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ABSTRACT

We analyze the impact of the original means-tested Old Age Assistance (OAA) programs on the health of the elderly prior to the first Social Security pension payments. Before 1935 a number of states had enacted their own OAA laws. After 1935 the federal government began offering matching grants and thus stimulated the adoption of OAA programs by the states. A new panel data set of 75 cities for each year between 1929 and 1938 combines mortality rates for older age groups with three measures of the OAA programs, spending on non-age-specific relief and a rich set of correlates. The data are analyzed using difference-in-difference-in-difference and instrumental variables methods. Our results suggest that Old Age Assistance in the 1930s had little impact on the death rate of the elderly. Our sense is that the OAA programs in the 1930s transferred the elderly from general relief programs without necessarily increasing the resources available to them.

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1. Introduction

During the Great Depression, the Roosevelt Administration faced substantial pressure to make special provisions to aid the elderly poor. The elderly tended to have the highest poverty rates among age groups, and several advocates received extensive publicity and support in opinion polls when they lobbied for expansive programs to help the elderly.[2] When the Roosevelt administration turned to the issue in late 1934 and 1935 they faced a set of choices. One was to help the states expand their old-age assistance programs that paid benefits to the elderly poor. A second was to provide an old-age pension plan for all workers, who would pay taxes into a fund while working and then receive benefits based on their contributions after age 65. The Social Security Act of 1935 chose both, an Old Age Assistance (OAA) matching grant program that aided the states in paying benefits to the needy elderly and the national Old Age Security Income (OASI) old-age pension for the working population.

The problems with funding OASI pensions, widely known as Social Security, have led to a variety of debates over restructuring the OASI tax and benefit structure to favor lower income retirees. In the debates, few people mention that the U.S. currently has means-tested old-age assistance programs under the Supplemental Security Income system, which is based on the original state old-age assistance programs. The debates over the OASI program raise a question about government action for old-age security. What would have happened had the federal government never adopted the OASI old-age pension and the U.S. had just continued forward with the state-based old-age assistance programs? In hindsight, it may seem odd to

[2]The most famous of these plans was the Townsend Plan, which called for $100 per month to be paid to the elderly, who were then expected to spend the entire sum as a stimulus to the economy. This plan essentially called for a transfer of 40 percent of annual GNP to the elderly for this purpose.

rely on the states, but it should be remembered that workers' compensation, unemployment insurance, aid to children, and aid to the blind still remain state-based programs.[3]

Prior published work on OAA focused on labor force participation and living arrangements. Parsons (1991) found that OAA benefits account for about half of the decline in the elderly work force between 1930 and 1950, while Friedberg (1999) showed that labor force participation would have risen slightly in the absence of OAA programs. Costa (1999) found that the 27 percent increase in average OAA benefits between 1940 and 1950 explains about 80 percent of the decrease in the proportion of older non-married women living with family members. Further, states that disallowed benefits to women with family who could care for them and states with lien requirements increased the share of women living with relatives.

We examine the impact of the Old Age Assistance state programs on elderly mortality rates during the period from 1929 through 1938 before the first OASI payments were issued.[4] The state programs made cash payments to the *needy* elderly to allow them to live on their own rather than among the needy population in almshouses provided by local governments.[5] Between the late 1920s and 1934 more than half the states adopted old-age assistance. After the Social Security Act of 1935 offered matching grants, all of the states eventually began paying old-age assistance benefits.

[3]There is no federal involvement in workers' compensation, the federal government handles administrative costs for unemployment insurance and offers matching grants for aid to children under the Temporary Assistance for Needy Families and for aid to the blind.

[4] Balan-Cohen (2007) independently in an as yet unpublished paper has been addressing the same issue with a different data set for states covering the period 1934-1955. We compare our results to hers later in the paper.

[5]Although the state programs have often been described as old-age pension programs, they in no way resembled the modern OASI pensions because they were not based on payments of taxes in advance of old-age in return for payments upon reaching age 65. The elderly needy with property did contribute some resources. In many states OAA recipients who had property often had to sign over their property or allow the government a first lien on the property to receive benefits.

We take advantage of the timing of the implementation of old-age assistance programs across states and the different benefits offered in the programs to assess their impact on the mortality rates of the elderly.[6] We create a new panel data set for 75 cities with annual data for the years 1929 through 1938 that combines data on mortality rates for different age groups and information on OAA benefits and other forms of government relief spending. To avoid confounding effects, we stop the analysis before the national Social Security pension system started to pay benefits. The relationship between Old Age Assistance and mortality is estimated using three measures of the program, several specifications, and multiple procedures ranging from difference-in-difference to difference-in-difference-in-difference analysis to instrumental variables. The results suggest that other relief programs did not reduce elderly mortality. After investigating several hypotheses about differences in the types of deaths experienced, the findings lead us to believe that the introduction of OAA in the 1930s was primarily an administrative shift that moved the elderly who most likely to be at risk of dying from the general relief rolls to the OAA relief rolls without changing the access to resources for the elderly poor.

2. Old Age Assistance Programs

Local governments in the United States held the primary responsibility for providing benefits to the poor through the first decade of the 20th century. The states became more heavily involved with the introduction of mothers' pensions, workers' compensation, and aid to the blind during the 1910s and 1920s.[7] Specific legislation targeted at the elderly was first

[6] OAA is among several New Deal programs included in the 1930s relief programs examined by Fishback, Haines and Kantor (2007) in their analysis of the demographic impact of relief spending for 114 cities in U.S. between 1929 and 1940. They find a negative relationship between relief spending per capita and infant mortality, suicide rates, and several major causes of noninfant deaths.

[7] The federal and state governments in the United States struggled with the issue of specific relief to the elderly later than in many other western countries. In 1889 Germany was the first country to provide a general OASI-style old-age pension plan through compulsory contributory insurance. Other European and Latin American countries followed suit over the next thirty years. Most of the systems covered only employed workers and

passed in several Western and Midwestern states during the 1920s, as seen in Table 1 for the states covered in our city sample. Details of the initial state laws are shown in Table 2. The early laws gave the option to local governments to create county-financed programs specifically targeted at the elderly. As the country sunk into Depression, studies in New York in 1930 and Connecticut in 1932 found that nearly 50 percent of the populations aged 65 years or older had less than an estimated subsistence income level of $25 per month. The share of elderly individuals with less than $300 per year in income and property valued at less than $5,000 exceeded 46 percent in Connecticut and 74.5 percent in New York City (Old Age Security Staff Report 1935).

Over half of the states responded to the problems of the elderly by passing old-age assistance programs intended to "give aid to each applicant in his or her home or in some other suitable home in preference to placing him or her in an institution (Florida 1935 Bill)." Essentially, the elderly poor were to be moved from the existing poor law system into their own categorical assistance programs. Over half of the states in Table 2 prevented the OAA recipients from receiving any other form of state aid. The programs in most states gave the eligible the choice of living on their own or inside almshouses, as most states in Table 2 would not pay benefits to elderly with relatives who could care for them. Generally, OAA programs were associated with a reduction in or a reduction of the growth in the number of elderly living in almshouses.[8]

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provided benefits for both invalidity and old age, although Switzerland and Latin American countries limited the coverage to workers of different categories. Denmark in 1891 and several other countries opted instead for OAA-style assistance targeted at the elderly people with insufficient means. Great Britain started in 1908 with a system of non-contributory means tested benefits for the elderly but then switched to a compulsory contributory OASI pension program in 1925 (Committee on Economic Security 1935, Tables A, B and C).

[8]Alabama, Colorado, Georgia, Minnesota, Tennessee and West Virginia all reported declines in the elderly population in almshouses after introducing OAA (Social Security Bulletin, March 1938, 15 and 42). A study reported in the Monthly Labor Review that resembles a rough difference-in-difference analysis shows that states with old-age pension laws experienced roughly half the increase in populations in almshouses between 1930 and 1931/1932 as did states without old-age pension laws ((Anonymous, 1933, 1095),

The minimum age of eligibility (Table 1) was 65 in most states, 70 in several states. Most states in Table 2 required U.S citizenship. Minimum state residency requirements, ranging from one to fifteen years in Table 2, meant that the elderly had virtually no opportunity to gain higher OAA benefits in the short run by migrating across state lines. Minimum county residency requirements were less stiff, primarily in states where the state provided funds for the program.

The benefits were structured to help the elderly poor reach a target level of income. Benefit payments were based on the difference between the income of the applicant and an established monthly budget. In 15 of the 29 states in our sample listed in Table 2, the state law set a maximum monthly total income, the sum of old-age benefits and income from all other sources, for OAA recipients. The maximums in those states typically were $30 per month with a low of $15 per month in Indiana in 1934. Ten other states set maximums for the old-age benefit payments, ranging from $15 in Oklahoma to $30 in several states. Kentucky, New York, Massachusetts, and Louisiana set no maximums but there was an implicit maximum in the monthly target budget that they created. Comparisons between the maximums and the average benefits paid in 1934 in Table 2 show that old-age assistance payments in the states with maximums for total income were well below the maximums. Average payments in states with maximum benefits, like Utah and New Jersey, were in the same range as in the maximum income states at $8.56 and $12.72. The average payments in the states without maximums, Massachusetts $24.35 and New York at $22.16 were higher than in the other states but well below the $30 maximums found in most states. This notion of a target income is also supported by the broad dispersion of benefit levels paid to OAA recipients in 1937-38 in so many states in Table 3.

Nearly all states also imposed some eligibility conditions related to the applicant's wealth, either in terms of annual income - in many cases no more than one dollar per day - or in terms of the value of their property – between $1,000 and $5,000. Recipients with property in most states essentially borrowed the benefit payments they received from the state. Many states established a lien on the property that required repayment of the benefits upon transfer of the property. Some required the recipient to transfer the property to the state.[9]

Under the Social Security Act of 1935, the federal government began offering matching grants to states for means-tested old-age assistance.[10] States were required to pass enabling legislation that either established OAA for the first time or modified existing OAA programs to meet the following federal requirements. The new state/federal OAA programs were mandatory for the entire state. A cap on monthly benefits subsidized by the federal government was set at $30 per individual; therefore, the maximum federal contribution was limited to $15 per individual. The state could maintain a higher cap if it wished but it was responsible for the extra funding. State and local residency requirements could be no more stringent than state residency for five years out of the last nine with a continuous residence of one year before the application. Recipients still had to be U.S. citizens but no minimum time was set. The minimum age was set at 65 years, although states with higher minimums could still receive matching grants through January 1, 1940.[11]

Average annual OAA benefits in 1940 ranged from $91 to $455 across states, while the share of elderly receiving benefits in the states ranged from 8.1 percent, to 50.2 percent (Friedberg 1999). Information from 1937-38 in Table 3 offers a snapshot that shows a broad

[9] Additional conditions in some states included the following rules: the applicant had not deserted his wife in the last 15 years, was not a beggar, was not imprisoned, was not in a charitable institution or he did not receive other state aid.

[10] The Act also provided matching grants for aid to dependent children and aid to the blind to expand on existing state mothers' pension and aid-to-the-blind programs.

[11] Pennsylvania decreased the minimum age effective January 1, 1940, Missouri effective July 1939, Indiana and Oregon effective 1938.

range of benefits across states, although the distributions varied across time. Part of the distribution was determined by differences in state maximums, which ranged from $15 in Kentucky to a high of $45 in Colorado in the states in our city sample. The distributions of benefits within states displayed quite different patterns. In some states it appears likely that the variation was caused by differences in the gap between the individual's resources and the state's estimates of the cost of necessities. Kansas and New Jersey displayed bell-curve type distributions below their maximums of $40 and $30, respectively. Kentucky's low maximum meant that roughly half of recipients were paid between $10 and $15 and roughly half were paid between $5 and $10. California and Louisiana illustrate two extremes. More than half of the California recipients received the state maximum of $35. Louisiana passed a generous maximum of $40 but paid more than 80 percent of their recipients less than $15.

3. Other Aid to the Elderly

It is important to realize that Old-Age Assistance programs were enacted as an alternative way to deal with poverty among the elderly. In the absence of old-age assistance, the elderly were eligible for most forms of poor relief at the local level. When the New Deal programs were enacted, the elderly were eligible for both direct and work relief under the Federal Emergency Relief Administration (FERA) in 1933, which provided about 78 percent of the relief funds distributed by state and local governments between June 1933 and June 1935. In October of 1933 roughly 8 percent of the population aged 65 and over received relief from the FERA in the states in our estimation sample, despite the presence of old-age assistance in many of the states. Correlations show that the share of elderly receiving FERA funds in October 1933 was lower in states where OAA assistance was available. The stringency of the state old-age assistance programs gave the elderly incentives to apply for

federal relief before seeking old-age assistance. Property owners had special incentives because the FERA did not ask home owners to accept a lien or a transfer of their property as a requirement for benefits.

In July 1935 the federal Works Progress Administration (WPA) replaced the FERA work relief programs, and responsibility for funding direct relief, which had no work requirement, was returned to state and local governments. This shift in responsibility and the expansion of old-age assistance programs to all states appears to have led a higher share of the elderly to enroll in old-age assistance programs. Table 2 shows that the share of the age-eligible elderly enrolled in old-age assistance programs in states with programs in 1934 average less than 10 percent with a maximum of 16.9 percent in Indiana. At the end of 1936 in a much improved economy about 14 percent of the population aged 65 and over received OAA assistance under the Social Security Act, while another 6 percent received aid through some other form of relief (Social Security Bulletin, March 1938, 6). By 1940 all states had established OAA and the share of people aged 65 years of age or older receiving benefits had risen to 21.8 percent even as per capita incomes had reached their 1929 level again (Friedberg 1999).

A significant minority of the elderly who signed up for OAA under the new SSA matching-grant rules had received some form of public assistance *before* moving to OAA. A study by the Social Security Board (1938) summarized in Table 4 suggests that roughly 40 percent of the elderly who signed up for the SSA matching-grant version of OAA in 1937 and 1938 had received some form of public assistance within the past two years. Three-fourths of that group had received some form of public aid within the 30 days prior to their acceptance in the OAA program. It is likely that some portion of the new recipients had been eligible for

aid for a period before signing up. Others might have newly reached the eligible age or had a recent change in their economic circumstances.

