National Poverty Center Working Paper Series

#05-21

October 2005

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Abstract

Given increasing evidence that medical care cannot fully explain variation in population health and increasing research on the relationship between socioeconomic factors and health, might non-health policies affect health? This research examines whether Supplemental Security Income (SSI) affects disability among the elderly. We use the 1990 and 2000 censuses, employing state and year fixed effect models, to test whether within state changes in maximum SSI benefits over time, which are plausibly exogenous to health, lead to changes in disability. The findings from this study support the hypothesis that both within-state changes in the maximum state SSI benefit and changes in SSI income received by individuals lead to changes in disability among single elderly individuals. Higher SSI benefits are linked to lower disability rates.

Key Words: Disability, Supplemental Security Income, Income Support Policy

This research was supported by the National Poverty Center at the University of Michigan, the Robert Wood Johnson Foundation, and the Anne E. Casey Foundation.

I. INTRODUCTION

This research examines whether Supplemental Security Income (SSI) affects disability among the elderly. Two underlying issues reinforce its importance. First, there is increasing evidence that medical care accounts for only a limited portion of the variance in population health (McGinnis, Williams-Russo, and Knickman 2002). Reflecting this pattern, the U.S. spends far more on health care and biomedical research than any other nation; yet the U.S. lags behind most other wealthy nations in life expectancy and infant mortality (United Nations Development Programme 2004). The disparate pattern suggests that "nonhealth" factors - i.e., social and economic determinants - and related policies deserve heightened attention, alongside biomedical factors, in determining individual and population health.

Second, an increasing body of research has documented a strong and consistent association between income and health (Case 2004; Case, Paxson, and Lubotsky 2002; Haan, Kaplan, and Camacho 1987; House et al. 1994; Duncan 1994; McDonough, Duncan, Williams, and House 1997). Most researchers conclude that income is likely a determinant of health and health is likely a determinant of income, but the strength of the relationship in either direction is contested (Smith, 1999; Adams et al, 2003; Adda, Chandola, and Marmot, 2003). Sociological, psychological, and biomedical scientists generally conclude that the bulk of the flow is from income to health, at least in terms of longer-term and more consequential (e.g., mortality, serious morbidity) physical health outcomes,. Economists and policy researchers are more inclined to emphasize the shorter-term impacts of health on labor market activity and income. Exploring the

relationship between income transfer programs and health may help better clarify the relationship between income and health. Changes in income transfer policies can represent an exogenous shock, or natural experiment, thus providing an alternative way to address the causal direction of the relationship between income and health.

Thus, this study examines whether SSI benefits for the elderly affect disability prevalence. Analyzing the effects of SSI benefits is useful for substantive and methodological reasons. Past research has consistently found a non-linear relationship between income and health; the relationship is strongest for those at the bottom of the income distribution (Backlund et al. 1996; McDonough et al. 1997; Wolfson et al. 1993). Thus, it makes the most sense to examine policies focused on this population, such as SSI, which provides a minimum income guarantee for the poorest elderly Americans. Second, SSI maximum allowable benefits vary significantly not only between states at a given time, but also within states over time. This variation in policy can plausibly be assumed to be exogenous to the health of the elderly, thus allowing us to test the impact on disability of changing benefit levels within states over time. Using the 1990 and 2000 censuses, we exploit within state variation in SSI benefits over time to see if they affect within state changes in disability among the elderly. We begin, however, by reviewing the limited empirical research that has examined the impact of income support policies and programs on health.

II. LITERATURE REVIEW

There have been some limited analyses of whether income support policies affect health with much recent work having been done in the developing world. These latter studies have generally shown positive health impacts of income supports on very poor

individuals (Case 2004; Gertler 2000). The few studies that have been done in the developed world, which we will detail below, have focused on U.S. social policies and also have indicated positive though not unequivocal impacts of income support policies on health.

Several studies have focused on how income subsidies for low income individuals affect birth weight. The first came out of the negative income tax experiments in the early 1970s, which were developed to examine the effects of the then proposed Nixon Family Assistance Plan. The Gary Income Maintenance Experiment was used to study how low birth weight rates were affected by the improvements in income (Kehrer and Wolin 1979). Participants were largely African American with a high concentration of female-headed households. Of the 1799 participating families, 1028 received supplements and 771 were controls. Data was collected on 104 infants born to participants between 1970 and 1974. The guarantee levels were equal to the poverty line, but medical expenses were subtracted from family earnings before applying the payment formula. Women in the experimental group who had health characteristics that put them at a high risk for having a low birth weight baby experienced a significant reduction in low birth weight births. These experiments, however, have been criticized for design and methodological problems, which called into question the validity of the findings associated with them (Moffitt 2004).

Currie and Cole (1993) looked at the effect of Aid to Families with Dependent Children (AFDC) on birth weight in a non-experimental design using instrumental variable techniques. They found a positive and significant effect (though impossible to precisely estimate) of participation in AFDC on birth weight for poor white mothers and

a positive and insignificant effect for black mothers. However, when looking at sibling comparisons to control for unobserved variable bias, these effects dissipated.

At the other end of the life course, a study by Taubman and Sickles (1983) examined the effect of Supplemental Security Income (SSI) on the health of elderly beneficiaries. SSI is a means tested income supplement program for the elderly, blind and disabled that was implemented in 1974. The authors used the Retirement History Survey to examine how the health of elder recipients changed after they started receiving SSI. They found that SSI had a positive impact on the health of elderly beneficiaries. The health of individuals eligible for SSI previous to implementation was statistically significantly worse than the health of those not eligible. In both 1975 and 1977 the difference in heath was no longer significantly different between these two groups.

