copayment over time with full coverage on days 1-20 following an inpatient hospital stay, partial coverage on days 21-100, and no coverage after day 100. Garber and MaCurdy (1993) estimated a discharge hazard function for Medicare residents and found large peaks around day 20 and day 100, implying that post-acute nursing home use is quite price sensitive. However, the significant differences in the post-acute and chronic care nursing home populations makes it difficult to generalize the Medicare results to the chronic care (i.e., Medicaid) side of the market.

NLTCS. They found that the presence of a medically needy program increased the probability of nursing home use by 2.5 percentage points (relative to a mean of 15 percent). They also examined the effect of Medicaid "underpayment" (defined as the private-pay price minus the Medicaid payment rate) on nursing home utilization. A one standard deviation increase in underpayment ($4.60 per day) lowered the probability of nursing home use by 1.7 percentage points. Hoerger and colleagues (1996) combined Medicaid payment and eligibility measures into a single variable measuring the Medicaid "discount" – the difference between the projected revenue a nursing home would receive if the sample person never qualified for Medicaid and the projected revenue taking into account when the sample person would qualify for Medicaid and the corresponding Medicaid payment rate. When Medicaid extracted an additional $10,000 from nursing homes in expected discounts, it reduced the probability of nursing home entry by 0.016 (relative to a mean of 0.10). In terms of other Medicaid policies, an increase in the ratio of nursing home beds in the state per 100 individuals aged 75 and older increased nursing home utilization by 0.016.

Other studies suggest little behavioral effect of Medicaid policy on nursing home use. Using cross-sectional data from the 10-site National Long-Term Care Channeling Demonstration from the early 1980s, Reschovsky (1996) found that both Medicaid income and asset tests were not associated with an increase in nursing home entry. Norton (1995) analyzed the effect of the Medicaid asset limit on spend down using two different cross-sectional samples, the 1989 Panel Survey of Income Dynamics and the 1999 Longitudinal Study of Aging. Because most nursing home stays are short and even most long stays do not result in a transition from private-pay to Medicaid, an increase in the Medicaid asset limit was found to have a minimal effect on the percentage of residents who spent down, and thus, overall Medicaid utilization. The results were

actually suggestive of a Medicaid "stigma" effect. Barring any behavioral effects, the time to spend-down is predictable from an individual's income and wealth. However, the predicted time to spend-down was found to be less than the actual time to spend-down, suggesting that the elderly receive transfers to avoid Medicaid eligibility.

Finally, using the 1989 and 1994 waves of the NLTCS, Norton and Kumar (2000) employed a differences-in-differences approach to examine nursing home utilization before and after the adoption of the MCCA spousal impoverishment rules across single and married individuals. The authors found that there was no increase in nursing home use for married people relative to single people following the MCCA.

In sum, the evidence for Medicaid eligibility criteria having a moral hazard effect on nursing home utilization is mixed. However, there are several limitations of the existing literature worth noting. Most importantly, with the exception of the Norton-Kumar study, all the studies are based on cross-state variation in Medicaid policies, which may lead to biased estimates due to unobserved heterogeneity. For example, states where demand for nursing home use is particularly high may be more or less inclined to have generous Medicaid policies. The one study that is not subject to this criticism is the Norton-Kumar analysis, which compares nursing home utilization before and after the MCCA across single and married individuals. However, this study imposes a different identification assumption that may be problematic: that there are no differential trends in the demand for nursing homes between single and married individuals around the time of the MCCA.

A second limitation is that studies have generally not considered the full menu of Medicaid policies in a common framework, but rather have focused on specific aspects of state Medicaid rules. Finally, several of the older studies do not account for recent changes in the

market for nursing home care such as the decline in the importance of CON laws in many states (Grabowski, Ohsfeldt et al. 2003). Our study addresses these limitations by exploiting within-state variation in a full menu of state Medicaid rules using all five waves of the NLTCS (1982-1999). By using within-state changes, we can include state fixed effects to control for secular differences in demand across states. We can also control for differential trends between married and single elderly as well. Moreover, as discussed below, we can implement alternative strategies that let us further consider the possible endogeneity of state Medicaid policy.