4. Anticipated Effects of Old-Age Assistance Programs.

The state Old Age Assistance programs changed the nature of means-tested public relief for the elderly. In one sense the new programs just replaced the existing systems provided to all age groups with a set of benefits targeted specifically to the elderly. If the new systems led to no changes in the access to benefits received by the elderly, then we would not expect to see a reduction in elderly mortality rates.

OAA programs did lead to some changes in the mechanism through which relief was offered to the elderly. A key statement typically found in many OAA laws was that Old Age Assistance was designed to pay the elderly enough that they could live on their own and thus not rely on other forms of public support. Since many states required that an OAA recipient or couple could not have relatives who could care for them, this meant that the choice of OAA benefits was allowing them to avoid living with non-relatives or in almshouses. If this shift in living arrangements was the key change wrought by OAA programs, then several opposing effects on mortality rates might be expected.

First, OAA benefits might lower the mortality rate by allowing the elderly person or couple to avoid exposure to communicable diseases among other poor living in almshouses or alternative arrangements.

Second, OAA would lower mortality rates to the extent that the program provided more economic resources to the elderly. To the extent that there were economies of scale in household production in the multiple person living arrangement, the extra costs of living alone might have eaten into the extra income and thus the net benefit might have been small.

Third, OAA assistance might have contributed to higher mortality even though the elderly person saw it as a net benefit. There may have been greater isolation from others from living alone. Modern studies suggest that individuals who retire into socially isolated settings tend to have higher mortality rates (Snyder and Evans 2006). Further, by living alone the elderly may have lost easy access to health care provided in almshouses. A BLS report on almshouses in 1925 found that payments to nurses and matrons accounted for approximately 10 percent of the payroll costs at almshouses. Descriptions of the quality of medical care, food, and living conditions from state reports suggested that it ranged from good to very poor. Generally, the quality of conditions was better in the large almshouses most often found in cities than in smaller ones (Stewart 1925, 19-37).

5. Empirical Strategy and Data

We examine the impact of old-age assistance programs on mortality rates for the older age groups of the United States. Mortality rates are important measures of the health of the elderly population as well as socio-economic well-being because mortality is influenced by both income and psychological factors. Lower mortality rates are likely to strongly improve the psychological health of the living elderly by reducing the loss of close friends. A part of the mortality rise associated with isolation and loss of friends may have manifested itself in the suicides studied by Balan Cohen (2007) or in other forms of stress that contributed to death.

In contrast to other studies that looked at the impact of Old Age Assistance programs, we have accumulated data about spending not only for Old Age Assistance, but also for all but a small share of the other public and private programs for assistance to the needy for 114 city/county observations in each year from 1929 through 1938 (Baird, 1992; Fishback, Haines, and Kantor, 2007). These 114 large areas represent 66 percent of the total population of U.S.

The data on public assistance of other kinds allows us to control for expenditures from all of the other public relief programs that provided benefits to all age groups, including seniors living with others in low-income households.[12] We match the relief data with information on mortality for persons aged 55 to 64, 65 to 74 and 75 and up for the 75 cities reporting age-specific mortality in the annual *Mortality Statistics* volumes for the years 1929 through 1938 published by the U. S. Bureau of the Census. The 75 cities account for roughly 48 percent of the total population of U.S.

The key to our analysis is the sharp changes that occurred in access to OAA benefits during the period we study. We measure access in three ways: access to benefits, total benefits paid per person of eligible age, and the monthly maximums set by the states. Baird (1942) reports payments under old-age-assistance programs in all of the cities. Among cities in the sample only one reported the payment of OAA benefits specific to the elderly in 1929 in the financial statistics reported by cities. Between 20 and 30 cities reported benefits in 1931 through 1933. The number jumped over 50, more than two-thirds of the sample by 1934. After the passage of the SSA matching grant law, the number jumped again to 67. All cities in our sample were paying OAA by 1938. Total benefits paid per person of eligible age also varied substantially. Meanwhile, the maximum benefits in Tables 1 and 2, which in many states served as a target income for recipients, varied both across cities and across time.

The aggregate mortality patterns in these large cities for people aged above 55 seem inconsistent with the usual expectations about the impact of the Great Depression. The

[12]Our measure of other direct relief available to the elderly includes city and state relief spending, federal *direct relief* under the Federal Emergency Relief Administration (FERA), *work relief* from the Civil Works Administration, the FERA, and the Works Progress Administration, private relief and aid to the blind. We exclude mothers' pensions and aid to dependent children because those were targeted at widows and children. The data for OAA and the other relief programs are relatively accurate measures of the net aid received by households since they do not include the salaries of administrative personnel of diverse agencies which distributed them. For a more detailed description of the relief spending data, see Fishback, Haines, and Kantor (2007) and Price Fishback's website at the University of Arizona (http://econ.arizona.edu/faculty/Fishback.aspx) under "Datasets from Published Research Projects."

histograms in Figures 1a through 1c show the year by year evolution of mortality rates for three age groups over aged 55 for the 58 cities reporting mortality in all of the years between 1922 and 1938. Linear trend lines based on the trends in mortality from 1922 through 1928 show a flat or rising trend as the economy entered the Great Depression. However, mortality among the elderly fell relative to each of these trends as the Depression deepened through 1933, rose slightly during the halting recovery from 1934 through 1937 and then fell again in 1938. This is consistent with patterns for overall mortality found by Ruhm (2000) for the modern era and by Fishback, Haines, and Kantor (2007) for the 1930s.[13]

Figure 2 shows a graphical comparison designed to illustrate the relationship between payment of OAA and the relative mortality of the people eligible for OAA. We first selected groups of cities from two types of states: states that paid OAA in every year from 1931 through 1935 and states that paid no benefits during that period. For each group of cities we then calculated for each year the difference between the death rate for people aged 65 and over and the death rate for people aged 55-64 (ineligible for OAA). This difference works to eliminate the impact of trends in mortality experienced by all age groups in the city. Figure 2 shows this over-65-minus-55-64 mortality rate difference for the cities in states that paid OAA and those that did not. The comparison reveals that the over-65-minus-55-64 mortality difference was higher in the cities paying OAA than in the cities without OAA. The absence of a beneficial mortality effect of OAA might simply reflect endogeneity in which areas with higher death rates were more likely to adopt OAA earlier. Below, we examine the relationship

[13] Other studies in the same category include Ruhm (2003) and Granados (2005). It might be the case that economic cycles are reflected in mortality rates with a lag of several years, a long term effect which would complicate the type of analysis required to identify the effectiveness of the program. However, previous literature explains the pro cyclical character of trend in mortality rates as a short run effect rather than a long run one. Ruhm suggests that the decline in mortality rates during recessions are related to reductions in smoking, height-adjusted weight, driving, and an increase in physical leisure-time activity associated with declines in disposable income.

between OAA and elderly mortality while including covariates to reduce omitted variable bias and using instrumental variable analysis to correct for endogeneity.

We estimate the effect of OAA on mortality rates using several methods, including a difference-in-difference analysis, a difference-in-difference-in-difference analysis, and ultimately an instrumental variables analysis combined with the difference-in-difference-in-difference analysis. We focus on the group aged 75 and over for the analysis to avoid measurement error related to different age eligibility standards in the states. The mortality information is reported only for age categories 65-74 and 75 and over, while the minimum eligibility age (see Table 1) in several states was 70. Since we cannot calculate a mortality rate for ages 70 and over, we can avoid this type of measurement error by restricting the analysis to the older age group. We have also estimated the model for ages 65 and over both with and without an extra dummy variable for states with an eligibility age of 70. The qualitative findings are the same for this age group as for the 75 and over age group. The results are reported in Appendix 3 for robustness tests.

The next step creates a difference-in-difference-in-difference analysis by performing a similar sequence of estimations using city and year fixed effects where the dependent variables are the differences in mortality rates between the 75 and older and the 55-64 age groups. Since persons aged 55-64 were not eligible for assistance, they are treated as a control group that is closest to the older age group without being eligible for benefits.[14]

The data on deaths are reported by age group but contain no information on the number of deaths among people who received OAA and the number of deaths of the elderly

[14] The population aged 55 to 64 may not be a perfect control group if some of the people aged 75 and over are married to spouses aged 55 to 64. In these cases income from old-age assistance for the older spouse may influence mortality for the younger spouse. Nationwide, during fiscal year 1937-38, the percent of married recipients among those who specified their marital status was 41.2 percent Source: Social Security Bulletin, February 1939.

non-recipients. Therefore, we cannot estimate directly the relationship between the death rates of OAA *recipients* and the payments received by OAA *recipients*. Instead, the dependent variable in the analysis is the number of deaths in the 75 and over age group per 100 people in that age group. This leads to the following econometric specification for the difference-in-difference analysis:

$$M_{it75} = \beta_1 OAA_{it} + \beta_2 R_{it} + \beta_3 X_{jt} + \beta_4 C_i + \beta_5 Y_t + \varepsilon_{it.} \qquad 1)$$

M_{it75} is the mortality rate in the 75 and over age group for city i in year t.[15] OAA_{it} is a measure describing the OAA program in city i in year t. R_{it} is a per capita relief spending in all of the other programs (including direct relief, work relief and work programs, private programs and programs for blind persons) that provided financial resources for the entire population, including the elderly. X_{jt} is a vector of economic activity, income distribution, cost of living, and demographic measures that potentially influence mortality rates for all age groups. C_i is a vector of city effects, Y_t is a vector of year effects, and ε_{it} is a stochastic error term containing unobservables.[16]

OAA_{it}, the old-age assistance policy, is measured in three ways: OAA expenditures (net of administrative expenses) in 1967$ dollars per person aged 65 and over, a dummy for the presence of OAA payments in the city and the OAA maximum benefit in $1967.[17] The OAA coefficient (β_1) in all cases can be interpreted as the relationship between the death rate

[15]The denominator was calculated as a linear interpolation of the size of the age group between the 1920, 1930, and 1940 censuses. A detailed description of the construction of the mortality rate variable can be found in appendix.

[16]Prior to 1937, mortality was reported by place of occurrence. After 1936, mortality was reported by place of residence. The year fixed effects in the analysis control for this change in national reporting. We have also estimated the series of specifications for the period 1929 through 1936, and there is no substantial change in the results. We have also estimated the model using Weighted Least Squares and the basic results are unchanged.

[17] Where benefits were reported for the city we used estimates of the city population, where reported for the county in which the city was located, we used the county population.

for all people 75 and over and the OAA policy measure. Prior studies of the impact of OAA on mortality by Balan Cohen (2007) and of all relief on mortality and fertility by Fishback, Haines, and Kantor (2007) have also faced the same problem of lack of information on the specific death rates of relief recipients and non-recipients. As a result, they also followed the same conservative approach of interpreting the policy coefficient as the impact on the death rate of the combined population of recipients and non-recipients.

This is still a useful estimate on its own terms. Even in the modern era, there are many low-income households who do not apply for welfare benefits. In essence, we are testing whether the presence of a program has an effect on mortality in situations where the effect might have been weakened by low take-up rates as well as the size of benefits when they were received. It is also important to look at the broader population for another reason. The availability of old-age assistance likely affects the behavior of others of eligible age and the extent of support they receive from others closest to them. The availability of old-age benefits might have contributed to reductions in the support provided by friends or by relatives in the states where benefits were paid to elderly who had family who could take care of them.

The coefficient for the OAA expenditures per person measure in equation 1 can be interpreted more aggressively as an unbiased measure of the influence of *total OAA expenditures on the number of deaths of OAA recipients* under the following assumptions: 1) OAA expenditures do not influence the total size of the elderly population in the denominator of the death rate and 2) OAA expenditures do not influence the death rates of non-recipients. The coefficient will be biased toward being too negative if OAA expenditures do not influence the total size of the elderly population and the death rates of non-recipients are lowered by more OAA spending. This might happen if OAA expenditures help prevent the development of contagious diseases among the relief recipients with consequent reductions in deaths among

the non-recipient population. For those interested in the relationship between the *OAA recipient death rate* and *expenditures per OAA recipient*, the OAA coefficient is an unbiased estimate when expenditures per recipient do not influence the recipient share of the elderly population and expenditures per recipient do not influence the death rates of elderly non-recipients. We derive the biases and assess whether the assumptions are reasonable in Appendix 2.

The alternative measures are a dummy variable for the presence of an OAA system that was making payments in the city and the OAA maximum benefit in $1967 for recipients as stipulated by the state law. The two measures get at a different issue than the OAA spending measure. The coefficient of the OAA dummy measures whether the shift in administration of welfare to the elderly from treating them as part of the general relief population to offering specific benefits influenced the overall death rate of the elderly.

The coefficient on the OAA monthly maximum addresses the issue of whether setting a target minimum for all elderly living in their own household influenced the death rate of all the elderly. The OAA benefits were designed to make up the difference between the recipient's income and a target budget. The patterns of payments show that most states set a maximum monthly benefit and then paid the difference between the OAA recipient's monthly income flow and the maximum benefit. Someone with no income from other sources could receive the maximum, while someone with income equal to half of the maximum would receive up to half of the maximum in OAA benefits. Thus, the maximum benefit effectively became the state's target level of subsistence. This target monthly income in some ways is a better measure to use than per capita payments or payments per recipient because health and mortality do not respond specifically to the cash payments paid by the state. Instead, the mortality is influenced more by the total income the person has available, whether the source is the state's OAA payment or the person's private income. Because of the difference in the

interpretation of the OAA dummy and the OAA maximum benefit variables, for reasons we discuss in Appendix 2, their coefficients cannot be used as easily as the coefficient of OAA spending as a measure of the impact of OAA on the *death rates of OAA recipients*. Therefore, we will focus our discussion on their impact on all elderly death rates.