To our knowledge, only one study has reported negative health impacts of an income support policy. Snyder and Evan (2002) used a quasi experimental design to examine the impact of varying Social Security benefits on mortality. Errant Social Security legislation led to a "notch," with individuals with the exact same work histories born just before January 1, 1917 receiving higher Social Security benefits in old age than those born just after this date. Thus, the study compared mortality rates between those born in the last 3 months of 1916 (the experimental group) and those born in the first 3 months of 1917 (the control group). The experimental group, who had Social Security benefits that were about 7 percent higher than the control group, despite similar working histories, also had higher mortality rates after age 65 than the control group. The authors concluded that the control group that had lower benefits had to work more, which lead to more social interaction and thus lower mortality.

While the use of the notch to help identify the effects of Social Security on health is novel, some features of this approach should be kept in mind. Most importantly, the study in essence looked at how minimally to modestly higher Social Security benefits affected the health of wealthier and healthier individuals. Previous research, however, has shown that the relationship between income and health is predominantly present at the bottom, as opposed to the top, of the income distribution. A notch beneficiary retiring at age 62 without a high school degree had just a 1% higher benefit or a $5 higher monthly benefit. Further, healthier beneficiaries received larger benefit increases because those retiring at age 65 received larger benefit increases than those retiring at age 62, who tend to be much sicker than later retirees (Haveman et al. 2003). Those who retired around age 62 had a very limited benefit increase, $7 a month, whereas those retiring at 65 had an average $110 increase. Consequently, this study largely measured the effect of increases for those who are wealthier and healthier on average. Our study, on the other hand, focuses specifically on the effects of income transfers to poorer individuals.[1]

Income Supports in Old Age

While these previous studies provide some intriguing findings, more research is clearly needed on whether income supports affect health. And old age policy provides a promising avenue for research. One reason is because income supports are so substantial in old age, especially in comparison to income supports early in the life course. Social

[1] Another issue is that those born just after 1917, who benefited from the notch and had higher mortality rates, had somewhat higher levels of disability rates in their 50s than did those born just before 1917. Though not significantly higher (the t value was 1.42), it was high relative to the difference in disability status between those born just before and just after the new year in 1915, 1916, 1918 and 1919 (t values between .2 to .65). Disability is a quite restricted measure of health. A health measure that captured more variation in health could have revealed statistically significant differences between the control and experimental group in their 50s. Thus, the higher mortality rates of the "notch" group may have had little or nothing to do with the Social Security benefits, rather reflecting their being sicker previous to retirement for some reason.

Security, of course, is the most extensive income support program in the United Sates, and it has substantially both increased income levels and reduced poverty levels among the elderly (Englehardt and Gruber 2004). Moreover, the U.S.'s only minimum income guarantee, Supplemental Security Income (SSI), is also only available to the elderly. Although some younger individuals are eligible for SSI, unlike the elderly they must also qualify based on disability. Another reason that old-age policies provide a promising avenue for research is because health events are concentrated among older people. It is difficult to capture significant levels of variation in health among younger individuals, especially using survey measures of health. Yet, beyond the work of Taubman and colleagues in the 1970s and Snyder and Evan in 2002, there has been no direct effort to evaluate the impact of old age income supports on health. Thus, old age income support policies are an obvious place to begin to evaluate the impacts on health of income support policy.

III. EVIDENCE FROM THE SUPPLEMENTAL SECURITY INCOME PROGRAM

Created in 1972 to provide a minimum income guarantee for the elderly, SSI is targeted at the poorest elderly Americans. At that time, minimum income guarantees varied greatly at the state level. Congress stepped in and established a federal minimum income guarantee, set at about three-quarters of the poverty line. In 2000, the federal monthly income guarantee for the elderly under SSI was $512 for single individuals and $769 for married couples. Overall, about 6 percent of the elderly receive SSI benefits.

However, states can supplement the federal minimum benefit, and 26 states do so. Thus, SSI maximum benefits vary between states and within states over time. The

variation within states over time, which is the focus of this study, is plausibly exogenous with respect to individual disability. This exogenous variation allows us to test the impact on disability of changing benefit levels within states over time.

But how large is the variation within states over time? Table 1 helps illustrate the magnitude of benefit change over the time period examined in this study, 1990 to 2000. The first two columns in table 1 show the federal minimum and state monthly benefit levels, in 2000 dollars, for single individuals in 1990 and 2000. In total, in 1990 and 2000, 26 and 25 states, respectively, provided a supplement to the federal benefit ranging from just a few dollars to $482 (Connecticut in 1990). States not included in this table had SSI monthly maximum benefit levels set at the federal minimum in 1990 and 2000. The benefit levels in almost all states were well below the poverty threshold in 2000, which was $688 a month or $8,259 annually.

The third column shows the overall percentage change in benefits between 1990 and 2000. While many of the percentage changes in benefits appear small, this measure obfuscates what are actually meaningful differences in income for very poor older Americans. Thus, column 4 shows the annual difference in benefits in dollar terms and column 5 shows the maximum annual benefit in 2000. For example, in Michigan, the benefit change was a 3.9 percent reduction between 1990 and 2000, which seems small. But that totaled $258 when the maximum annual income for an individual in Michigan in 2000 was just $6312. Given that studies of income and health show that small differences in income at the bottom end of the income distribution are correlated with large differences in health, it is reasonable to assume that the differences in income displayed in Table 1 could lead to changes in disability. Of course, there are also some

states with inarguably large changes in benefits between 1990 and 2000. Connecticut's benefit between 1990 and 2000 dropped by 25 percent and California's dropped by 17 percent.