Part II: Data and Methods

Our source of nursing home utilization data is the National Long-Term Care Survey (NLTCS). The NLTCS is a longitudinal sample with replacement of all Medicare-eligible individuals. We use all five waves of the NLTCS: 1982, 1984, 1989, 1994 and 1999. In 1982, the NLTCS sampled only community-dwelling individuals, but in subsequent waves, both community-dwelling and institutionalized individuals were entered into the sample.

We model nursing home utilization based on whether an individual was in a nursing home at the time of the NLTCS survey. Because the 1982 wave sampled only community-dwelling elderly, this wave is excluded from this approach. In order to avoid short stays in nursing homes that are paid for by Medicare, and are therefore not affected by Medicaid incentives, we drop Medicare-financed nursing home stays from the file.[6]

[6] Some long term care may be delivered in facilities that are not certified for Medicaid reimbursement. Unfortunately, the NLTCS only breaks out the type of facility in two of our four waves, so we cannot restrict the sample to those facilities. But tabulations for those years show that 83% of stays are in facilities that we know are certified, and only 10% are in facilities that we know are not certified, with 7% uncertain. So this is unlikely to significantly affect our analysis.

In addition to nursing home use, the NLTCS contains extensive data on the sample person's demographics, health and wealth. Summary statistics for all the variables are contained in Table 1.

INSERT TABLE 1 HERE

A critical input into this effort is data over a long span of time on Medicaid policies towards nursing homes. Although there have been efforts to summarize state Medicaid policy for a given point in time (Bruen, Wiener et al. 1999; Schneider, Fennel et al. 1999; Kassner and Shirey 2000; Bruen, Wiener et al. 2003), we are not aware of a published source summarizing these policies over time. Thus, after compiling as much information as possible from the cross-sectional efforts, we conducted our own survey of state Medicaid officials regarding eligibility policy for nursing home care for the period 1982-1999. Based on this survey, we construct a range of state Medicaid policies that may affect nursing home utilization. We assign these rules to individuals in the NLTCS by state, year and marital status.

We analyzed six policies in particular. First, as noted in the previous section, a number of states have spend-down provisions through either medically needy programs or 209(b) status. Thus, we included a dummy for "spend-down" in our models. Between 1982 and 1999, Georgia (1990), Louisiana (1993), New Jersey (1995), Oregon (1986), Rhode Island (1986) and Tennessee (1989) all adopted spend-down rules with Oregon (1991) eventually repealing these provisions. These changes allow us to identify the effect of introducing a spend-down provision on utilization, while conditioning on state differences in tastes for nursing home care through state fixed effects.

Second, the actual income standard used to qualify for Medicaid may also be important in those states without spend-down provisions. Based on our conversations with state officials, the

income standard is not an important barrier towards determining eligibility in states with spend-down provisions, because the high cost of nursing home care (that is effectively added on to the state income test level) swamps the income test in importance. Thus, we set the income standard equal to zero in those states with spend-down provisions.

Third, in addition to the income test, we also included the asset test used to qualify for services. Over the period 1982 through 1999, 35 states set their asset standard directly from the SSI asset limit: a limit for unmarried individuals of $1,500 in 1982 (in nominal terms), a series of $100 increases beginning in the mid-1980s, and the establishment of today's limit of $2000 in 1990. Other states were slightly above or below this limit.

Fourth, one important policy innovation over our period of study was the adoption of the spousal impoverishment rules under the MCCA. States generally set their standard at (or near) the Federal minimum or maximum values. In 1990, 17 states approached the Federal maximum level, and by 1995, this had increased to 20 states with Colorado, Maine and Massachusetts all substantially increasing their asset limit.