The X_{jt} vector of covariates includes a series of socio-economic variables that might have affected mortality rates for all of the elderly. The variables are all averages for the entire population. Since we do not have specific information on these variables for the elderly, the population averages serve as proxies that work well to the extent that they are correlated with the averages for the elderly. Retail sales per capita is included as a measure of average consumption in the way it was used in Fishback, Haines, and Kantor (2007). The share of people who filed federal income taxes is a measure of the share of the population in the upper tier of the entire country's income distribution. It captures the share of individuals with more than $2,000 in income and families with more than $5,000 at a time when earnings per full-time equivalent worker in industry were less than $1,300 and many workers were working less than full time or were unemployed.[18] Health care availability is measured by the number of hospital beds per capita; whereas city-specific shocks in prices are accounted for by using a city-specific cost of living index. We also control for city level trends between census years in demographic measures with straight-line interpolations between Census information in 1930 and 1940 of total population, and the percentages of population who were illiterate, black or foreign born. C_i is a vector of city effects designed to control for time-invariant differences across cities that includes the basic sanitation infrastructure, and Y_t is a vector of year effects that control for economy-wide shocks. For more details about the construction of the data see the Data Appendix.

[18]Full-time equivalent industry earnings are from Robert Margo's estimates using methods similar to those of Stanley Lebergott's (series Ba4419 in Carter, et. al., 2006, volume 2, p. 283).

6. Results

During the 1930s, New Deal administrators produced a series of studies with simple comparisons of data to show the success of their policies. An Old Age Assistance administrator who looked at the simple OLS results with mortality rates of the elderly as a function of only the OAA measures would likely have declared success. The mortality rate of people aged 75 and over was statistically significantly lower in cities where OAA programs were in place and where the OAA monthly maximum benefits were higher. Using the dummy variable measure in the first specification in Table 5, the presence of OAA in the state was associated with mortality rates that were -0.2979 deaths per hundred lower for people aged 75 and over. This change represents 0.21 standard deviations in the mortality rate and about a 2.2 percent drop relative to the average death rate of 13.4 deaths per hundred people aged 75 and over. If we assume that OAA expenditures do not influence the total size of the elderly population in the denominator of the death rate and OAA expenditures do not influence the death rates of non-recipients, then the marginal effect for elderly recipients of OAA assistance will be -0.2979 divided by the share of people receiving OAA benefits. If 10 percent of the elderly population received benefits, then the introduction of OAA payments was associated with a reduction of 3 deaths per 100 recipients of OAA assistance over the age of 75. Using the OAA maximum benefit specification, a rise in the OAA maximum monthly benefit of one dollar (in 1967$) was associated with a reduction of 0.0055 deaths per 100 people aged 75 and over. This implies that a one-standard deviation increase in maximum OAA benefits per month was associated with a 0.004 standard deviation reduction in death rates. The specification using OAA benefits per person suggests that a dollar per person increase (in 1967 $) was associated with a reduction of 0.0007 deaths per 100 persons aged 75 and over, but we cannot reject the hypothesis of no effect. The coefficient implies that a one-standard

deviation increase in OAA benefits per capita was associated with death rates that were 0.0568 lower.

The OAA administrator might have taken heart that the negative relationship between OAA and mortality rates remains when the remaining correlates are added. However, it is clear that the negative effects in the simplest specifications above were driven by omitted variable bias. Once the other correlates are included, each of the OAA coefficients is less negative and the only relationship that remains statistically significant is the one between death rates and the OAA maximum monthly benefit.[19] The first two specifications still leave several other important features that might have influenced death rates uncontrolled. Some are not easily measured but were largely time-invariant while varying across cities during the 1930s. They include the basic quality of water treatment and sanitation facilities for the city, public health practices, private customs related to hand-washing and other personal sanitation activities, typical diets, and regional variations in the practice of medicine. In addition, there were national shocks to the economy that were common across cities. New drugs that successfully treated infections and other illnesses tended to diffuse rapidly across the country in a short period of time. The key change in drugs during the 1930s was the development of sulfa drugs, which Thomasson and Treber (2008) find contributed to a reduction in maternal mortality.

Once we move to the equivalent of a difference-in-difference analysis by incorporating city and year fixed effects, the coefficient falls sharply to -0.0017 for the OAA monthly maximum and it turns positive for the OAA payments dummy and OAA expenditures per elderly person.[20]

[19] The full results with the added correlates are shown in Appendix Table 1.

[20] We have also estimated the model by adding a predicted time trend for the 1920s to the analysis. When we add the trend, the number of observations is reduced from 734 to 590 since a number of states had not yet joined the

It is also important to examine the effects of the remaining welfare programs on elderly mortality because the elderly during the 1930s also received benefits from the broader welfare programs. The results show little sign that the broader welfare programs were associated with reduced elderly mortality. The coefficients for spending per capita on other relief programs in the left half of Table 5 are negative when only the correlates are included, but positive when the fixed effects are added. They are all statistically insignificant.

An additional step can be taken to further control for unmeasured factors that might have varied both across cities and across time but were common determinants of death rates for people aged 55 and over within the same city and year. Such factors might include epidemics and changes in access to sanitation and treated water. In this case we use as the dependent variable the difference between the mortality rates of the elderly ages 75 and over and the mortality rates of the group aged 55 to 64. The remaining correlates and the year and city effects are kept to control for differences in the impact of these factors on different age groups. The results for the three measures of the OAA program are presented in the right half of Table 5. The key coefficients to look at are in the difference-in-difference-in-difference specifications in the far-right column. An additional dollar added to the monthly maximum benefit is associated with a reduction of -0.0021 in deaths per 100 elderly persons. A one-standard-deviation increase in the monthly maximum was associated with a relatively small 0.062 standard deviation reduction in the difference in the death rates. The other two coefficients are positive. The introduction of OAA payments was associated with a 0.05 standard deviation increase in the death rate difference, while a one-standard-deviation increase in OAA spending per person was associated with a 0.14 standard deviation increase.

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death registration area and begun reporting mortality data consistently during the 1920s. The results are similar to those reported here and are available from the authors.

However, all three coefficients are statistically insignificant and we cannot reject the hypothesis of no effect.

6.1 Instrumental Variable Analysis

Although we have controlled for a significant range of factors with the techniques so far, there still remain the possibility of endogeneity bias in the coefficients on the OAA measures. Such bias will arise to the extent that legislators and relief administrators responded to a rise in the *relative* mortality of the elderly by adopting OAA earlier or raised the benefits and spending on OAA when it was already in place. One key omitted variable that we may be missing is the poverty status of the 75 and over group *relative to the rest of the population*. Changes in poverty over time within a city for the 75 and older group relative to the 55-64 age group were likely to lead to a larger positive gap in mortality rates between the two age groups. Similarly, increases in relative poverty for the 65 and older group across time within a city would likely lead to enhancements in the availability and level of OAA. The combination of these two positive correlations would cause the OAA coefficients in the difference-in-difference-in-difference analysis to be more positive than the true causal effect. We work to eliminate this potential bias using an instrumental variable approach. An instrument for the OAA measure needs to address the potential problem that the states established the OAA policy parameters in response to the unmeasured factors influencing the relative mortality rates of the elderly. The states set the benefit structure and also determined the timing of OAA introduction.[21]

[21]Balan-Cohen (2007) treats these state parameters as exogenous, arguing that adoption of the OAA programs and the benefits chosen were determined largely by political factors and administrative tinkering with the law. Given the absence of annual information on the incomes of the different age groups during the 1930s, we are not sanguine that we have fully controlled for the relative poverty of the age groups in the analysis, which is why we instrument for the state parameters. State control over most features continued even after the Social Security Act

The identifying instrument for the OAA measures is based on the long-term propensities of states to adopt new policy innovations with similar timing during different time periods. The wave of adoption of Old Age Assistance laws toward the end of the 1920s and during the 1930s followed on earlier waves of legislation at the state level. These included the initial establishment of state bureaus of labor statistics in the 1870s and 1880s, the introduction of factory inspectors in the 1880s-1890s, and the broad range of Progressive Era regulations, including workers' compensation and mothers' pensions, of the 1910s. As each new wave of proposals arose, some states showed a consistent pattern of adopting laws early, while others tended to be followers.[22]

We use the patterns of workers' compensation benefits across states and time from twenty years earlier as an instrument for the OAA measures. Workers' compensation was a major social insurance reform of the 1910s, just as OAA was a major social insurance reform of the 1930s. The specific instrument is the ratio of the state's expected workers' compensation benefits per capita based on the national average wage relative to the national average wage 20 years before the year in the sample. Fishback and Kantor (2000) constructed this expected benefits ratio to identify the differences across states and time in workers' compensation benefits that were driven by the parameters of the state laws.[23] Higher workers' compensation benefit ratios are expected to be correlated positively with each OAA measure. The instrument isolates the features of the timing and cross-sectional variation in OAA benefits that are associated with the long-term propensity of states to try new legislation of all

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of 1935. The federal government offered the matching grant opportunity to all states and set some basic administrative and residency requirements. Each state then enacted their own enabling legislation; therefore, the states set the benefits and determined the timing of the changes.

[22]For examples of these long waves, see Walker (1969), Gray (1973); Holmes (2005); Holmes, Fishback, and Kantor (2007), and Fishback, Holmes, and Allen (2008); Welch and Thompson (1980).

[23]The variable was created by Fishback and Kantor (2000). Details on the construction of the variable are discussed there in Appendix B. The data as well as details on the construction of the data are available in the "Datasets for Published Studies" section of Price Fishback's website at the Department of Economics at the University of Arizona, http://economics.eller.arizona.edu/faculty/Fishback.aspx.

kinds earlier rather than later. Given the long time lag between the 1930s and the 1910s, it is highly unlikely that the instrument would be correlated with the unobserved time-varying error in the final stage mortality difference equation. Potential correlation with the unobserved error is also unlikely because workers' compensation benefits were focused on workplace accidents in jobs that were rarely held by the elderly.[24]

Table 6 reports the key results and diagnostics for instrumental variable analysis with the difference between mortality rates for those aged 75 and over and the mortality rates for the group aged 55-64 as the dependent variable and all correlates and city and year fixed effects included on the right-hand side of the equation. As shown in Table 6, the coefficients of the workers' compensation instrument for each OAA measures have the expected positive sign and are statistically significant at the one-percent level in the first-stage OAA equation. Comparisons of the Kleibergen-Paap (2006, 2007) Wald F-statistic with the critical values for tests of weak instrument bias developed by Stock and Yogo (2002a, 2002b) reject the hypothesis of weak instrument bias if we are willing to accept a maximal weak instrument bias of 10 percent in the estimation for OAA spending per elderly person and for the maximum monthly benefit and a bias of up to 15 percent for the OAA payments dummy.[25]

The second-stage results for the three OAA measures are similar to the results from the difference-in-difference and difference-in-difference-in difference analysis in that none of the coefficients are both negative and statistically significant. The coefficient of the OAA

[24]We explored developing an instrument for the other relief programs variable. Given that the other relief programs targeted the entire population, it seems unlikely that the relative death rate of those 75 and older would have been a driving factor in the choice of other relief. We have estimated the model where we developed an instrument for other relief spending per capita based on an interaction between trends in relief spending per capita outside the region where the city was located and a measure of long run swing voting activity. When we instrumented for both OAA assistance and other relief per capita, the diagnostics suggested that our instruments were not as strong as they are in the reported analysis in Table 6.

[25]We have explored using several other instruments that have been used in other settings, by Fleck (1999) and Fishback, Haines, and Kantor (2007). The inclusion of other instruments typically reduced the strength of the first-stage equation a great deal.

payment dummy implies a rise in the difference between the death rates of those aged 75 and over and those aged 55-64 of 0.32 standard deviations. A one-standard-deviation rise in OAA spending per capita and the maximum monthly benefit was associated with 0.18 and 0.11 standard deviation increases in the death rate difference, respectively. We cannot reject the hypothesis of no effect for any of these coefficients.

7. Placing the Results in Context

The results in Tables 5 and 6 show very little sign that old-age-assistance programs contributed to a reduction in mortality among the elderly. The results we find here differ in some ways from those found by a concurrent and independent unpublished analysis performed by Andreea Balan Cohen (2007) for the period 1934 to 1955 using state-level aggregates. For the period 1934 to 1955 her OLS results suggest that OAA benefits reduced elderly mortality by about 3 percent, and her IV results suggest that OAA benefits reduced it by a statistically significant 22 percent.

There are some obvious differences between Balan Cohen's analysis and our analysis. In contrast with Balan Cohen, our goal is to examine how the presence of means-tested program would have helped reduce elderly mortality by itself during a period when no OASI-style federal pensions were being paid. The payments from the nationwide program likely influenced long-term savings and decisions by relatives and friends about supporting the elderly that are not easily measured. To avoid these confounding effects, we focus on the period prior to 1940 when no one was receiving OASI pension payments. We are also interested in the effectiveness of the state run systems operated in the early 1930s before the federal matching grants were initiated. As a result our focus is on the period 1929 through

1938, while most of Balan Cohen's analysis focuses on the period from 1935 into the 1950s after the federal matching grants were in place.

There is still overlap between the time periods in our analysis and in Balan Cohen's analysis; therefore, we examined several potential reasons for the differences in findings. Our data set centers on large cities; whereas Balan Cohen (2007) uses state level data that combines information for large cities, smaller towns, and rural areas. In the absence of Old Age Assistance, it is possible that access to public assistance might have been greater in large cities than in other areas. The BLS Survey of Almshouses in 1925 showed that the larger alms houses provided better housing and medical care in the cities than the typically smaller almshouses in rural areas (Stewart 1925). As a result, OAA laws in the 1930s that made OAA mandatory might have had stronger effects on mortality rates in areas outside the cities we studied. We estimated the difference-in-difference-in-difference analyses for the specification with the presence of the OAA payments using state level mortality data and also using mortality rates for the portions of each state outside the cities that we studied. Table 7 shows the results of these analyses using our city data, the state aggregates, and the state aggregates outside our cities. The coefficient for the cities is positive and 0.09, while the coefficients for the state aggregates and the states outside the cities are around -0.09. The magnitudes are roughly 1 percent of the mean value for the difference in mortality between people ages 75 and older and those ages 55-64, and are about 0.11 to 0.13 standard deviations. As a result, the coefficients suggest a more negative effect of OAA in rural areas than in our cities, but the standard errors are large enough that we cannot reject the hypothesis that OAA had no effect in the rural areas.