Finally, the size of benefit change in this study is comparable to other studies. Snyder and Evans' (2002) study of Social Security's 'notch' analyzed benefits that were an average 7 percent different between the experiment and control group (Snyder and Evans 2002); the average change in SSI maximum benefits for single individuals between 1990 and 2000 was a 2.5 percent decline. Moreover, benefit changes due to the 'notch' likely translated into much smaller percentage changes in overall income than the changes in SSI benefits analyzed in this study. For an average earner, if Social Security comprised 40 percent of his/her income, the notch would increase overall income by 2.7 percent. Contrastingly, for SSI recipients, the percentage change in maximum SSI benefit translates into a percentage change in overall income. By definition, the annual income for SSI recipients is the maximum SSI benefit.

Overview of the Analysis

We utilize change in state variation in SSI benefit policy between 1990 and 2000 to examine the effect of the SSI program on disability among elderly Americans. Numerous studies have exploited state variation in SSI benefits to examine its effects on trends in retirement, savings, and living arrangements among the elderly (Costa 1999; McGarry and Schoeni 2000; Neumark and Powers 1998; 2003; 2003). We extend these analyses to look at disability.

These analyses focus on two separate questions. First, do increases in maximum state SSI benefits affect disability among the elderly? To answer this question we use

census data with state and year fixed effect models to examine whether increases in the state maximum SSI benefit between 1990 and 2000 lead to changes in disability. The substantive rationale for using the maximum state SSI benefit is because it allows us to directly answer whether an income support policy affects disability, which from the perspective of a policy analyst is a critical question. The methodological rationale for employing the maximum state benefit is due to concerns of endogeneity. Using the SSI benefit actually received by an individual, or even the average benefits for a state, would produce endogeneity problems because SSI benefits are inversely related to labor force participation and earnings, which are correlated with health. The change in state maximum benefits is plausibly independent of the change in the health of the elderly, reflecting more general variation in states' ability or willingness to supplement above the federal minimum, which is our maintained hypothesis.

The second research question pushes the analysis one step further; do increases in individual SSI income per se affect disability among the elderly? Using census data in 1990 and 2000, we employ instrumental variable techniques, where the state maximum SSI benefit is an instrument for individual SSI income. This analysis will test whether increases in individual SSI income affect disability. Again, like the series of prior studies that have examined the causal effects of SSI on retirement, savings, and living arrangements, the maintained assumption is that changes in SSI maximum state benefits are exogenous to the dependent variable, in our case disability among the elderly.

This approach to estimating the causal effects of income on health is an alternative to the approach used in most prior studies. The typical study treats income, and socio-economic status more generally, as exogenous to health. More recent studies

use panel data to condition on prior health thereby focusing on innovations in income and socio-economic status to identify causal effects. Adams et al (2003) is the most thorough of the latter studies, and they find mixed evidence for causality running from socio-economic status to health; there is no evidence of causal effects on mortality, accidents, or many acute conditions, but the data support causal effects on mental health and some degenerative and chronic conditions, including one of the measures examined in the present study, IADLs.

Data and Sample

The data used in these analyses are drawn from the 1990 and 2000 1% census samples as compiled by the Integrated Public use Microdata Series (IPUMS). This is micro level data from the census long forms from both years. The questionnaires are self administered.

We restrict the sample to single individuals aged 65 and over. The substantive rationale for focusing on single individuals is because they are far more likely to be poor and rely on SSI than are married couples, and single individuals comprise 80 percent of all SSI beneficiaries (Martin and Davies 2004). Further, restricting the analyses to single individuals helps balance concerns of endogeneity with the reality that a substantial share of the general population does not receive SSI benefits. A sample restricted to SSI recipients, or those who are eligible for SSI, would suffer from endogenous sample selection, while a sample that included the entire elderly population would likely hide a true relationship if such a relationship existed. While just over 1 percent of married

couples receive SSI, about 8 percent of single individuals receive SSI (U.S. House Ways and Means Committee 2000).

Our primary dependent variable is a measure of disability included in both the 1990 and 2000 census. Specifically, the respondent indicates whether he/she had any health condition that had lasted 6 or more months, which made it difficult or impossible to go outside the home alone. The validity of such self-reported disability measures is supported by the fact that they independently predict Medicare health spending and mortality (Ferraro and Farmer 1999; Komisar et al. 1998). At the same time, these measures are also influenced by socio-economic factors and the environment (Pope & Tarlov, 1991; Verbrugge & Jette, 1994). For example, higher income may allow individuals to purchase assistive technology – such as a cane, a walker, an apartment with an elevator, or a home in a neighborhood that has curb cuts in their sidewalks-- which in turn allows elderly to leave their homes. Therefore, the effect that is being estimated may be due to changes in underlying health or changes in the ability to cope with disability, and data limitations do not allow us to disentangle these competing pathways.

Table 2 provides means or percentage distributions for variables used in our analyses.[2] The main covariates include age, sex, race, ethnicity (Hispanic or not), immigrant status, state unemployment rate, and institutional status. Hispanic encompasses those who are either Caucasian or non-Caucasian. Immigrant is defined as an individual who was not born in the United States. Education is a nine category

[2] Though most studies have found that overall disability rates among the elderly have improved over this time period (Freedman et al. 2002) this is not true for every disability measure. Comparisons to analogous disability measures in the Medicare Current Beneficiary Survey showed trends similar to what we found in the Census. Similar to findings in the 1990 and 2000 census, ADL disability rates declined in the MCBS over this period. And though there is no question exactly like the mobility measure in the Census, some measures of mobility in the Medicare Current Beneficiary Survey (including the ability to walk one-quarter of a mile unaided) worsened over this period.

continuous variable that is intended to capture overall socioeconomic status.[3] To control for within state changes in economic conditions between 1990 and 2000, the state unemployment rate is included. Prior studies have shown a strong connection between unemployment rates and health, even for the elderly (Ruhm 2000). Institutional status measures whether an individual lives in an institution. A living situation is defined as an institution if the individual is in formally authorized, supervised care or custody in places such as nursing homes, hospitals, mental institutions, and jails. Because SSI can be used to pay for institutional care, it is important to control for this factor. The last covariates necessary for the fixed effect models include state of residence and census year (1990 or 2000).