Fifth, we include a measure of the real Medicaid payment rate per day of nursing home care. Finally, we control for supply side restrictions on nursing home care. We do so in two ways. First, we include a dummy variable measuring whether a state had either a CON or a moratorium in place for a given state-year. At the beginning of our study period, every state had a CON law in place. Over our period of study, ten states repealed their CON law without instituting a moratorium. The disadvantage of this measure is that it is a relative crude indicator of the overall tightness of state policy towards nursing home capacity. Thus, we also include a common measure from other studies, the number of beds per elderly individuals (age 65+) in the state. On the other hand, this measure has the clear potential to be endogenous to demand for

nursing home care, so we present results both including and excluding this measure. Data on the Medicaid payment rate and the supply constraints were obtained from multiple editions of the *State Data Book on Long-Term Care Program and Market Characteristics* (Harrington, Swan et al. 1999) and unpublished data from Harrington and colleagues. The population data were obtained from the U.S. Bureau of the Census.

The basic model specification is as follows:

$$NH_{ijt} = \alpha + \beta POLICY_{jt} + \gamma X_{ijt} + \nu_i + (\lambda_t \times \nu_i) + \eta_j + \lambda_t + \varepsilon_{ijt} \qquad (1)$$

where i indexes individuals, j states, and t years, NH is a dummy for nursing home use, POLICY is a vector of the policy variables described above, X is a set of individual characteristics, and ν_i, η_j and λ_t are marriage, state and year dummies. An interaction of marriage and year ($\lambda_t \times \nu_i$) is also included. Thus, the model is identified by within-state variation in policies over time. X includes age, gender, marital status, race/ethnicity, and the number of children. In addition to these clearly exogenous indicators, we also include measures of health and income. For health, we control for the number of activities of daily living (bathing, dressing, eating, toileting, transferring out of bed, and walking) for which the individual requires assistance; for income, we include the following dummies for an individual's annual income: less than $15,000, $15,000 to $29,999, $30,000 to $49,999, $50,000 or greater, and income missing.[7] The health and income measures are potentially endogenous to nursing home utilization, but are also very important correlates of nursing home use, and their inclusion significantly increases the precision of our policy estimates. In order to assess the potential bias from the endogeneity of these measures, we also present models that exclude them.

[7] In constructing the income dummies, the NLTCS collected slightly different income data for the institutionalized elderly. For these individuals, the low category cutoff is $14,400 rather than $15,000 and the high category cutoff is $48,000 rather than $50,000.

All models are adjusted using the NLTCS weights. One concern with the approaches discussed above is autocorrelation in outcomes and policies. To address this concern, we correct the standard errors for autocorrelation within states.

Part III: Results

Basic Results

The first set of results is based on a standard two-way fixed effects specification, which exploit within-state variation in policies over time (see Table 2). These models are estimated as probits, but the coefficients are presented as marginal probability effects.

INSERT TABLE 2 HERE

The first column of Table 2 presents the coefficients of interest from a regression specification that includes all of the controls described above. The coefficients of all of the policy variables in this specification are statistically insignificant, and are typically even wrong-signed. That is, we find no statistical evidence here that any changes in Medicaid generosity within states affect the rate of nursing home utilization

The estimated effects are substantively insignificant as well, and given the small standard errors we can rule out meaningful effects of Medicaid policy. For example, the estimated coefficient on the availability of a spend-down program indicates that such a program *lowers* nursing home utilization by 0.01 percentage points, with a standard error of 0.07 percentage points. The resulting confidence interval implies that we can rule out an effect of introducing a spend-down program of more than 0.13 percentage points. This is less than 3% of the baseline nursing home utilization rate of 4.6 percentage points. So we can rule out any substantive effects of introducing a spend-down program on utilization rates.

The coefficient on the level of the income limits, which applies to the non-spend-down states, indicates that a $1,000 increase in income limits *lowers* nursing home use by 0.005 percentage points. The confidence interval on this estimate is also sufficiently small such that we can rule out an estimated effect of doubling the mean income limit ($619/month) of more than 0.03 percentage points, or only 0.66% of baseline utilization rates. The estimates on asset limits, both own and spousal, are likewise trivially small and tightly estimated.