Our sense is that the differences arise because of changes in the nature of the OAA programs and medical care between the 1930s and the later years. The negative effect that

Balan Cohen (2007, Tables 2 and 3) finds for the overall mortality regressions for the period 1934-1955 comes from combining two periods that may have had different structures. We consider two possible factors that might account for the greater success of OAA in reducing mortality after 1938 than before that year: changes in the nature of medical care and a rise in generosity of the programs combined with a nonlinear effect of OAA.

The impact of better quality of medical care might well have been a significant factor. Even as late as the 1930s medical care in hospitals was rudimentary relative to the advances that followed. Melissa Thomasson and Jaret Treber (2008), for example, find that maternal mortality was actually slightly higher in areas with hospitals until sulfa drugs were introduced in the mid-1930s. Differences in medical care also fit Balan Cohen's (2007, Table 7) findings when she examines the effects of OAA on infectious disease mortality rates before and after the development of antibiotics. The coefficients for OAA are all positive and statistically insignificant for the period 1934-1943. For the period 1944 to 1955 the coefficients are all negative and statistically significant and larger in magnitude than in her examination of overall mortality for the period 1934 to 1955. Thus, means-tested aid to the elderly might well have had relatively little impact on elderly mortality until after the development of penicillin, other antibiotics, and additional medical techniques.

A second possible difference might arise if OAA did not have much of an effect on death rates until it raised an elderly person's income beyond a threshold level. We examined this issue in two ways. First, we compared the OAA monthly maximums in 1934, 1938 and 1949 after adjusting for inflation with the CPI (1967=1). We focus on monthly maximum payments because they appeared to be a target level of monthly income that states sought to help the elderly try to reach. By 1949 several states, including Colorado, Connecticut, and Oklahoma no longer had maximum payments and they were making average payments per

recipient ranging from $73 to $94 in 1967 dollars. California had the highest binding maximum at $105. That inflation-adjusted maximum was not too much different from those in 1938 and 1934 in our sample of cities. Colorado's maximum in 1938 in 1967 dollars was $106.6 and Massachusetts, New York, Kansas, and Louisiana had maximums of $95. In 1935 New York and Massachusetts had maximums of around $97. The difference in the distribution of inflation-adjusted OAA maximums comes more in the bottom tail, as the lowest payments in OAA states are much lower in the 1930s than in the 1940s.[26]

As a second check of the threshold effect, we have re-estimated the analysis by replacing the dummy for the presence of OAA payments with a dummy variable that takes a value of one when the monthly maximum was $40 or above or there was no maximum; the value is zero when the maximum was below $40 in contemporary dollars. If there were a threshold effect, we would expect a much stronger effect with the new dummy variable. The results are conflicting because the difference-in-difference-in-difference coefficient is negative at -0.41 and statistically significant, while the IV difference-in-difference-in-difference coefficient is a positive 0.35 and statistically insignificant. Based on the similarities in the upper portion of the distributions of benefits and these regression results, we cannot say definitively that the difference in results between our work here and Balan Cohen's findings for the 1940s and 1950s are being driven by nonlinear threshold effects. Our sense is that the differences are being driven by improved quality of medical care that could be purchased with the OAA benefits when the elderly were living on their own.

8. Were There Offsetting Effects for Different Causes of Death?

[26]The values were calculated from information in Berman (1947, 1949), Berman and Haskell (1945), and the information from the data set. The deflator is from U.S. Bureau of the Census (1975, series E-135, pp. 210-11.

The absence of a statistically significant reduction in mortality associated with OAA may hide several conflicting interactions created by the new programs. Absence of a formal program for means-tested OAA in a state in the 1930s did not imply that the impoverished elderly received no support at that time. Instead, the elderly were just one of many groups receiving benefits from the existing public assistance programs. The shift to OAA programs might not have led to much of a change in per capita welfare benefits available for the elderly. It is not clear that any more elderly were eligible under the new program who had not been eligible for the various forms of aid under the old program. In fact, the elderly might have preferred the types of direct relief offered under the Federal Emergency Relief Administration from 1933 through 1935 as the states were very careful in the way they defined eligibility for OAA. Many states required that the recipients of benefits had no family members available to support them. Further, the elderly with low incomes who owned houses were required by most states to sign over ownership of the home or sign a lien on the home to become eligible for benefits. In essence, the OAA served as a loan from the government against the value of the home when the recipient died. The programs benefited the elderly in that they were receiving a government subsidized loan that might not have been available in private credit markets. Moreover, the positive benefits might have been spread out to other age categories whose financial burden of taking care of the elderly was diminished.

The legislative acts typically claimed that a primary purpose of the law was to allow the elderly freedom to live on their own and not be lumped in with the rest of the poor in the almshouse programs. Mortality for the elderly was likely to fall if the elderly were able to move away from almshouses with low quality sanitary conditions and where the spread of disease was more likely. On the other hand, when OAA freed the elderly poor to live alone, they may have lost a feeling of connectedness to others in the community. Snyder and Evans

(2006) found social isolation to be an important factor adversely affecting the mortality rates for the elderly in the modern era. Further, the move away from almshouses might have reduced access to medical care. If they lived in a poorer district, their access to sanitation and water treatment facilities might not have been as good, which might have led to an offsetting increase in the death rate.

To test for a rise in deaths related to depression and a reduction of deaths from contagious diseases, we estimated the models for suicide rates and for death rates from diseases that potentially were contagious—infectious diseases like typhoid and paratyphoid fever, measles, scarlet fever, whooping cough, diphtheria, meningitis, some forms of tuberculosis and syphilis; another grouping of pneumonia and influenza; and another grouping of diarrhea and entiritis. The coefficients in Table 9 for the OAA variables in nearly all of the suicide specifications are negative although not statistically significant, which is inconsistent with the hypothesis that the move by the poor elderly from almshouses to living alone was leading to greater depression and higher suicide rates. The estimates for specific death causes related to contagious diseases are also inconsistent with the hypothesis that the move away from almshouses reduced death rates due to contagious diseases. The difference-in-difference and the difference-in-difference-in-difference coefficients are all negative, but none are statistically significant. Meanwhile, the IV difference-in-difference-in-difference coefficients are all positive. We also see no consistent pattern of negative and statistically significant coefficients in the estimates for influenza and pneumonia or for diarrhea and enteritis. When comparing all of the results for specific causes of death, it does NOT appear that the OAA movement to allow the elderly to live on their own outside of almshouses led to a rise in deaths due to depression that was offset by a decline in deaths from contagious diseases.

9. Conclusion

Simple correlations suggest that the means-tested OAA programs introduced by the states in the 1920s and 1930s were associated with lower mortality rates for the elderly. Given the emphasis on reporting the equivalent of simple correlations by public agencies at the time, OAA assistance could easily have been portrayed as a success in its early years. Unfortunately, the heart-warming story is not supported by more rigorous examination of the data for cities during the period 1929 through 1938. The results from difference-in-difference, difference-in-difference-in-difference and IV difference-in-difference-in-difference analysis show no statistically significant negative relationship between OAA and elderly mortality.

We had speculated that the OAA program goal of allowing the elderly to live on their own rather than in almshouses had led to offsetting changes in death rates from specific causes. By moving out of almshouses the elderly might have experienced less exposure to contagious diseases but by living alone they might have become isolated and more depressed with less access to medical care. Estimations with suicide rates were inconsistent with the view that deaths due to depression had risen, while estimations with deaths from contagious diseases were inconsistent with the view that deaths from contagious diseases had fallen. Our sense is that the move to OAA was largely an administrative move that did not do much to increase the resources for the elderly poor relative to the resources they received as participants in relief programs targeted at the entire population.

There may have been important ties between the poverty program for the elderly and access to new medical technologies that prolonged life. We use similar analytical techniques to those used by Finkelstein and McKnight (2005) for Medicare in the 1960s and Balan Cohen (2007) for OAA in the 1940s and 1950s. When the stream of work is considered in total, it suggests the following time path for the impact of old-age programs. We find statistically

insignificant effects of OAA on mortality in the 1930s, possibly because OAA in the 1930s was really more an administrative change than a true change in access to relief benefits for the elderly poor. This was also a period when medical care was relatively rudimentary. Balan Cohen (2007) finds that OAA benefits reduce mortality in the 1940s and 1950s when OAA payments could be used to make use of more effective medical techniques than those available in the 1930s. Although medical practice continued to improve in quality in the 1960s, Finkelstein and McKnight find no effect of the introduction of Medicare coverage of hospitalization and availability of subsidized health insurance for other procedures.[27] The lack of a Medicare effect on mortality may be a result of differences in the targeting of benefits. Medicare is a universal insurance program for the entire elderly population, while OAA is a means tested program focused on the poor elderly. Even if mortality did not fall with the introduction of Medicare, there were other benefits to the elderly population. Finkelstein and McKnight (2005) find that people in the upper fourth of the medical spending distribution experienced a decline of forty percent in their out-of-pocket costs.

One question remains. We suggest that OAA programs had little effect on elderly mortality in the 1930s because the OAA programs were an administrative shift that did not necessary increase the amount of benefits available to the elderly at risk of dying. If it was just an administrative shift, why do scholars like Friedberg (1999), Costa (1999), and Parsons (1991) find that higher OAA benefits in the 1940s allowed more women to live separately and men to reduce their labor participation. The OAA administrative shift was specifically designed to allow the poor elderly to live alone more readily than they could under the prior regime or through the New Deal relief programs in the 1930s. Once the extra costs of living alone are accounted for, the disposable income available to the poor elderly women receiving

[27] For a literature review on the impact of Medicare, see Levy, Meltzer (2001).

OAA might have been no different than if they were receiving smaller benefits while living in an almshouse or with a relative. Meanwhile, OAA gave elderly men who owned their own homes a new opportunity to live at home without working. OAA allowed the men to essentially take out a "loan" against the value of their home. They could obtain OAA benefits in return for giving the state a lien against (or ownership of) their home. They could stop working and their heirs would then receive the residual value of the home left over after the value of the stream of OAA benefits was repaid to the state. Since the elderly men who chose not to work even though they were able would be the group least likely to be at risk of mortality, the administrative shift could lead to a reduction of labor supply without a decline in mortality.

Appendix I

Construction of the Data

The sample consists of 75 cities for which annual data were available on all forms of relief spending from 1929 to 1938 and age-specific mortality information from 1922 to 1938. Data for relief spending of all types comes from Baird (1942) and it was reported either at the city level or at the county level. The information on the timing of passage of Old Age Assistance and the features of the laws come from Fishback and Thomasson (2006, p. 2-709), from copies of the original laws made from each state's legislative statutes, and from information provided by Dora Costa for 1940. The mortality rates were constructed from annual information on the number of deaths in each age group published by the U.S. Bureau of the Census (1925; 1926; 1927 a,b; 1929 a,b; 1930; 1932; 1934; 1935 a,b; 1936 a,b; 1937; 1938; 1939; 1940). The mortality rates were calculated at the city level based on the following formulas:

$M_{a,i,t} = (D_{a,i,t} / P_{a,i,t})*100$

where:

$M_{a,i,t}$ = estimated mortality rate for population of age a, in city i, year t

$D_{a,i,t}$ = deaths of people of age a, in city i, year t

$P_{a,i,t}$ = estimated population of age a, in city i, year t

Estimated population was determined using the following formula:

$P_{a,i,t} = \%C_{a,i,t} * P_{i,t}$

where:

$\%C_{a,i,t}$ = percentage of city i's population of age a, in year t

$P_{i,t}$= city total population in year t

$\%C_{a,i,t}$ was determined through linear interpolation using data at the city level collected by Haines from the 1920 and 1930 population census and at the county level by Gardner and Cohen for 1940 from the population census. Since we did not have information about the age distribution for cities in 1940 we used the age distribution from the counties in which the cities were located to obtain an estimate of the age group's share of the population.

For 16 cities in 1920 we needed to estimate a more detailed age distribution (55-64, 65 years old and older and over 75 years old) than the age distribution reported in the original source (population 45-64 years old and over 65 years old). For this, we interpolated the shares of the respective age groups as they were in those cities in 1930. For example, if age 75 and older represented 60 percent of the people age 65 and over in 1930, we applied that share to the population 65 and older in 1920 to determine the population age 75 and older in 1920 in that particular city.

We constructed mortality rates at the state level in the same way that we constructed the city mortality rates and from the same sources. We also followed the same procedures when we calculated the mortality rates for the areas of the states not included as part of our 75 cities.

In some specifications we incorporated city-specific time trends from the 1920s. We based these on linear regressions of the age-specific mortality rate on time over the earlier period for each city. The mortality rates for the 1920s were also constructed using the same procedure as above.

We also collected data on other correlates from a variety of sources. Information on the city population, the percentage illiterate, the percentage foreign born, and the percentage

black from the U.S. Bureau of the Census Population Censuses of 1920, 1930, and 1940 comes from the ICPSR file number 0003 as amended and corrected by Michael Haines in ICPSR file number 2896. The values for non-census years are linear interpolations between 1920, 1930 and 1940. The census reported illiteracy for people aged 10 and above in 1930 and then reported the number of years of school completed for people aged 25 and up in 1940. For 1930 we used the illiteracy rate for people aged 10 and above. We then estimated illiteracy rates for 1940 for people aged 25 and over. We used 1947 information from the U.S. Bureau of the Census (1948, 7) to find the number of people over 24 years old with no schooling and those with 1 to 4 years of schooling. The illiteracy rate in 1947 for persons with no schooling was 78.2 percent for male and 80.72 percent for females. The illiteracy rate for 1-4 years of schooling was 22.5 percent for males and 16.68 percent for females. We assumed those with more than 5 years of schooling were all literate. U.S. Bureau of the Census, "Illiteracy in the United States, October 1947," Current Population Reports: Population Characteristics, September 22, 1948. Series P-20 no. 20.