The covariate of primary interest is the maximum state SSI benefit, which are merged to the microdata for 1990 and 2000. This variable is also used to instrument SSI income actually received by individuals, which is available in the 1990 and 2000 censuses. All income measures are inflation adjusted, using the CPI, to the year 2000.

Analytical Approach

The estimation approach identifies the effect of the SSI program through changes in policies within states over time. The dependent variable takes on a value of 1 if an individual *i* at time *t* is disabled. The probit model is:

$$Prob(Disabled)_{it}=\beta_0+\beta_1 X_{ist}+\beta_2 SSIMAX_{st}+\beta_3 STATE_{is}+\beta_4 YEAR_{it}+u_{ist}$$

[3] While ideally adjustments for SES should include income, controlling for individual non-SSI income is not an option because changes in SSI income cutoffs may lead to changes in behavior. For example, if the income cutoff is raised, individuals may stop their employment because the SSI increase would compensate for this loss. The same problem arises if controls for assets are introduced into the model because SSI is an asset tested program. That said, the inclusion of non-SSI income, or Social Security income, did not alter the results. In the analyses presented, an individual income variable is used only to conduct subgroup analyses based on income percentiles.

where X is the vector of covariates (including sex, age, race, ethnicity, immigrant status, educational attainment, state unemployment rates, and institutional status) for individual *i* at time *t* in state s. These covariates are intended to address factors that may produce a spurious correlation between *SSIMAX* and the dependent variable. *SSIMAX* is the maximum SSI benefit in state *s* at time *t*. *STATE* represents state fixed effects, *YEAR* represents year fixed effects, and u_{ist} is the error term. We report standard errors for all models that allow for an arbitrary correlation matrix within states (the so-called Huber-White sandwich estimator) because of the possibility of serially correlated errors within states. Because probit coefficients are not intuitively interpretable, we included derivatives as well as predicted probabilities to calculate how large of a change in functional limitations results from a change in SSI state maximum benefits.

To address the question of whether increases in individual SSI income per se affect the probability of being disabled requires an alternative model. Here, SSIMAX is used to instrument individual SSI income in a two-stage analysis. SSIMAX is a powerful predictor of SSI income, with a first stage F statistic of 672.4.

Sensitivity Analyses

A variety of sensitivity analyses are performed to test the reliability of the results. First, two different income subgroups are examined: those below the 30th income percentile and those above the 85th income percentile. The expectation is that the SSIMAX coefficient would increase in size and significance when focusing on a poorer population given that almost all SSI beneficiaries would be concentrated at the bottom of

the income distribution. Focusing on the entire population of single individuals, given many do not receive SSI, should produce a diluted effect of SSIMAX in the model relative to focusing on very poor single individuals. Contrastingly, SSIMAX should shrink to insignificance when examining those over the 85th income percentile because decisions made by this relatively affluent population should not be influenced by SSI policy. Finally, separate analyses of the 1990 and 2000 data cross sections were analyzed to test whether they confirm the time series findings.

The last sensitivity analysis focuses on whether there are other factors correlated with within state changes in SSIMAX over time that may lead to a spurious correlation between SSIMAX and disability. Of particular concern is that Medicaid eligibility is linked to SSI eligibility. There is the possibility these results reflect Medicaid program effects as opposed to SSI. Changes in SSI benefits automatically lead to changes in Medicaid eligibility. It is, however, important to keep in mind a few factors. First, this will only prove problematic for those individuals with incomes that fall between the SSI federal benefit and the maximum state benefit. Second, almost all of these individuals, given their slightly higher incomes, have Social Security benefits and consequent Medicare coverage. The Medicaid eligibility simply gives them supplemental insurance to their Medicare benefits. Further, every elderly American in every state can receive some supplemental insurance if they fall anywhere below 150 percent of the poverty line. While these benefits are not as generous as a full Medicaid supplement, this would soften the effect. That said, additional analyses, using the Current Population Survey, examine

whether changes in maximum state SSI benefits between 1992 and 2000 are correlated with changes in Medicaid participation.[4]

Results

The results provide support for the hypothesis that more generous SSI benefit levels lead to reductions in disability. Table 3 shows the results for all single individuals and the two subgroups of low and high- income single individuals. These findings answer the policy relevant question of whether changes in state maximum SSI benefits over time lead to changes in disability.

Across models 1, 2, and 3 in Table 3, the demographic covariates respond as expected. Being black, female, older, having low educational attainment, and being institutionalized all have a significant and positive association with disability. Immigration status and state unemployment rates had no discernable impact.

Model 1 in Table 3, which includes all single individuals, shows that the key variable of interest, the SSI monthly state maximum benefit, is a significant and negative predictor of mobility limitations for single individuals: the higher the state maximum, the lower the rate of disability. The derivative shows that a $100 increase in the maximum monthly SSI benefit leads to a .01 decline in the probability of having a mobility limitation.

Sensitivity analyses were conducted to investigate the robustness of the results. Our first strategy was to alter the sample population and see if the results respond as expected. First, we limited the sample by looking at a subsample of individuals below the 30th income percentile. The size of the effect for this group increases by 233 percent,

[4] The 1992 CPS was used because questions regarding type of health insurance did not appear in the 1990 or 1991 CPS.

as compared to model 1 (which included all single individuals). This is expected given the high concentration of SSI recipients that fall within this sample of individuals below the 30th income percentile. In terms of magnitude, the derivative estimate shows that an increase of $100 in the maximum state SSI benefit leads to a .03 decline in the probability of having a mobility limitation among these low-income individuals. In column 3, the sample is limited to those above the 85th income percentile. By examining the population who would be well outside of eligibility guidelines for SSI, we would expect to see no effect of SSI. Indeed, this is what happens; the coefficient on SSI monthly state maximum is substantively small and statistically insignificance.