On the supply side, we also get a substantively small effect of reimbursement rates on utilization. The coefficient suggests that raising reimbursement rates by $100/day lowers utilization by 0.02 percentage points. At the mean daily reimbursement rate of $84, the confidence interval implies that we can rule out a utilization effect of doubling the daily reimbursement rate of more than 0.27 percentage points, or 6% of baseline utilization rates. The estimated effect on CON/moratoria is the expected sign but insignificant, implying that such a policy lowers the odds of utilization by 0.07 percentage points, or 1.5% of baseline (with an upper bound of the confidence interval of 0.19 percentage points, or 4.1% of baseline). Finally, our coefficient estimates suggests that increasing supply by one additional nursing home bed per 100 elderly increases utilization by 0.6 percentage points, which amounts to slightly more than 10% of baseline, but it is also insignificant.

Thus, this model suggests only very modest impacts of increased policy generosity on nursing home utilization. Perhaps more importantly, our estimates are sufficiently precise to rule out any likelihood of large effects of Medicaid policies.[8]

[8] Another prediction of the theoretical model discussed earlier was that more generous Medicaid policy would lead to a shift in payer mix towards Medicaid. We have estimated models among nursing home residents where the dependent variable is Medicaid status, but the results were imprecise and could not rule out zero or large effects on payer mix.

Sensitivity to Specification

In estimating the model shown in the first column of Table 2, we included two types of potentially endogenous variables. The first is measures of income and health. Income may be endogenous to Medicaid policy through spend-down behavior, while (reported) health may be endogenous through "justification effects": individuals whose nursing home behavior changes in response to Medicaid policy changes may justify this by changing their reported health status. Thus, in column (2) of Table 2, we show the effects of excluding the income and health measures.

Excluding these measures has no effect on our basic conclusions: all of the policy variables remain insignificant, and often wrong-signed. But there is a dramatic effect on the confidence intervals, as the standard errors rise by a factor of 5-10 when these variables are excluded. This reflects the critical role that the health variables in particular play in explaining nursing home utilization; indeed, the partial R-squared associated with the health variables is 0.32. Thus, potential concerns about endogeneity do not seem sufficient to overcome the loss of precision when the measures are excluded.

In column (3) of Table 2, we address another potential endogeneity concern by excluding the beds per elderly measure from the regression. This has little effect on the results.

Robustness to Alternative Measure

Because our rejection of moral hazard effects is so strong, we want to ensure that it does not result from the particular construction of our data. In this subsection, therefore, we consider an alternative measure of nursing home utilization: transition rates. That is, we turn to modeling not the cross-sectional probability of being in a nursing home, but of the probability of

transitioning from the community into the home, paralleling work by Cutler and Sheiner (1994) and others.

The result of using this alternative approach is shown in the fourth column of Table 2. The results are very similar to those shown in the first column: little evidence of an effect of any policy, although there is a significant effect of the number of beds per elderly. Once again, the standard errors are very small, so that confidence intervals are tight. Thus, even using this alternative transition-based measure, there is no evidence that Medicaid policy changes affect nursing home utilization.

State-Specific Trends

The working assumption of the analysis thus far has been that changes in state Medicaid policy are exogenous with respect to changing demand for nursing home care. Although this seems a plausible assumption, we can assess its robustness in two ways. The first is to include in the model state-specific linear time trends. These trends allow for a slowly evolving change in tastes for nursing home care across states. By including them in the model, we control for the possibility that states where there is generally growing/shrinking demand for nursing home care are the ones where policies are changed to facilitate or mitigate nursing home utilization

The fifth column of Table 2 shows the results of including these trends. In fact, we find that including these trends has relatively little effect on any of the estimated policy coefficients, although the estimates become more imprecise. The one particularly notable effect is that the coefficient on beds per elderly becomes insignificant, although this arises from an increase in the standard error, not a change in the coefficient estimate.

DDD Analysis of Spousal Asset Test Change

A second means of dealing with the potential endogeneity of state Medicaid policy is to evaluate a policy "experiment" which allows us to form treatment and control groups within each state: the change in the spousal asset test under the MCCA. As noted above, the community spousal asset protection rules were adopted under the MCCA in 1990. When a married individual enters a nursing home, the couple's total (non-excludable) assets are combined and half is attributed to each spouse. The community-dwelling spouse must be allowed to keep at least the federal minimum ($16,392 in 1999), even if this amount is greater than half the couple's total assets. The community spouse may not keep more than the federal maximum ($81,960 in 1999). A key policy distinction is that certain states set their minimum level of protection above the federal minimum, typically at the federal maximum level. Thus, these "high" asset states are more generous in that they permit the community-dwelling spouse to keep the first $81,960 in assets.