The retail sales information for 1929 and 1939 used to construct the economic activity measure retail sales per capita for the counties in which the cities were located came from ICPSR file number 0003, as amended and corrected by Michael Haines in ICPSR 2896 . Retail sales in 1933 and 1935 are from U.S. Department of Commerce, Bureau of Foreign and Domestic Commerce (1936, 1939). The county population estimates used to create the per capita measure was based on straight-line interpolations between 1920, 1930, and 1940 data from the amended ICPSR file 0003. We interpolated values of per capita retail sales in the intervening years using estimates of state personal income from the U.S. Bureau of Economic Analysis (1989). For each year between 1930 and 1940, we divided state personal income by an estimate of state population. Then to interpolate per capita retail sales between the benchmark years of 1929, 1933, 1935, and 1939, we used a formula like the one below for 1931:

$$R_{31} = S_{31} * (0.5 * R_{29} / S_{29} + 0.5 * R_{33}/S_{33}),$$

where R_t is per capita retail sales in year t for the county in which the city was located and S_t is per capita state personal income in year t. Both the per capita state income and per capita retail sales are adjusted for inflation using the CPI where 1967=100. For more specifics see below.

Information on the number of federal individual income tax returns filed in county for 1929 is from U.S. Department of Commerce, Bureau of Foreign and Domestic Commerce (1932); 1930, 1933, 1937, and 1938 from US Bureau of Internal Revenue (1932, 1935, 1939, and 1940, respectively); 1931, 1932, 1935, and 1936 from Rand McNally (1934, 1935, 1938, and 1939, respectively); 1934 from U.S. Department of Commerce, Bureau of Foreign and Domestic Commerce (1939).

Information on the number of hospital beds in the city was made available to us by Melissa Thomasson and Jaret Treber from their annual sample of hospitals in the United States that they used in their 2008 paper. This information was compiled by the American Medical Association (various years between 1930 and 1943).

Price Fishback created an urban cost-of-living index that can be used to make cross-sectional and time series comparisons in the cost of purchasing the same broad basket of goods each year over the period from 1914 through 1939 for up to 64 cities. The basic index starts with the Works Progress Administrations's comparison of the costs of "a uniform level of living" in 59 cities across the United States "at a given time and how its cost compared from one city to another." The WPA program constructed quantity budgets at two standards of living for a 4-person manual worker's household: "basic maintenance" and "emergency".

The study constructed an identical budget across the cities with certain adjustments for fuel, ice and transportation based on climate and other local conditions. The budget was divided into food, housing, fuel and light, clothing, furniture, and miscellaneous items. The Bureau of Labor Statistics (BLS) than helped WPA workers to obtain the prices used to compare the budgets across cities. U.S. Bureau of Labor Statistics 1940, p. 11; Works Progress Administration (1937, pp. ix-xxvi.) The actual numbers are found in Works Progress Administration (1937, pp. 158-175). For 32 cities, the values of spending from the WPA were adjusted to earlier and later years by using the Urban-CPI for each city. The U.S. Bureau of Labor Statistics consistently reported these figures for all 32 cities in the 1910s, 1920s, and 1930s using the CPIS for five categories of spending--food, housing, fuel and light, clothing, furniture, and miscellaneous items—that matched well with the five categories reported by the WPA for March 1935 and then summing to get a total. For a number of the other cities in the sample, the BLS reported a food CPI prices and we assumed that the time paths followed for other portions of the budget were similar to those for similar cities. A detailed description is available from Price Fishback.

Information on workers' compensation was collected from Fishback and Kantor (2000) and is available at Price Fishback's website at the University of Arizona (http://econ.arizona.edu/faculty/Fishback.aspx) under "Datasets from Published Research Projects." See the section on workers' compensation. Once this paper is accepted for publication, the data set used in the study will also be made available at the website.

Appendix II.

Intepreting the Coefficients as Measures of the Impact of OAA on the Death Rates of the Recipients of OAA.

The analysis and interpretations in the text focus on the impact of the OAA programs on the death rate of all of the elderly, recipients and non-recipients. Under certain assumptions the coefficient results can be used to say more about the impact of the OAA programs on the deaths of the recipients. The central data problem for evaluating the impact of the OAA policy on the people receiving OAA benefits is the lack of information on the number of deaths of people who received OAA benefits. We only know the total number of deaths of the people in the age group (including recipients and non recipients). Therefore, we have a problem with aggregation bias in the dependent variable and we estimate the relationship between the death rate for all elderly and total OAA payments per elderly person. In other words, we estimate

$$(D_R + D_N)/(R+N) = c + \beta_1 B/(R+N) + e \qquad 1)$$

Where
D_R = deaths among the elderly population who receive OAA benefits.
D_N = deaths of the non-recipient elderly population.
R = the number of elderly who receive OAA benefits.
N = the number of elderly nonrecipients.
R + N =the total elderly population.
B = total OAA benefits paid to the elderly, which equals total benefits paid to the recipients of OAA.
c = a constant term
e = a stochastic error term.

Throughout the discussion, we suppress the state and time subscripts to reduce clutter. To make the process simpler, we multiply through Equation 1) by (R+N) to obtain

$$(D_R + D_N) = c\ (R+N) + \beta_1 B + e\ (R+N). \qquad 2)$$

This is equivalent to estimating the number of elderly deaths as a function of total OAA benefits paid, holding constant the size of the elderly population. We can learn what the coefficient (β_1) on total OAA benefits (B) means by taking the derivative of equation 2) with respect to B.

$$dD_R/dB + dD_N/dB = c\ (dR/dB+dN/dB) + \beta_1 + e\ (dR/dB+dN/dB) \qquad 3).$$

Within the city population, if a total benefit increase would be associated with a rise in recipients that is exactly offset by a decline in the number of nonrecipients, then

$$(dR/dB+dN/dB) = 0.$$

Changes in OAA spending would not have influenced the overall size of the elderly population in the denominator if a rise (fall) in the recipient elderly population was exactly

offset by a fall (rise) in the nonrecipient elderly population. A rise in OAA spending at the margin likely would not have led to an in-migration of recipients because the rigorous rules for time as a resident would have blocked movement across state lines and within the state the benefit rates and eligibility standards were determined by the same state laws. OAA spending was such a small share of the tax burden that we do not believe that a change at the margin would have generated out-migration by elderly nonrecipients.[28] The overall population potentially could rise if an additional OAA dollar reduced the number of deaths in the recipient population over the course of the year. One way to eliminate the impact of the population size is to use the population at the start of the time period as the denominator. We have estimated the models using either an interpolated measure of the population between the census years or the 1930 population as the denominator. The qualitative results show little sign of OAA being associated with a reduction in elderly death rates.

If $(dR/dB+dN/dB) = 0$.

Then

$$dD_R/dB + dD_N/dB = \beta_1 . \quad 4)$$

If changes in benefits had no effect on the deaths of nonrecipients, $dD_N/dB=0$, the coefficient of the regression is an estimate of the impact of a change in total OAA benefits on the number of deaths of recipients.

$$dD_R/dB = \beta_1 . \quad 5)$$

To the extent that a rise in total benefits lowered the deaths in the nonrecipient population, say by reducing infectious diseases, $dD_N/dB < 0$, and the coefficient we estimate will be more negative than the effect of the death benefits on the recipients.

Can the Estimated Coefficient Be Interpreted As the Effect of Benefits per OAA Recipient on Death Rates of Recipients?

Another question that could be asked is: What was the effect of an increase in the typical benefit paid per recipient on the death rates of recipients of OAA? If we actually did have information about the number of recipients and the number of deaths among recipients, we would estimate the death rate of the recipient elderly as a function of the Benefits per eligible elderly person.

$$d_R = a + \gamma b + u, \quad 6)$$

[28] The tax burden of OAA on the elderly would have been very light because the tax burden was spread across all ages. Persons over 65 accounted for 5 percent of the population in 1930. Of that group assume a high figure of 20 percent on relief, so 1 percent of the population would have been elderly on relief. The typical OAA payment amounted to about $300 per year but a significant share of that would eventually come back from liens on houses, leaving $100 per recipient per year to come from taxes. This comes to $1 per taxpayer per year. A one dollar change in average benefits per year would have raised the cost to the typical elderly taxpayer by 1 cent, which seems well below the costs of shifting states to avoid the burden.

where

$d_R = D_R/R$ = death rate of recipients.
$b = B/R$ = OAA benefits per recipient.

Take the derivative of D_R with respect to B.

$$dd_R/db = \gamma. \quad 7)$$

In actuality, we estimate β_1 as described in equation 1)

$$(D_R + D_N)/(R+N) = c + \beta_1 b R/(R+N) + e \quad 8)$$

Now we manipulate the equation to put it into death rates for recipients and nonrecipients After rearranging on the left side

$$D_R /(R+N) + D_N/(R+N) = c + \beta_1 b R/(R+N) + e \quad 9)$$

Multiply some of the terms by $1 = R/R = N/N$

$$(D_R/R)*R/(R+N) + D_N/N*N/(R+N) = c + \beta_1 bR/(R+N) + e \quad 10)$$

Let $d_R = D_R/R$ and $d_N = D_N/N$ be the death rates for recipients and nonrecipients.

$$d_R*R/(R+N) + d_N*N/(R+N) = c + \beta_1 b R/(R+N) + e.$$
11)

let $s_R = R/(R+N)$ = number of recipients as share of elderly.

$$d_R* s_R + d_N (1- s_R) = c + \beta_1 b s_R + e. \quad 12)$$

Differentiate with respect to b, the OAA payments per recipient,

$$dd_R/db\ s_R + ds_R/db\ d_R + dd_N/db - dd_N/db\ s_R - ds_R/db\ d_N = \beta_1 s_R + \beta_1 b\ ds_R/db \quad 20).$$

Rearrange terms,

$$dd_R/db\ s_R + ds_R/db\ (d_R - d_N) + d\ d_N/db\ (1- s_R) = \beta_1 s_R + \beta_1 b\ ds_R/db \quad 13)$$

Substitute from equation 7), so that we can see the relationship between γ and β_1.

$$s_R \gamma + (ds_R/db)\ (d_R - d_N) + (dd_N/db)\ (1- s_R) = \beta_1 (s_R + b\ ds_R/db) \quad 14)$$

Divide through by $(s_R + b\ ds_R/db)$ and rearrange terms

$$\beta_1 = \gamma\ s_R/(s_R + b\ ds_R/db) + [(ds_R/db)\ (d_R - d_N) + (dd_N/db)\ (1- s_R)]/\ (s_R + b\ ds_R/db) \quad 15)$$

If the number of recipients as a share of the elderly population is not influenced by the average payment, then $ds_R/db=0$, and

$$\beta_1 = \gamma + [(dd_N/db)(1- s_R)]/ (s_R) \quad 16)$$

If non recipients experience no impact on death rates from the benefits, then $dd_N/db = 0$.

$$\beta_1 = \gamma \quad 17)$$

Therefore, the coefficient in the equation that we estimated will be the same as the effect of the benefit payments per recipient on the death rates of the recipients if the average benefit payments do not affect the death rates of the non-recipients and the average benefit payment has no causal effect on the number of recipients as a share of the elderly population.

There are two potential conflicting effects of OAA payments per recipient on the recipient share. During the Depression relief budgets were tight enough that administrators sometimes cut relief payments per person when the number of applicants rose so that they could help more households. On the other hand, the recipient share might have risen in response to a rise in benefits per recipient to the extent that some elderly reduced their attempts to earn income to obtain the more lucrative benefits. The OAA administrations tried to restrict this type of "moral hazard" in several ways. Of the 29 states in the sample listed in Table 2, 23 required that the elderly could only receive benefits if they did not have relatives available to care for them. For the home-owning elderly, 21 of the 29 states expected to be able to either apply a lien against the value of the home or might require a transfer of the property to cover the cost of the benefits, making OAA essentially a loan against the value of the home.

To the extent that the states stood firm on these rules, the perverse anti-work incentives would have been confined to the share of the elderly population that was renting with a spouse absent and not living with relatives. For this group the maximum OAA benefits per month in 1939 would have been $30 per month in 17 of the 29 states in Table 1, lower in five, higher in three. There were no maximums in four. We used the IPUMS data for 1940 to get a sense of the annual wage and salary incomes and typical rents paid by men and women aged 60-64 who were living without spouses as household heads and renting in cities. We chose ages 60-64 to get a sense of income for people who were nearing eligibility but whose decisions were not yet affected by OAA. The average annual wage and salary earnings for men and women in this group working 40 or more weeks per year was $1181 and $909, respectively. The average monthly rents paid by these men and women were in the neighborhood of $25 to $33, or roughly $300 to $400 per year. For the elderly able to work full time, the move to OAA would have lowered their income in most states from $900-$1200 to $360, of which a large share would have been consumed by rents. The larger share consumed by rents would have been true even if they paid rents of only $15 to $20 per month.

OAA was more attractive to the people in the group working less than 40 weeks per year and struggling to make ends meet. Men and women aged 60-64, living with no spouse present, renting in cities, and working less than 40 weeks per year in regular employment earned an average of $480 and $374, respectively. Men and women in the same category but working less than 40 hours per week on WPA projects earned an average of $360 and $326, respectively. These groups were more likely to reduce time worked to pick up marginal OAA dollars because the loss of a dollar of work income would have been offset by an extra dollar

of OAA payments once the person was below the OAA maximum benefit. Given the maximum monthly benefit of $30 in most states, the key annual cutoff was an income of $360 for the year. Using the IPUMS sample weights, we estimate that there were about 2200 women and 1800 men in cities renting without spouses present who were earning between $360 and $450 per year in 1940. This would account for about 0.3 percent of the population aged 60-64 or about 3 percent of the likely population on OAA relief once they hit age 65. This likely overestimates the extent of true moral hazard in this setting because these people were among the potential targets of OAA spending as they were struggling to reach the $360 income level and could easily fall below due to relatively small mishaps.

Interpreting the OAA Presence of Payments and Maximum Benefit Coefficients as Measures of Their Effect on the Death Rate of OAA Recipients.

As we discuss in the text, the maximum benefit really serves more as a minimum target level of income for people living on their own. In a state with a maximum benefit of $30, the recipients who have $15 a month in income would receive $15 in OAA benefits. Someone with no income would receive $30 in monthly OAA benefits.

Given the absence of information about deaths among the recipients of OAA, we can estimate the death rate for all elderly as a function of the maximum monthly benefit.

$$(D_R + D_N)/(R+N) = c + \beta_1 MB + e \qquad 18)$$

Where MB is the Maximum Monthly benefit

There is no easy conversion of β_1 into a measure of the impact of the maximum monthly benefit on the death rate of the recipients of OAA.