To help give a more intuitive presentation of these findings, Table 4 displays predicted probabilities based on the probit coefficients from Table 3. When analyzing all single people, those with a $500 maximum state monthly benefit had a 20.6 percent probability of being disabled. Increasing that maximum to $600 led to a 0.8 percentage point decline in the probability of being disabled. Finally, those with a $700 maximum state SSI monthly benefit had a 19.0 percent probability of being disabled. When focusing on those below the 30th income percentile, the percentage point changes in probabilities associated with each $100 increase were larger than when analyzing all single individuals. Those with a $500 maximum state monthly SSI benefit had a 26.5 percent probability of being disabled, compared to a 22.2 percent probability for those with a $700 maximum state monthly SSI benefit.

Further sensitivity analyses ruled out some additional concerns. First, findings using alternative dependent variables generally back up the findings with disability as the dependent variable. In table 5, the dependent variable is whether or not an individual has

difficulty with an activity of daily living, including dressing, bathing or getting around inside the home. When all single individuals are included in the sample, the maximum monthly state SSI benefit is marginally insignificant ($p<.12$). But when focusing on those below the 30th income percentile, the maximum state SSI benefit becomes significant and the coefficient doubles in size. For every $100 increase in the maximum state SSI benefit, the probability of having an ADL limitation drops by .01. And as expected, when narrowing the sample to those above the 85th income percentile, the maximum SSI benefit is no longer statistically significant ($p<.31$).

The dependent variable in Table 6 is whether an individual has "any disability" (ADL or mobility disability). Among all single individuals, the maximum state SSI benefit is statistically significant. The coefficient doubles and remains significant when limiting the sample to those with incomes below the 30th percentile. The probability of being disabled drops by .02 for every $100 increase in the state maximum SSI benefit. When the sample is restricted to those above the 85th income percentile the maximum state SSI benefit is no longer significant.

Separate analyses of the 1990 and 2000 data that ignore state fixed effects show that higher SSI state maximum benefits were associated with lower probabilities of mobility limitations. For every $100 increase in the SSI state maximum, there was a .008 and .010 reduction in the probability of having a mobility limitation in 1990 and 2000 respectively.

An additional concern is whether changes in Medicaid policy had an impact on these results. Analyses using the CPS demonstrate that within state changes in the SSI

maximum over the 1990s are not correlated with within state changes in Medicaid receipt. Appendix Table 1 displays these findings.

Finally, welfare policy reforms in 1996 could have produced erroneous results. When the welfare reform initiative was launched, legal immigrants (resident aliens) lost access to public welfare benefits. This legislation was altered in 1997, however, to grandfather in those individuals who were receiving SSI benefits before the 1996 legislation. Nonetheless, these changes did likely have some impact on immigrant participation in SSI and thus where immigrants fell in the income distribution between 1990 and 2000. Including or excluding immigrants in the analysis, however, has little impact on our results (results not shown in tables).

Estimates of the Effects of Income: SSI Policy as an Instrument

The previous analyses focused on whether changes in SSI benefit policies affected disability. But we can also use the policy variation to identify an effect of income per se on disability. That is, we can use SSI maximum benefits to help predict SSI income, and then subsequently estimate the effects of SSI income on disability. That is, under the assumption that SSI benefit policies only affect disability through its effect on the amount of SSI income, we can use IV methods to derive an unbiased estimate of the effects of income on disability. Thus, the second research question is: do increases in individual SSI income have any impact on disability among the elderly?

The first pair of columns in Table 7 display the two-stage results where the state SSI maximum benefit instrumented individual SSI income. The findings from these analyses confirm that increases in individual SSI income lead to changes in disability. A $50 increase in monthly SSI income, or $600 annually, leads to a 0.053 decline in

disability. Given that the federal SSI maximum in 2000 was just under $6,200 a year, this represents an economically meaningful increase in income, which also translates into a significant reduction in disability. Given that the relationship between income and health is strongest for the poorest, we would expect the causal effects of income to be greatest within this low-income population.

The subsequent columns in Table 7 test to what extent these findings differ with the alternative disability measures: ADL disability and any disability (ADL or mobility). For both measures, increases in SSI income are found to lead to significant improvements in disability.

IV. SUMMARY AND DISCUSSION

Do increases in income, particularly those focused on the poorest elderly Americans, improve disability among the elderly? The findings from this study support the hypothesis that both within-state changes in the maximum state SSI benefit and changes in SSI income actually received by individuals, between 1990 and 2000, lead to changes in disability among single elderly individuals. Higher benefits are linked to lower disability rates.

Varying sensitivity analyses were employed to test the validity of these findings. Sensitivity analyses that limited the sample based on their likelihood of being SSI recipients responded as expected. When limiting the sample to single individuals below the 30^{th} income percentile, the strength of the SSI state maximum variable grew. Contrastingly, when limiting the sample to those above the 85^{th} income percentile, the effect of the state SSI maximum covariate was statistically insignificant.

Further, varying the disability measure did not meaningfully alter the general findings, though of the three measures, SSI had the weakest impact on activity of daily living limitations. One possible explanation for its relative weakness is that income may have a weakening impact after relatively severe levels of decline in disability as indicated by measures such as dressing, bathing, and eating.