This policy change therefore sets up a richer evaluation framework that allows us to control for potential taste shocks to states that might drive Medicaid policy. In particular, we can implement a "differences-in-differences-in-differences" framework where we compare the nursing home utilization of married vs. single elderly, before vs. after the MCCA, in states with high vs. low spousal asset limits. By comparing married vs. single elderly within the same state, we can control for time-varying state effects to capture shifts in state-level demand for nursing homes. And by comparing high vs. low asset limit states, we can control for differential trends in demand for nursing home care by married and single elderly.

This second specification takes the following basic form:

$$NH_{ijt} = \alpha + \gamma X_{ijt} + \beta(HIGH_{jt} \times \nu_i) + \eta_j + \lambda_t + \nu_i + (\eta_j \times \nu_i) + (\lambda_t \times \nu_i) + (\eta_j \times \lambda_t) + \varepsilon_{ijt}. \qquad (2)$$

The term, v_i, represents fixed effects for marriage. This unrestrictive model includes a full set of interactions between the marriage, year and state fixed-effects. Identification in this "differences-in-differences-in-differences" (DDD) framework relies effectively on comparing the change in the gap between married and unmarried nursing home use in states that did and did not adopt a high asset limit. The interactions between the high asset limit, $HIGH_{jt}$, and the marriage fixed effects, v_i, are set to zero for the unmarried individuals for whom these laws were presumably irrelevant. Thus, contemporaneous nursing home utilization among unmarried individuals serves as a control for state-year unobserved factors. Because these models include interactions of state and year fixed effects (that is, $\eta_s \times \lambda_t$), the other policy variables are omitted.

A key assumption of this DDD approach is that the policy change did not affect nursing home utilization among unmarried individuals. A concern with this assumption is that the spousal impoverishment rules may have dynamic implications for the nursing home utilization of recent widows (and widowers). Specifically, states with more generous spousal impoverishment rules will result in wealthier widows, which may ultimately impact the widow's nursing home use.[9] Thus, we also experiment with an alternative DDD specification that excludes all previously married individuals and compares married individuals with only the never married.

The results of this analysis are shown in Table 3. The models are once again estimated as probits, but the coefficients are presented as marginal probability effects.[10] The first column of Table 3 indicates that the adoption of high asset rules under the MCCA led to a 0.03 percentage point increase in nursing home utilization among married individuals in high asset states, with a

[9] Unfortunately, we are not able to identify the timing of the death of a spouse or a divorce within the NLTCS.
[10] One practical problem with the probit version of this DDD model is that it has poor convergence properties when saturated with a full set of interactions between the state, year and marriage fixed effects. The estimates we present in Table 3, Model 2 were generated by limiting the number of model iterations to 30.

standard error of 0.10 percentage points. Thus, the upper bound of the confidence interval is approximately 16% of the baseline utilization rate for married individuals.

INSERT TABLE 3 HERE

Once again, a concern with including recently widowed and divorced individuals in the "unmarried" group is that the MCCA may have increased assets for these individuals, which may have affected nursing home utilization among these individuals. In an effort to address this issue, we re-estimated the DDD regression model using only the never married group in the comparison group (see column 2). In this alternative specification, we do not obtain results suggestive of increased nursing home utilization for married women in high asset states. The coefficient estimates are negative and statistically insignificant, with the upper bound of the confidence interval indicating that we can rule out an effect of more than 0.02, which is less than 2% of baseline.

Part IV: Conclusions

The optimal policy for long term care expenditures under Medicaid is a critical issue facing state governments in the 21st century. Long term care expenditures have been growing explosively, putting enormous pressure on state budgets. At the same time, tight asset limits threaten to weaken asset accumulation in the U.S. and leave many without access to public coverage of this enormous expense, and reduced reimbursement for nursing homes threatens the quality of care delivered in those homes. The appropriate resolution of this tension is a central issue for public health policy.