As we did in equations 9-14, we can rearrange terms to convert equation 18 to

$$d_R s_R + d_N (1-s_R) = c + \beta_1 MB + e \qquad 19)$$

where d_R is recipient deaths per recipient and s_R is the share of recipients among the elderly. After differentiating equation 19) with respect to MB, the equation becomes

$$dd_R/dMB\ s_R + (d_R - d_N)\ ds_R/dMB + dd_N/dMB\ (1-s_R) = \beta_1 \qquad 20)$$

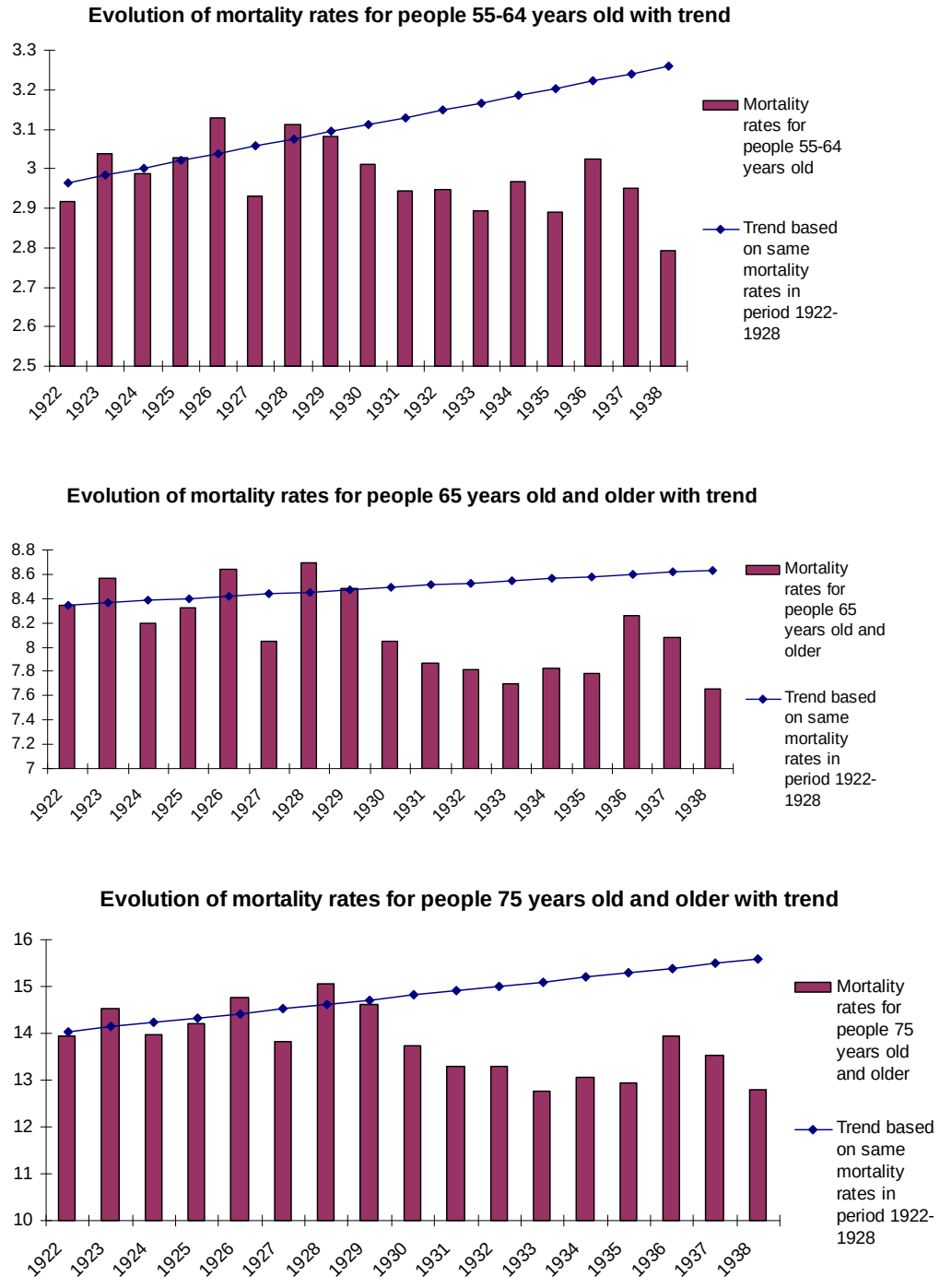
If the nonrecipient death rate is unaffected by the maximum benefit ($dd_N/dMB = 0$) and the number of recipients as a share of the elderly is unaffected by the maximum benefit ($ds_R/dMB=0$), then

$$\beta_1 = dd_R/dMB\ s_R \quad \text{or } \beta_1/s_R = dd_R/dMB. \qquad 21)$$

Therefore, the β_1 coefficient as an estimate of the effect of the maximum benefit on the death rate of elderly recipients varies with the recipient share s_R, which varies a great deal itself across time and place.

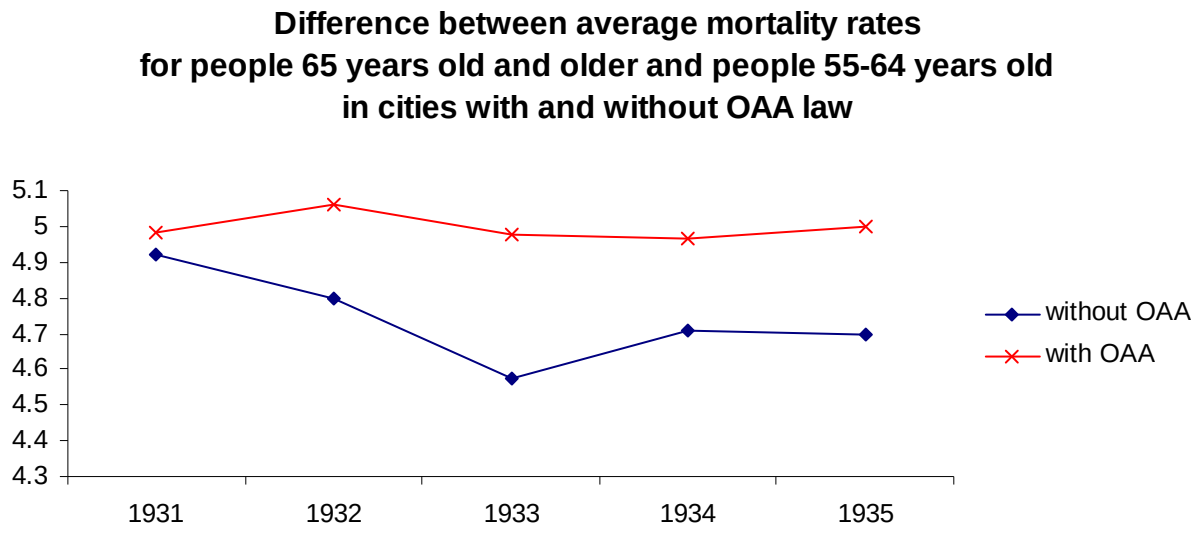
The same issue arises if we use the OAA dummy variable for the presence of an OAA program. Therefore, the cleanest estimation for interpretive purposes is to estimate the relationship between the death rate of the elderly as a function of the OAA payments per elderly person.

Figure 1.



Source: U.S. Department of Commerce, Bureau of the Census (1925, 1926, 1927a, 1927b, 1929a, 1929b, 1930, 1932, 1934, 1935a, 1935b, 1936a, 1936b, 1937, 1938, 1939, 1940).
Mortality rates are deaths per 100 people in the age group.
Note: 17 cities from the sample were not taken into account because we did not have mortality data for each year in the period 1922-1938. Trend is based on 1922-1928 period.

Figure 2.



Source: U.S. Department of Commerce, Bureau of the Census (1935a, 1935b, 1936a, 1936b, 1937)

Table 1. Timeline of Adoptions and Amendments for OAA Laws in States Where Cities in Our Sample Are Located

State	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939-40
Alabama	No Law							A, 65, $30, F			
California	No Law	A, 70, $30						65, F	$35		
Colorado	A(1927), 70, $30			65				F	$45		
Connecticut	No Law						A, 65, $30	F			$39
Delaware	No Law		A, 65, $25					F			
Florida	No Law						A, 65, $30		F		
Georgia	No Law								A, 65, $30	F	
Iowa	No Law					A, 65, $25		F			
Illinois	No Law							A, 65, $30	F		
Indiana	No Law					A, 70, $15		$30, F			65
Kansas	No Law								A, 65, $No Max, F		
Kentucky	A(1926), 70, $21								65, $15, F		
Louisiana	No Law							A, 65, No Max, F			
Massachusetts	No Law		A, 70, No Max					65, F			
Michigan	No Law					A, 70, $30		65, F			
Minnesota	A, 70, $30							65, F			
Missouri	No Law						A, 70, $30	F			65
Nebraska	No Law				A, 65, $20			F			
New Jersey	No Law			A, 70, $30				65, F			$40
New York	No Law		A, 70, No Max					F	65		
Ohio	No Law					A, 65, $25		$30, F			
Oklahoma	No Law							A, 65, $30, F			
Oregon	No Law					A, 70, $30		F		65	
Pennsylvania	No Law					A, 70, $30			F		65
Rhode Island	No Law						A, 65, $30	F			
Tennessee	No Law								A, 65, $25	F	
Utah	A, 65, $25							F		$30	
Virginia	No Law									A, 65, $20	F
Washington	No Law				A, 65, $30			F			
Wisconsin	A(1925), 70, $30							65, F			

Source: statutes and Social Security Yearbook 1939. Information on timing of adoption in the remaining states is in Appendix Table 1.
Note: "A" means the OAA law was adopted and is in effect; "A(1927)" means that the law is in effect since 1927; "70" or "65" denotes the minimum age required to be eligible for OAA payments; "$35" signifies the maximum monthly benefit (No max means no maximum monthly benefit was specified); "F" means that the state started to get subsidies from the federal government. If a change in legislation took effect before the mid of the year, we considered the law changed during that year, otherwise the change was assigned for the next year.

Table 2.
Details about OAA Legislation in Year States First Passed Law

State	Min. Years U.S. Citizen	Min. Years State Resident	Min. Years County Resident	Must Have No Relatives Available to Care For Them	Lien on Property	May Require Transfer of Property	Can Not Receive Other State Aid	Wealth or Property Eligibility Cap	Annual Income Eligibility Cap	Max. Benefit	Max. Total Income[4]	Avg. Monthly Pension, 1934	Mandatory	State Support	Share of Elderly Enrolled 1934[5]
AL	UorC	1	1	Yes	Yes	Yes	No	no	360	30	---	na	Yes	Yes	na
CA	15	15	1	Yes	No	Yes	No	3000	no	---	30	21.16	Yes	No	9.2
CO	15	15	15	Yes	No	Yes	Yes	3000	no	---	30	8.59	No	No	14.1
DE	15	5	0	Yes	No	No	Yes	no	no	---	25	9.79	Yes	Yes	9.7
FL	UorC	10	1	No	No	No	Yes	400	no	30	---	na	Yes	Yes	na
GA	0	1	0	No	Yes	No	No	no	no	---	30	na	Yes	Yes	na
IA	15	10	2	Yes	Yes	Yes	Yes	no	365	---	25	13.5	Yes	Yes	1.6
IL	UorC	10	1	No	Yes	No	No	5000	260	30	---	na	Yes	Yes	na
IN	15	15	15	Yes	Yes	Yes	No	1000	no	---	15	6.13	Yes	Yes	16.9
KS	0	1	0	No	Yes	No	Yes	no	no[3]	no	no	na	Yes	Yes	na
KY	15	10	10	Yes	Yes	No	No	2500	400	21	---	na	No	No	none
LA	0	5	UorC	Yes	No	Yes	Yes	no	no[3]	no	no	na	Yes	Yes	na
MA	20	20	0	No	No	No	No	no	no	no	no	24.35	Yes	Yes	12.8
MI	15	10	0	Yes	Yes	Yes	Yes	3000	365	---	30	9.59	Yes	Yes	1.8
MN	15	15	15	Yes	Yes	Yes	Yes	3000	no	---	30	13.2	No	No	2.8
MO	UorC	1	0	Yes	No	No	Yes	1500	no[3]	---	30	na	Yes	Yes	na
NE	15	15	0	Yes	Yes	Yes	Yes	no	300	20	---	na	Yes	Yes	na
NJ	UorC	15	1	Yes	No	Yes	Yes	3000	no	30	---	na	Yes	Yes	9.4
NY	UorC	10	1	Yes	No	No	No	no	no	no	no	22.16	Yes	Yes	13.7
OH	15	15	1	Yes	No	Yes	No	3000	300	---	25	13.99	Yes	Yes	5.8
OK	UorC	15	0	No	No	No	No	2000	350	15	---	na	Yes	Yes	na
OR	15	15	2	Yes	Yes	Yes	Yes	3000	no	---	35	na	Yes	No	na
PA	15	15	0	Yes	No	No	Yes	no	no	30	---	na	Yes	Yes	na

RI	UorC	5	UorC	Yes	Yes	No	No	5000	no	---	30	na	Yes	Yes	na
TN	0	1	0	No	Yes	No	No	no	no[3)]	---	25	na	Yes	Yes	na
UT	15	15	5	Yes	Yes	No	Yes	no	300	25	---	8.56	Yes	No	4.1
VA	0	1	0	Yes	Yes	No	Yes	no	no	---	20	na	Yes	Yes	na
WA	15	15	5	Yes	Yes	Yes	Yes	no	360	30	---	na	Yes	No	2.2
WI	15	15	15	Yes	Yes	Yes	Yes	3000	no	---	30	16.75	No	No	1.8

Source: State statutes in year of first passage. Average benefits in 1934 and Share of Elderly Enrolled are from Old Age Security Staff Report (1935, Exhibit B).