The main potential weakness with the state and year fixed effect model is whether there are within state changes that are correlated with within state changes in maximum SSI benefits that produce a spurious relationship between SSI and functional limitations among the elderly. The primary concern in this regard was whether within state changes in SSI maximum benefits were correlated with within state changes in Medicaid receipt among the elderly. We found no evidence, however, that this was the case.

While these findings are quite robust, further analyses are needed to confirm their reliability. There are at least two ways to do this. First, new analyses should explore a larger time range that can capture even larger variations in means tested income support benefit for the elderly across time. Second, future analyses should incorporate alternative health measures, in particular mortality. Alternative health measures may also allow one to determine whether the estimated effects are due to gains in underlying health or improvements in older person's ability to function among those who have diseases.

Thus, while the findings from these analyses are intriguing, they should be viewed as initial findings. These analyses are, in fact, part of a larger project that will examine the connection between means tested income supports for the elderly and their health over the latter half of the 20th century. Previous to SSI, there was no uniformity in state means tested income supports for the elderly. SSI changed this by setting a minimum

federal benefit, as well as some standard eligibility criterion. We will examine whether income increases associated with the establishment of the federal SSI program, which in some states were quite large, had any impact on elderly morbidity and mortality.

We will also examine the Old Age Assistance Program (OAA), which was the predecessor of SSI. In the 1940s and 1950s OAA was actually a more significant income support program for the elderly than was Social Security. Overall, 1-in-5 elderly persons in 1940 were receiving OAA. And between 1940 and 1950 OAA benefits rose dramatically, by about 27 percent on average, and with considerable variance between states. Research on retirement and living arrangements has examined the impact of OAA benefit change over this period (Costa 1999; Friedberg 1998). We are expanding on this research to look at mortality outcomes among the elderly. A significant advantage to focusing on OAA is that we can employ an age-differencing approach because only the elderly were eligible for OAA.

More broadly, further research is needed on the question of whether non-health policies affect health. The U.S. spends nearly twice as much on health care relative to other industrialized countries, but on basic health measures the U.S. lags well behind. While most would agree that medical care, and access to that care, is an important predictor of good health, it is becoming increasingly clear that medical care is not the only or even the primary predictor of good health. Thus, recent research that focuses on connections between social and economic factors and health sets the stage for analyses that explicitly explore whether there are connections between social and economic policies and health. Aside from SSI, there are numerous other income support policies, from the Earned Income Tax Credit to Social Security, which could be studied.

Ultimately, if public policy is to play a role in improving population health, we must have a clearer understanding of the different ways it can play that role.

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Table 1. State Variation in Maximum SSI Benefit for Single Persons: 1990 and 2000 (in 2000 dollars)

	Maximum Monthly Benefit*		% Change in Maximum Monthly Benefit:	Annual Dollar Benefit Change:	Maximum Annual Income SSI Receipts
	1990	2000	1990 to 2000	1990 to 2000	can have: 2000
Alaska	944	874	-7.4%	-841	10488
California	829	692	-16.6%	-1650	8304
Colorado	579	548	-5.4%	-374	6576
Connecticut	990	747	-24.6%	-2919	8964
DC	528	512	-3.0%	-189	6144
Hawaii	515	517	0.5%	29	6204
Iowa	508	534	5.1%	312	6408
Idaho	604	565	-6.5%	-470	6780
Maine	521	522	0.2%	10	6264
Massachusetts	678	641	-5.5%	-444	7692
Michigan	548	526	-3.9%	-258	6312
Minnesota	607	593	-2.3%	-166	7116
Nebraska	558	519	-7.0%	-469	6228
Nevada	555	548	-1.3%	-89	6576
New Hampshire	544	539	-0.8%	-55	6468
New Jersey	549	543	-1.1%	-70	6516
New York	621	599	-3.6%	-268	7188
Oklahoma	592	565	-4.6%	-328	6780
Oregon	511	514	0.7%	40	6168
Pennsylvania	550	539	-2.0%	-134	6468
Rhode Island	592	576	-2.8%	-196	6912
South Dakota	528	527	-0.1%	-9	6324
Utah	516	512	-0.8%	-47	6144
Vermont	591	570	-3.6%	-252	6840
Washington	545	539	-1.1%	-71	6468
Wisconsin	644	596	-7.4%	-572	7152
Wyoming	534	522	-2.3%	-148	6264
Federal maximum (i.e., remaining states)**	508	512	0.8%	48	6144
Average across all states	558	544	-2.5%	-166	6533

*These figures are rounded to the dollar, but annual benefit change reflects changes in monthly benefits to the cent.

**SSI benefits are automatically adjusted each year to account for inflation. The difference in the federal minimum benefit between 1990 and 2000 is because the CPI adjuster used for automatic cost of living increases (for both Social Security and SSI) is different than the CPI adjuster used in most studies to account for inflation.

Table 2. Single Individuals Aged 65+ in the 1990 and 2000 Census: Descriptive Statistics

	1990	2000
Male	0.22	0.25
Age		
65 to 75	0.450	0.404
75 to 84	0.386	0.397
85+	0.164	0.199
Race/ethnicity		
Hispanic	0.037	0.052
Black	0.125	0.139
Foreign born	0.172	0.168
Average education (1-9)	5.6	6.1
State unemployment rate	0.063	0.058
Institutionalized	0.105	0.100
Disabled: mobility limitation	0.287	0.327
Disabled: ADL limitation	0.219	0.192
Disabled: either of the above	0.334	0.358
Proportion receiving SSI	0.11	0.08
Number of observations	155,108	179,289

Table 3. Mobility Limitation Regressed on Maximum State SSI Benefit among Single Individuals: Probit Estimates