One important input into this resolution is an understanding of the elasticity of demand for nursing home care: does more generous Medicaid policy towards nursing homes lead to more

nursing home utilization? We have addressed this question through a careful empirical framework which incorporates the range of public policies towards nursing homes and addresses the potential endogeneity of state Medicaid policies. Doing so, we find consistent and clear evidence that nursing home utilization is inelastic with respect to state policies. Thus, the large increase in nursing home expenditures over the past few decades is not likely attributable to increased generosity in state Medicaid payment programs.

Table 1: Summary Statistics (using sample weights)

	Mean	Standard Deviation
Nursing Home Use	0.046	0.210
Medicaid Nursing Home Use	0.022	0.148
Spend-down provision	0.66	0.47
Income test	619	1,026
Asset test	3,234	1,323
Spousal Asset test	12,928	26,372
Medicaid payment rate	84.13	25.79
Beds per 100 elderly	5.33	1.55
Certificate-of-need/Moratorium	0.90	0.30
Age	74.49	7.44
Female	0.59	0.49
White	0.88	0.32
Black	0.09	0.28
Other race	0.02	0.13
Married	0.53	0.50
Number of children	2.52	2.17
Income: Less than $15,000	0.40	0.49
Income: $15,000-$29,999	0.22	0.41
Income: $30,000-$49,999	0.09	0.28
Income: $50,000	0.05	0.22
Income: missing	0.25	0.43
Activities of daily living score	0.55	1.44
Hospitalized in last year	0.21	0.41
N	25,697	

Notes: Data include the 1984, 1989, 1994 and 1999 National Long-Term Care Survey waves.

Table 2: Effects of Medicaid Policies: Basic Specification

Variable	Model 1	Model 2	Model 3	Model 4	Model 5
Spend-down provision	-0.0001	0.0024	-0.00001	0.0008	-0.0003
	(0.0007)	(0.0040)	(0.0007)	(0.0005)	(0.0010)
Income test ($10,000s)	-0.0005	0.0160	-0.0005	0.0025	-0.0008
	(0.0029)	(0.0123)	(0.0029)	(0.0023)	(0.0030)
Asset test ($10,000s)	-0.0014	-0.0124	-0.0009	-0.0003	0.0008
	(0.0012)	(0.0099)	(0.0011)	(0.0016)	(0.0010)
Spousal asset test	-0.00003	0.0003	-0.0001	-0.0007	0.0007
($100,000s)	(0.0012)	(0.0049)	(0.0012)	(0.0013)	(0.0011)
Medicaid payment rate	-0.0002	-0.0082	-0.0001	0.0009	-0.0005
($100s)	(0.0017)	(0.0143)	(0.0018)	(0.0018)	(0.0026)
CON or Moratorium	-0.0007	-0.0062	-0.0006	-0.0008	-0.0015
	(0.0006)	(0.0026)	(0.0007)	(0.0009)	(0.0012)
Beds per 100 elderly	0.0006	0.0036	---	0.0007	0.0006
	(0.0003)	(0.0020)		(0.0003)	(0.0008)
Includes health/income	Y		Y	Y	Y
State-specific time trends					Y
Nursing Home Outcome	Use	Use	Use	Entry	Use
N	23,630	24,079	23,630	11,984	23,630

Notes: All models adjust for age, gender, marital status, race/ethnicity, and the number of children and include state, year and year*marriage fixed effects. Estimates are generated with a probit model and marginal effects are presented with standard errors in parentheses.

Table 3: Effect of Spousal Asset Test on Nursing Home Use: Differences-in-differences-in-differences regression estimates

Variable	Model 1	Model 2
High Asset × Marriage	0.0003	-0.0002
	(0.0010)	(0.0475)
N	24,159	10,164
Cohorts included:		
Married	X	X
Never Married	X	X
Divorced/Widowed	X	

Notes: All models adjust for age, gender, marital status, race/ethnicity, the number of children, health, and income and include state, year, marriage, year*marriage, year*state and state*marriage fixed effects. Estimates are generated with a probit model and marginal effects are presented with standard errors in parentheses.

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