Notes for Table 2:

1. In columns "Minimum Years U.S. Citizen", "Minimum Years State Resident" and "Minimum Years County Resident" 0 means no requirements, UorC means the applicant needed to be a US citizen and/or a county resident at the date of the application.
2. "Yes" in column "Lien on Property" means that a lien was established for the property of the applicant and that after she died, the benefits granted were deducted from the value of the real estate, in many cases with an interest rate of 3-6 percent. However, the estate of the deceased was not settled until the surviving spouse died or ceased to occupy the estate. For states where column "May Require Transfer of Property" indicates "Yes", the commission in charge with determining and approving OAA benefits had the choice of requiring absolute conveyance of all or part of the property of the applicant. "Yes" in column "Can Not Receive Other State Aid" means that persons receiving OAA benefits were not entitled to receive other assistance from the state, except for medical reasons. "No" in all the cases means that there was no specification in the law regarding the particular issue.
3. Not a clear stated maximum income
4. The recipients' total income, the amount of aid plus all other income shall not exceed this maximum.
5. Share of population above the age of eligibility enrolled for benefits.

Table 3.
Percentage Distribution of OAA Monthly Grants Initially Approved for Recipients During the Fiscal Year 1937-38 in States in Our Sample

State	less than $5.00	$5.00-9.99	$10.00-14.99	$15.00-$19.99	$20.00-24.99	$25.00-29.99	$30.00-34.99	$35.00 or more
All states	0.8	10.7	23.3	21.8	18.4	10.7	8.4	5.9
Alabama	2.3	28.5	33.3	16.5	10	4.3	5.1	0
California	0.4	2.8	3.2	5.9	9.5	11.8	10.2	56.2
Colorado	0	0.4	1.1	2.8	5.7	7.7	15	67.3
Connecticut	0	2.4	2.2	13.3	17.4	24.9	39.8	0
Delaware	0	33.4	42.9	19.7	2	2	0	0
Florida	0	11.4	40.8	30.4	12.3	4	1.1	0
Georgia	4.8	58.7	24.8	7.2	2.6	0.9	1	0
Illinois	0	4.4	20.9	28.9	21.7	17.4	6.7	0
Indiana	0.6	8.8	36.3	31.3	16.1	5	1.9	0
Iowa	2.1	7	13.5	24.6	47.3	5.5	0	0
Kansas	0.5	12.8	27.5	25	16.4	10.1	6	1.7
Kentucky	0	47.3	48.3	4.4	0	0	0	0
Louisiana	5.8	46.4	34	8.4	3.7	0.9	0.7	0.1
Massachusetts	0	0.5	2.7	6.7	19.5	19	47.9	3.7
Michigan	0.5	3.4	23.8	32.3	24	10.4	5.6	0
Minnesota	0.2	4.3	12.9	34.3	28.1	15.5	4.7	0
Missouri	0.1	8.5	37.2	33.5	14.4	4.9	1.4	0
Nebraska	0	10.5	40.6	31.3	12.8	3.9	0.9	0
New Jersey	0	2.4	22.1	33.5	31.4	8.9	1.7	0
New York	0.1	1.4	17.6	22.2	23.1	17.8	10.7	7.1
Ohio	0.1	1.4	7.2	32.3	33.7	19.8	5.5	0
Oklahoma	0.9	10.2	43.9	18.7	15.9	6.4	4	0
Oregon	0	2.3	18.7	25.4	24.6	14.7	14.3	0
Pennsylvania	0.9	1.6	23.1	18.5	26	18.5	11.4	0
Rhode Island	0	4.7	28	23.3	23.8	13.9	6.3	0
Tennessee	0	15.4	51.8	22.5	6.8	3.5	0	0
Utah	0.1	2	5.1	18.8	23.2	16	34.4	0.4
Washington	0	0.1	9.9	14	28.8	17.7	29.5	0
Wisconsin	0.2	3.9	20.4	29.5	20.1	13.5	12.4	0

Source: Social Security Bulletin, November 1938, p.13.

Table 4.

Old Age Assistance: Relief Status Prior to Entering OAA Programs, 1937-1938

No assistance within two years:	57.7%
Some assistance within two years:	39.3%
- within 30 days:	30.1%
-general relief:	22.2%
-other public assistance:	3.2%
-Works Program earnings:	2.7%
-care in public institution:	1.3%
-private assistance:	1.2%
- none within 30 days:	9.2%
Unknown within two years, none within 30 days:	3.0%

Source: Social Security Bulletin, December 1938, pp. 3. The survey shows the relief status within 30 days and within 2 years prior to investigation of recipients accepted during the fiscal year 1937-38 in all states with plans approved by the Social Security Board.

Table 5.
Estimation Results for Mortality Rate Equations, Fixed Effects and Difference-in-Difference-in-Difference Specifications

	Dependent Variable: Mortality Rate Ages 75 and Over			Dependent Variable: Mortality Rate Ages 75 and Over Minus Mortality Rate Ages 55 to 64		
	1) No Correlates	2) Correlates Included	3) Correlates Plus Fixed Effects	4) No Correlates	5) Correlates Included	6) Correlates Plus Fixed Effects
Specifications Using OAA Payments Made (dummy)						
OAA Payments Made (dummy)	-0.2979*	-0.0850	0.0912	-0.0546	0.0551	0.0710
	0.1621	*0.1947*	*0.1473*	*0.1546*	*0.1794*	*0.1361*
Other Relief per Capita (1967$)		-0.0005	0.0016		-0.000014	0.0016
		0.0017	*0.0019*		*0.0017*	*0.0018*
Specifications Using OAA Payments per Person Ages 65 and Over						
OAA Payments per Person Ages 65 and Over(1967$)	-0.0007	-0.0005	0.0025*	0.0003	0.0007	0.0019*
	0.0006	*0.0009*	*0.0007*	*0.0006*	*0.0009*	*0.0007*
Other Relief per Capita (1967$)		-0.0011	0.0003		-0.0004	0.0005
		0.0015	*0.0018*		*0.0014*	*0.0018*
Specifications Using OAA Maximum Monthly Benefit (1967$)						
OAA Maximum Monthly Benefit (1967$)	-0.0055*	-0.0044	-0.0017	-0.0025	-0.0023	-0.0021
	0.0021	*0.0024*	*0.0020*	*0.0021*	*0.0023*	*0.0019*
Other Relief per Capita (1967$)		-0.0006	0.0019		0.0009	0.0019
		0.0018	*0.0020*		*0.0019*	*0.0018*

Sources: See Data appendix. Full specification for the OAA payments estimations is reported in Appendix Table 1.

* Statistically significant at 10 percent in two-tailed t-test.

Notes. White-corrected robust standard errors with observations clustered at the city level are reported in italics below the coefficient. The mortality rate is deaths per 100 people of that age. The Correlates include retail sales per capita (thousands of 1967$) and number of income tax returns as a percentage of population, number of beds in hospital per capita, a city cost of living index, and trends between census years in total population, percentage of population black, percentage of population illiterate, percentage of population foreign born. There are 734 observations.

Table 6.
Key Diagnostics for Instrumental Variable Estimation, Dependent Variable Equal to Difference Between Mortality Rate Ages 75 and Older and Mortality Rate for Ages 55-64

Specification With:	OAA Payments Made	OAA Payments per Person Ages 65 and Over	OAA Maximum Benefit where OAA Paid
Second Stage Coefficients and Standard Errors			
OAA	0.4181	0.0021	0.0037
	0.8001	*0.0040*	*0.0076*
First-Stage Coefficients and Standard Errors for Identifying Instrument			
Workers' Compensation Benefit Ratio 20 Years Before	. 201*	39.45*	22.56*
	0.063	*9.12*	*4.04*
Summary Statistics From First-Stage Equations			
Kleibergen Paap Wald F-statistic	10.20	18.73	22.02
Exceeds Stock-Yogo Critical Value for Maximal IV Size of	15 percent	10 percent	10 percent

Sources: See Data Appendix.
* Statistically significant at one percent level in two-tailed t-test.

Notes. The Kliebergen Paap Wald F-statistic is a version of the Cragg-Donald statistic when the standard errors are estimated robustly. The correlates in both the first- and second-stage regressions include per capita relief spending on other programs (1967$), retail sales per capita (1967$) and number of income tax returns as a percentage of population, number of beds in hospital per capita, a city cost of living index, and trends between census years in total population, percentage of population black, percentage of population illiterate, percentage of population foreign born, and year and city fixed effects.

Table 7.
Comparison of Results Between State and City Level Analysis for the Specification With the Presence of OAA Payments

Fixed Effects	Mortality Rate Age 75 and Over Minus Mortality Rate Age 55-64
City data	.0948
	(.1116)
State-cities data	-.0931
	(.0959)
State data	-.0970
	(.0852)

Sources: See Data appendix.
*** Statistically significant at 1 percent in two-tailed t-test.
** Statistically significant at 5 percent in two-tailed t-test.
* Statistically significant at 10 percent in two-tailed t-test.
Notes: The right hand-side measures were the presence of OAA payments (dummy) and state and city effects. The analysis in all cases is done for the 1930-1938 sample. Standard errors are reported in parenthesis (for the city level analysis standard errors are robust and clustered at the city level; for the state they are clustered at the state level.). For the state and state-cities level analysis the number of observations is 270 whereas for the cities level analysis there are 675 observations.
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Table 8.
Re-estimation of the Specification With Maximum Monthly Benefit as a Measure of OAA Program

DEPENDENT VARIABLE: Mortality Rate Ages 75 and Over Minus Mortality Rate Ages 55-64		
	Correlates Plus Fixed Effects	IV with Correlates and Fixed Effects
Maximum Monthly Benefit is High or Does Not Exist	-0.4064*	0.3499
	0.2137	*0.6758*
Other Relief per Capita (1967$)	0.0020	0.0014
	0.0019	*0.0015*

Sources: See Data appendix.

* Statistically significant at 10 percent in two-tailed t-test.

Notes. The maximum monthly benefit is a dummy variable with value equal to 1 if the maximum monthly benefit is $40 or there is no maximum and 0 if it is below that level. The remaining variables in the analysis are the same as those used for the results in Tables 5 and 6 and Appendix Table 1. White-corrected robust standard errors clustered at the city level are in italics below the coefficient..

Table 9.
Coefficients and Standard Errors for OAA Measures and Other Relief Per Capita in Estimations for Mortality Rates by Cause for Ages 75 and Over and the Difference in Mortality Rates Between Ages 75 and over and 55 to 64.

	Suicide	Infectious Diseases	Pneumonia, Influenza	Diarrhea and Enteritis
Dependent Variable: Deaths Per Thousand People Ages 75 and Over				
Specifications Using OAA Payments Made (dummy)				
OAA Payments Made (dummy)	-0.0564	-0.021	-0.123	0.0349
	0.054	*0.0544*	*0.383*	*0.0581*
Other Relief per Capita (1967$)	0.0015	-0.0004	0.0033	-0.0009
	0.0009	*0.0009*	*0.0055*	*0.001*
Specifications Using OAA Payments per Person Ages 65 and Over				
OAA Payments per Person Ages 65 and Over(1967$)	-0.00008	0.0002	0.0011	.0007*
	0.0005	*0.0004*	*0.0037*	*0.0004*
Other Relief per Capita (1967$)	0.0014	-0.0005	0.0024	-0.0011
	0.001	*0.001*	*0.0062*	*0.002*
Specifications Using OAA Maximum Monthly Benefit (1967$)				
OAA Maximum Monthly Benefit (1967$)	-.0006	-0.0008	-7E-05	0.0005
	0.0008	*0.0009*	*0.0053*	*0.0007*
Other Relief per Capita (1967$)	0.0015	-0.0003	0.003	-0.0008
	0.0009	*0.0009*	*0.0055*	*0.001*
Dependent Variable: Mortality Rate Ages 75 and Over Minus Mortality Rate Aged 55-64				
Specifications Using OAA Payments Made (dummy)				
OAA Payments Made (dummy)	-0.011	-0.024	-0.255	0.018
	0.053	*0.061*	*0.348*	*0.056*
Other Relief per Capita (1967$)	.002*	-0.0005	0.007	-0.001
	0.0011	*0.001*	*0.005*	*0.001*
Specifications Using OAA Payments per Person Ages 65 and Over				
OAA Payments per Person Ages 65 and Over (1967$)	0.0001	-8.00E-07	0.0007	0.0005
	0.0004	*0.0005*	*0.0036*	*0.0004*
Other Relief per Capita (1967$)	.0023**	-0.0005	0.0062	-0.0013
	0.0011	*0.001*	*0.0057*	*0.001*
Specifications Using OAA Maximum Monthly Benefit (1967$)				
OAA Maximum Monthly Benefit (1967$)	-0.00063	-0.00084	-7E-05	0.00047
	0.00078	*0.00086*	*0.005*	*0.00072*
Other Relief per Capita (1967$)	.0015*	-0.00031	0.003	-0.00085
	0.0009	*0.00092*	*0.0055*	*0.00103*

Dependent Variable: Mortality Rate Ages 75 and Over Minus Mortality Rate Ages 55-64				
IV Estimation				
Presence of OAA payments (dummy)	-0.4866	0.931	2.452	-0.0054
	0.4932	*0.498*	*3.116*	*0.3633*
OAA Payments per Person Ages 65 and Over (1967$)	-0.0019	0.0037	0.0097	-0.00002
	0.0019	*0.0016*	*0.0112*	*0.00143*
Other Relief per Capita (1967$)	-0.0041	0.0079	0.0207	-0.000046
	0.0040	*0.0037*	*0.0252*	*0.003066*

Sources: See Data appendix.

* Statistically significant at 10 percent in two-tailed t-test.

Notes. The mortality rates for each cause are per thousand people in the age group. Robust standard errors are reported in parentheses with observations clustered at the city level. Each regression included the following correlates: retail sales per capita (1967$) and number of income tax returns as a percentage of population, number of beds in hospital per capita, a city cost of living index, total population, percentage of population black, percentage of population illiterate, percentage of population foreign born. The identifying instrumental variable in the IV results is the workers' compensation benefits index from 20 years before used in Table 6. There are 584 observations from 1929 through 1936. Infectious diseases include typhoid and paratyphoid fever, measles, scarlet fever, whooping cough, diphtheria, epidemic cerebrospinal meningitis, other forms of tuberculosis and syphilis (last one not included in the 1929 data). The influenza category includes bronchitis and bronchopneumonia too.