	All		Below 30th Income Percentile		Above 85th Income Percentile	
	Coefficient	Derivative	Coefficient	Derivative	Coefficient	Derivative
Maximum monthly state SSI benefit[a]	-0.0281***	-0.00964**	-0.0681***	-0.0268***	-0.0092	-0.00207
	(0.0105)		(0.0183)		(0.0304)	
Male	-0.1572***	-0.0526***	-0.1309***	-0.051***	-0.1260***	-0.02757***
	(0.0059)		(0.0110)		(0.0153)	
Age (Reference= 85+)						
65-74	-0.9230***	-0.2973***	-0.7328***	-0.2764***	-1.1787***	-0.2668***
	(0.0070)		(0.0119)		(0.0197)	
75-84	-0.5482***	-0.1801***	-0.4462***	-0.1721***	-0.6764***	-0.1373***
	(0.0067)		(0.0114)		(0.0188)	
Race/Ethnicity (reference=white)						
Black	0.1402***	0.0493***	0.0379***	0.0149***	0.2145***	0.0529***
	(0.0075)		(0.0114)		(0.0290)	
Hispanic	0.0728***	0.0253***	-0.0129	-0.0051	0.1342*	0.0321*
	(0.0129)		(0.0183)		(0.0575)	
Immigrant	0.0141	0.0048	-0.0094	-0.0037	0.0305	0.0069
	(0.0076)		(0.0125)		(0.0227)	
Years of education	-0.0720***	-0.0247***	-0.0463***	-0.0182***	-0.0736***	-0.0165***
	(0.0012)		(0.0020)		(0.0038)	
State unemployment rate	0.0099	0.0034	0.0060	0.0024	-0.0003	-0.00007
	(0.0058)		(0.0102)		(0.0168)	
Institutionalized	1.4838***	0.5415***	1.4118***	0.5058***	1.3537***	0.4591***
	(0.0088)		(0.0126)		(0.0307)	
Year 2000	0.1480***	0.0505***	0.0407***	0.0160	0.2362***	0.0524***
	(0.0066)		(0.0115)		(0.0190)	
Mean of dependent variable	0.31		0.42		0.17	
Number of observations	334397		101446		53310	

All models include state fixed effects; Standard errors in parentheses; p^ <.10, *p<.05 **p<.01 ***p<.001.

[a]Parameter estimates on SSI maximum multiplied by 100.

Table 4. Predicted Probability of Having a Mobility Limitation*

State maximum benefit	$500	$600	$700
All single people	20.6	19.8	19.0
Singles with incomes below the 30th income percentile	26.5	24.3	22.2

*Evaluated for an individual who is white, has less than a high school education, is 65 to 75 years old, lives in Alabama and has a 6% unemployment rate, does not live in an institution, and the year is 1990.

Table 5. Activity of Daily Living (ADL) Disability Regressed on Maximum State SSI Benefit among Single Individuals: Probit Estimates

	All		Below 30th Income Percentile		Above 85th Income Percentile	
	Coefficient	Derivative	Coefficient	Derivative	Coefficient	Derivative
Maximum monthly state SSI benefit[a]	-0.0180	-0.0046	-0.0385*	-0.0130*	-0.0365	-0.0055
	(0.0115)		(0.0194)		(0.0340)	
Male	-0.0628***	-0.0159***	-0.0535***	-0.0179***	-0.0241	-0.0036
	(0.0065)		(0.0117)		(0.0172)	
Age (reference= 85+)						
65-74	-0.7152***	-0.1747***	-0.5978***	-0.1917***	-0.9314***	-0.1469***
	(0.0075)		(0.0124)		(0.0219)	
75-84	-0.4254***	-0.1047***	-0.3586***	-0.1180***	-0.5458***	-0.0756***
	(0.0070)		(0.0116)		(0.0207)	
Race/ethnicity (reference=White)						
Black	0.1969***	0.0541***	0.0999***	0.0343***	0.2128***	0.0368***
	(0.0082)		(0.0122)		(0.0329)	
Hispanic	0.0756***	0.0201***	0.0040	0.00136	0.0245	0.0038
	(0.0143)		(0.0200)		(0.0694)	
Immigrant	-0.0075	-0.0019	-0.0457***	-0.0153***	-0.0040	-0.0006
	(0.0084)		(0.0134)		(0.0258)	
Years of education	-0.0581***	-0.0149***	-0.0377***	-0.0127***	-0.0623***	-0.0095***
	(0.0012)		(0.0021)		(0.0042)	
State unemployment rate	-0.0051	-0.0013	0.0150	0.0051	-0.0348	-0.0052937
	(0.0064)		(0.0108)		(0.0190)	
Institutionalized	1.5954***	0.5543***	1.5269***	0.5522***	1.4768***	0.4372***
	(0.0082)		(0.0118)		(0.0295)	
Year 2000	-0.1203***	-0.0311***	-0.1463***	-0.0500***	-0.1626	-0.0250***
	(0.0072)		(0.0122)		(0.0214)	
Mean of Dependent Variable	0.20		0.30		0.11	
Number of observations	334397		101446		53310	

All models include state fixed effects; Standard errors in parentheses; ^ p<.10 *p<.05 **p<.01 ***p<.001.

[a]Parameter estimates on SSI maximum multiplied by 100.