Appendix III
Tables for Robustness Testing

This appendix includes a series of Tables showing the results of several types of robustness testing. Appendix Table 1 shows the full results for the difference-in-difference specifications for the death rate for people aged 75 and over.

Some commentators have thought that it might be useful to interact the old-age assistance variables with time and measures of economic activity. The interaction with a time counter is designed to see if OAA had stronger effects the longer the program was in place. The interaction with retail sales per capita is meant to measure whether the OAA program had a stronger effect in cities where the economy had turned down more on the grounds that OAA was more effective in areas with more poor elderly. Appendix Table 2 shows the results of the inclusion of these interaction terms. The results show the same qualitative findings as in the text, as there are no negative and statistically significant effects of the OAA programs.

In the text we focused on the death rates of people aged 75 and over because a number of states chose a minimum age of 70 for OAA assistance. We show the same sequence of results for elderly aged 65 and over in Appendix Tables 3 through 5.

Appendix Table 1
Coefficients and Standard Errors for Equations with "Mortality rate ages 75 and Over" as A Function of the Presence of OAA Payments in the City, with Means and Standard Deviations for All Correlates, OAA Measures, and Dependent Variables

	OAA Payments Made	OAA Payment per Person Ages 65 and Over (1967$)	OAA Maximum Monthly Benefit ($1967)	Mean	Std. Dev.
Constant	10.5794	9.7780	10.0586		
	3.5205	*3.5593*	*3.5059*		
OAA Payments Made	0.0912			0.56	0.50
	0.1473				
OAA Payment per Person Ages 65 and Over (1967$)		0.0025		79.85	115.84
		0.0007			
OAA Maximum Monthly Benefit ($1967)			-0.0017	45.65	39.19
			0.0020		
All Other Relief Spending per Capita (1967$)	0.0016	0.0003	0.0019	69.23	56.89
	0.0019	*0.0019*	*0.0019*		
Retail Sales per Capita (1967$)	-0.4584	-0.6415	-0.3884	1.94	0.43
	0.4365	*0.4091*	*0.4391*		
Tax Returns per Capita	0.0644	0.0458	0.0686	5.11	1.89
	0.0829	*0.0865*	*0.0841*		
Hospital Beds per 100 people	0.0336	0.0514	0.0479	5.38	1.90
	0.0642	*0.0654*	*0.0649*		
City Cost of Living Index	-0.6358	-1.2589	-0.5880	0.95	0.10
	2.1194	*2.0932*	*2.0930*		
Population Trend(000)	0.0004	0.0000	0.0002	447.73	920.43
	0.0016	*0.0011*	*0.0015*		
Percent Black Trend	-0.3715	-0.3633	-0.3580	7.30	9.79
	0.2135	*0.1993*	*0.2131*		
Percent Illiterate Trend	0.1300	0.2161	0.1370	3.30	1.76
	0.3671	*0.3447*	*0.3563*		
Percent Foreign Born Trend	0.1819	0.2507	0.1884	13.48	8.27
	0.0959	*0.0976*	*0.0966*		
Year 1930	-0.8689	-0.9042	-0.8380		
	0.2202	*0.2087*	*0.2213*		
Year 1931	-1.4235	-1.5097	-1.3330		

	0.4453	*0.4291*	*0.4432*		
Year 1932	-1.5277	-1.6910	-1.4189		
	0.6123	*0.5926*	*0.6106*		
Year 1933	-2.0804	-2.2060	-1.9727		
	0.5877	*0.5763*	*0.5865*		
Year 1934	-1.5975	-1.5994	-1.4542		
	0.5574	*0.5477*	*0.5530*		
Year 1935	-1.7320	-1.7515	-1.5905		
	0.5821	*0.5860*	*0.5789*		
Year 1936	-0.6704	-0.6959	-0.5281		
	0.6313	*0.6409*	*0.6220*		
Year 1937	-1.0797	-1.2961	-0.9193		
	0.6283	*0.6574*	*0.6207*		
Year 1938	-1.8332	-2.1749	-1.6695		
	0.6707	*0.6919*	*0.6627*		
Deaths Per 100 People. Ages 75-over				13.373	1.4235
Difference in Deaths Per 100 People. Ages 75-over minus Ages 55-64				10.515	1.3204

Sources and Notes. See Table 5. There are 734 observations. The errors are White-corrected robust standard errors clustered at the city level. The mortality rate is the number of deaths per 100 in the age group.

Appendix Table 2
Coefficients of OAA Measure and Interaction Terms in Fixed Effect and Difference-in-Difference-in-Difference Analyses

	Mortality Rate Ages 75 and Over			Mortality Rate Ages 75 and Over Minus Mortality Rate Ages 55-64		
	OAA Payments Dummy	OAA Payment per Person Ages 65 and Over	OAA Max Monthly Benefit	OAA Payments Dummy	OAA Payment per Person Ages 65 and Over	OAA Max Monthly Benefit
OAA Measure	0.0749	0.0033081	0.0037	0.05578	0.0019	0.00018
	0.4148	*0.0028*	*0.0049*	*0.3817*	*0.0027*	*0.00462*
OAA Measure * Time	0.0032	-0.000095	-0.0004	0.00303	0.000007	-0.00048
	0.0718	*0.0003*	*0.0009*	*0.0649*	*0.0003*	*0.00080*
OAA Measure	0.2627	0.0031	0.0053	0.072	0.0015	0.0028
	0.555	*0.0022*	*0.0067*	*0.5305*	*0.0022*	*0.0064*
OAA Measure*Retail Sales Per Capita	-0.0942	-0.00028	-0.0039	-0.00054	0.0002	-0.0027
	0.2782	*0.00078*	*0.0034*	*0.2682*	*0.0008*	*0.0032*

Notes. White-corrected robust standard errors with observations clustered at the city level are reported in italics below the coefficient. The mortality rate is deaths per 100 people of that age. The Correlates include retail sales per capita (1967$) and number of income tax returns as a percentage of population, number of beds in hospital per capita, a city cost of living index, and trends between census years in total population, percentage of population black, percentage of population illiterate, percentage of population foreign born. There are 734 observations.

Appendix Table 3
Estimation Results for Mortality Rate for Ages 65 and Over, Fixed Effects and Difference-in-Difference-in-Difference Specifications

	Dependent Variable: Deaths per 100 People Ages 65 and Over			Dependent Variable: Mortality Rate Ages 65 and Over Minus Mortality Rate Ages 55 to 64		
	1) No Correlates	2) Correlates Included	3) Correlates Plus Fixed Effects	4) No Correlates	5) Correlates Included	6) Correlates Plus Fixed Effects
Specifications Using OAA Payments Made (dummy)						
OAA Payments Made (dummy)	-0.1458	-0.0984	0.139*	0.09755	0.0417	0.119
	.0961	*0.1109*	*0.071*	*0.0715*	*0.0898*	*0.059*
Other Relief per Capita (1967$)		0.00006	0.0016*		0.00057	0.0015
		0.0010	*0.0010*		*0.0008*	*0.0008*
Specifications Using OAA Payments per Person Ages 65 and Over						
OAA Payments per Person Ages 65 and Over (1967$)	-0.00047	-0.0009*	0.0015*	0.00058*	0.00027	0.0010*
	0.00035	*0.00047*	*0.0003*	*0.00028*	*0.0004*	*0.0003*
Other Relief per Capita (1967$)		-0.0004	0.001		0.0005	0.0011*
		0.0009	*0.0009*		*0.0007*	*0.0007*
Specifications Using OAA Maximum Monthly Benefit (1967$)						
OAA Maximum Monthly Benefit (1967$)	-0.0023	-0.0025	0.0008	0.0007	-0.0004	0.0003
	0.0013	*0.0014*	*0.0010*	*0.0010*	*0.0012*	*0.0008*
Other Relief per Capita (1967$)		0.0004	0.0017		0.0009	0.0017*
		0.0010	*0.0010*		*0.0009*	*0.0008*

Sources: See Data appendix. Full specification for the OAA payments made (dummy) estimations is reported in Appendix Table 1.

* Statistically significant at 10 percent in two-tailed t-test.

Notes. White-corrected robust standard errors with observations clustered at the city level are reported in italics below the coefficient. The mortality rate is deaths per 100 people of that age. The Correlates include retail sales per capita (1967$) and number of income tax returns as a percentage of population, number of beds in hospital per capita, a city cost of living index, and trends between census years in total population, percentage of population black, percentage of population illiterate, percentage of population foreign born. There are 734 observations.

Appendix Table 4
Key Diagnostics for Instrumental Variable Estimation, Dependent Variable Equal to Difference Between Deaths Per 100 People Ages 65 and Older and Deaths per 100 People Ages 55-64

Specification with:	OAA Payments Made	OAA Payments per Person Ages 65 and Over	OAA Maximum Benefit where OAA Paid
Second Stage Coefficients and Standard Errors			
OAA	0.528	0.0027	0.0047
	0.359	*0.0018*	*0.0032*
First-Stage Coefficients and Standard Errors			
Workers' Compensation Benefit Ratio 20 Years Before	. 201*	39.45*	22.55*
	0.063	*9.12*	*4.69*
Summary Statistics From First-Stage Equations			
Kleibergen Paap Wald F-statistic	10.20	18.78	22.02
Exceeds Stock-Yogo Critical Value for Maximal IV Size of	15 percent	10 percent	10 percent

Sources: See Data Appendix.
* Statistically significant at one percent level in two-tailed t-test.

Notes. The Kliebergen Paap Wald F-statistic is a version of the Cragg-Donald statistic when the standard errors are estimated robustly. The correlates in both the first- and second-stage regressions include per capita relief spending on other programs (1967$), retail sales per capita (1967$) and number of income tax returns as a percentage of population, number of beds in hospital per capita, a city cost of living index, total population, percentage of population black, percentage of population illiterate, percentage of population foreign born, and year and city fixed effects.

Appendix Table 5
Coefficients and Standard Errors for OAA Measures and Other Relief Per Capita in Estimations for Mortality Rates by Cause for Ages 65 and Over and the Difference in Mortality Rates Between Ages 65 and over and 55 to 64.

	Suicide	Infectious Diseases	Pneumonia, Influenza	Diarrhea and Enteritis
Dependent Variable: Deaths from Cause per 1000 people Ages 65 and Over				
Specifications Using OAA Payments Made (dummy)				
Presence of OAA payments (dummy)	-0.002	0.005	0.2446	0.012
	-0.033	*-0.032*	*-0.179*	*-0.022*
Other Relief per Capita (1967$)	.0012*	-0.00005	-0.0004	0.00008
	-0.0005	*-0.0005*	*-0.0028*	*-0.0003*
Specifications Using OAA Payments per Person Ages 65 and Over				
OAA Payments per Person Ages 65 and Over (1967$)	0.0002	0.00025	0.0016	0.00025
	-0.0003	*-0.00027*	*-0.0018*	*-0.00016*
Other Relief per Capita (1967$)	0.0011	-0.00017	-0.0007	-0.00002
	-0.0005	*-0.0005*	*-0.0029*	*-0.0003*
Specifications Using OAA Maximum Monthly Benefit (1967$)				
OAA Maximum Monthly Benefit (1967$)	-0.0007	-0.0005	-0.0015	0.0004
	-0.0008	*-0.0009*	*-0.0056*	*-0.0008*
Other Relief per Capita (1967$)	.0017*	-0.0004	0.003	-0.001
	-0.0009	*-0.001*	*-0.0058*	*-0.001*
Dependent Variable: Mortality Rate Ages 65 and Over Minus Mortality Rate Aged 55-64				
Specifications Using OAA Payments Made (dummy)				
Presence of OAA payments (dummy)	0.0435	0.0014	0.1137	-0.0051
	0.0376	*-0.0381*	*-0.1391*	*-0.0224*
Other Relief per Capita (1967$)	0.002	-0.0002	0.0034	-0.0002
	0.0007	*-0.0006*	*-0.0023*	*-0.0003*

Specifications Using OAA Payments per Person Ages 65 and Over				
OAA Payments per Person Ages65 and Over(1967$)	0.0004	-0.00001	0.0012	0.0001
	0.0003	*0.00033*	*0.0016*	*0.0002*
Other Relief per Capita (1967$)	0.0019	-0.00015	0.0031	-0.0002
	0.0008	*0.00061*	*0.0025*	*0.0003*
Specifications Using OAA Maximum Monthly Benefit (1967$)				
OAA Maximum Monthly Benefit (1967$)	0.0003	-0.0003	0.0017	0.00001
	0.0006	*0.0006*	*0.0019*	*0.00035*
Other Relief per Capita (1967$)	0.002	-0.0001	0.0034	-0.00016
	0.0007	*0.0006*	*0.0023*	*0.00034*
Dependent Variable: Mortality Rate Ages 65 and Over Minus Mortality Rate Ages 55-64				
IV Estimation				
Presence of OAA payments (dummy)	-0.17070	0.08451	0.15184	-0.00473
	0.29329	*0.25267*	*0.13492*	*0.14349*
OAA payments per person aged 65 (1967$)	-0.00067	0.00033	0.00599	-0.00002
	0.00113	*0.00101*	*0.00471*	*0.00057*
Other Relief per Capita (1967$)	-0.00144	0.00071	0.01281	-0.00004
	0.00243	*0.00214*	*0.01076*	*0.00121*

Sources: See Data appendix.

* Statistically significant at 10 percent in two-tailed t-test.

Notes. Robust standard errors are reported in parentheses with observations clustered at the city level. Each specification included the following correlates: retail sales per capita (1967$) and number of income tax returns as a percentage of population, number of beds in hospital per capita, a city cost of living index,and trends between census years in total population, percentage of population black, percentage of population illiterate, percentage of population foreign born. The identifying instrumental variable in the IV results is the workers' compensation benefits index from 20 years before used in Table 6. There are 584 observations from 1929 through 1936. Infectious diseases include typhoid and paratyphoid fever, measles, scarlet fever, whooping cough, diphtheria, epidemic cerebrospinal meningitis, other forms of tuberculosis and syphilis (last one not included in the 1929 data). The influenza category includes bronchitis and bronchopneumonia too.

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