Table 6. Any Disability (Mobility or ADL Limitations) Regressed on Maximum State SSI Benefit among Single Individuals: Probit Estimates

	All		Below 30th Income Percentile		Above 85th Income Percentile	
	Coefficient	Derivative	Coefficient	Derivative	Coefficient	Derivative
Maximum monthly state SSI benefit[a]	-0.0277**	-0.0101**	-0.0599***	-0.0239***	-0.0289	-0.0082
	(0.0102)	(0.0040)	(0.0181)	(0.0070)	(0.0596)	(0.0070)
Male	-0.1395***	-0.0501***	-0.1302***	-0.0518***	-0.0870***	-0.0221***
	(0.0058)	(0.0020)	(0.0109)	(0.0043)	(0.0145)	(0.0036)
Age (reference= 85+)						
65-74	-0.9211***	-0.3177***	-0.7559***	-0.2923***	-1.1382***	-0.2912***
	(0.0069)	(0.0022)	(0.0120)	(0.0044)	(0.0191)	(0.0048)
75-84	-0.5620***	-0.1978***	-0.4677***	-0.1842***	-0.6803***	-0.1594***
	(0.0067)	(0.0023)	(0.0116)	(0.0045)	(0.0186)	(0.0041)
Race/ethnicity (reference=White)						
Black	0.1865***	0.0699***	0.0788***	0.0314***	0.2637***	0.0749***
	(0.0073)	(0.0028)	(0.0113)	(0.0045)	(0.0274)	(0.0085)
Hispanic	0.0923***	0.0343***	0.0075	0.0030	0.1134*	0.0306*
	(0.0126)	(0.0047)	(0.0181)	(0.0072)	(0.0553)	(0.0157)
Immigrant	0.0155*	0.0057*	-0.0221	-0.0088	0.0347	0.0090
	(0.0074)	(0.0027)	(0.0124)	(0.0049)	(0.0216)	(0.0057)
Years of education	-0.0770***	-0.0281***	-0.0511***	-0.0204***	-0.0839***	-0.0215***
	(0.0011)	(0.0004)	(0.0020)	(0.0008)	(0.0036)	(0.0009)
State unemployment rate	-0.0015	-0.0005	-0.0005	-0.0002	-0.0231	0.0263***
	(0.0057)	(0.0021)	(0.0101)	(0.0040)	(0.0158)	(0.0046)
Institutionalized	1.5060***	0.5418***	1.4350***	0.4920***	1.3554***	0.4809***
	(0.0093)	(0.0025)	(0.0133)	(0.0035)	(0.0314)	(0.0116)
Year 2000	0.0831***	0.0303***	0.0235*	0.0094*	0.1025***	-0.0059
	(0.0064)	(0.0024)	(0.0114)	(0.0045)	(0.0179)	(0.0041)
Mean of Dependent Variable	0.35		0.47		0.20	
Number of observations	334397		101446		53310	

All models include state fixed effects; Standard errors in parentheses; ^ p<.10 *p<.05 **p<.01 ***p<.001.

[a]Parameter estimates on SSI maximum multiplied by 100.

Table 7. Two Stage Instrumental Variables: Probit (N=334397)

	Mobility Disability		ADL Disability		Any Disability	
	Coefficient	Derivative	Coefficient	Derivative	Coefficient	Derivative
SSI income[a]	-0.2928**	-0.1063**	-0.1878^	-0.0485^	-0.2891***	-0.1116***
	(0.1051)		(0.1066)		(0.0596)	
Male	-0.1706***	-0.0572***	-0.0714***	-0.01798**	-0.1527***	-0.0550***
	(0.0062)		(0.0093)		(0.0060)	
Age (reference= 65-74)						
65-74	-0.9264***	-0.2991***	-0.7174***	-0.1754***	-0.9245***	-0.3199***
	(0.0093)		(0.0113)		(0.0102)	
75-84	-0.5510***	-0.1813***	-0.4273***	-0.1051***	-0.5648***	-0.1993***
	(0.0075)		(0.0090)		(0.0078)	
Race/ethnicity (reference=White)						
Hispanic	0.1834**	0.0673**	0.1467**	0.0397**	0.2017***	0.0782***
	(0.0641)		(0.0483)		(0.0528)	
Black	0.2568***	0.0940***	0.2717***	0.0757***	0.3017***	0.1165***
	(0.0340)		(0.0511)		(0.0316)	
Immigrant	0.0440**	0.01540**	0.0116	0.0026	0.0450**	0.0167**
	(0.0161)		(0.0217)		(0.0163)	
Years of education	-0.0888***	-0.0308	-0.0689***	-0.0177***	-0.09360***	-0.0346***
	(0.0050)		(0.0064)		(0.0036)	
State unemployment rate	0.0055	0.0018	-0.0079	-0.0021	-0.0058	-0.0022
	(0.0080)		(0.0104)		(0.0072)	
Institutionalized	1.4882***	0.5436***	1.5982***	0.5557***	1.5123***	0.5437***
	(0.0287)		(0.0254)		(0.0274)	
Year 2000	0.1465***	0.0499***	-0.1213***	-0.0317***	0.0816***	0.0296***
	(0.0067)		(0.0133)		(0.0073)	
Constant	0.5675***		0.0639		0.8186***	
	(0.1056)		(0.1406)		(0.0837)	

All models include state fixed effects; Standard errors in parentheses; ^ p<.10 *p<.05 **p<.01 ***p<.001.
[a]Parameter estimates on SSI income multiplied by 100.

Appendix Table 1. Medicaid Participation Regressed on SSI Maximum State Benefit: Probit Estimates

	Coefficient
Maximum monthly state SSI benefit	-0.0718
	(0.0636)
Male	-0.1748***
	(0.0328)
Age (reference= 85+)	
65-74	.1015**
	(.0407)
75-84	.0413
	(.0412)
Race/ethnicity (reference=White)	
Black	.5655***
	(0.0379)
Hispanic	0.6858***
	(0.0496)
Years of education	-0.1001***
	(0.0044)
State unemployment rate	-.0052
	(.0273)
Year 2000	-.0181
	(0.0337)
Number of Observations	15,393

All models include state fixed effects; Standard errors in parentheses; ^ p<.10 *p<.05 **p<.01 ***p<.001.