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Quantifying the mortality impact of the 1935 old-age assistance

GREGORI GALOFRÉ-VILÀ*, MARTIN MCKEE** AND DAVID STUCKLER***
**Department of Economics, Universidad Pública de Navarra and Institute for Advanced Research in Business and Economics, Pamplona 31006, Spain, gregori.galofre@unavarra.es*
***Department of Health Services Research and Policy, London School of Hygiene & Tropical Medicine, London WC1H 9SH, UK, martin.mckee@lshtm.ac.uk*
****Department of Social and Political Sciences, University of Bocconi, Milan 20136, Italy, david.stuckler@unibocconi.it*

In 1935, the United States introduced the old-age assistance (OAA) program, a means-tested program to help the elderly poor. The OAA improved retirement conditions and aimed to enable older persons to live independently. We use the transition from early elderly plans to OAA and the large differences in payments and eligibility across states to show that OAA reduced mortality by between 30 and 39 percent among those older than 65 years. This finding, based on an event study design, is robust to a range of specifications, a range of fixed effects, placebo tests, and a border-pair policy discontinuity design using county-level data. The largest mortality reductions came from drops in communicable and infectious diseases, such as influenza and nephritis, and mostly affected white citizens.

1. Introduction

The foundation of modern US social security can be traced to the expansion of old-age assistance (OAA) under the 1935 Social Security Act (SSA). It marked the origins of the US pension system, providing old-age support and retirement income. At its signing, President Roosevelt explained that the SSA would enable all citizens to live with dignity against economic hazards, noting that "Old age is at once the most certain, and for many people the most tragic of all hazards. There is no tragedy in growing old, but there is tragedy in growing old without means of support." It would transform a patchwork system of private coverage into a universal program of pension support. By 1972, the OAA was replaced by the Supplemental Security Income (SSI) alongside the old-age insurance.

The OAA was a means-tested program; it was funded from federal and state revenues collected from matching employer and employee contributions and was administered by states, with some involvement of the local governments (Lansdale *et al.*, 1939; Costa, 1998, 1999; Fetter, 2017; Fishback, 2017; Eichengreen, 2018; Fetter and Lockwood, 2018; Fishback, 2020). The federal government offered the matching grant opportunity to all states and set some baseline requirements. The most common criteria were having a little income, being older than 65 years, and being a resident of the state or with some period of residency in the state before claiming benefits. Each state enacted their own laws, with the states being also the actors that set the benefits and determined the timing of the changes. Payments

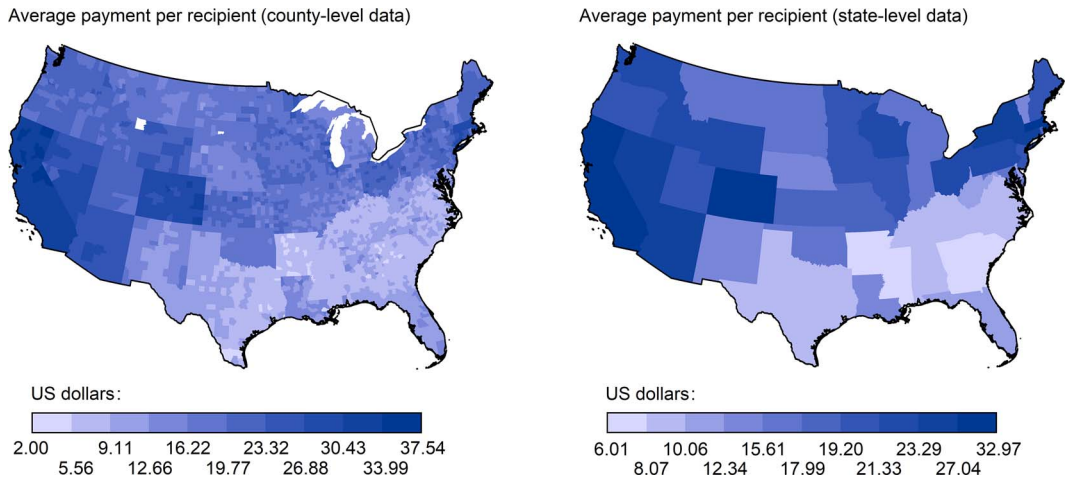

Figure 1. *County- and state-level variation in average payment per recipient in OAA, December 1939*. County-level data are from the Bureau Report of the Social Security Act (1940) and state-level data from the *US Social Security Bulletins* (several issues). The average payment under OAA is the ratio between the number of obligations incurred for payments to recipients and the total number of recipients, in current US dollars. Once county-level spending is adjusted by the number of recipients, most OAA variation is defined by the states. Remaining local differences are likely to be due to differences in the local prices and the local economy. In the county level, there are two counties colored in white highlighting missing data.

were determined mainly by each state, which would decide how much it would spend per person. The federal government matched state spending up to a maximum amount per person. In order to receive federal matching funds, a state had to involve some state financial participation and had to be administered, or at least overseen, by a state-level agency (Lansdale *et al.*, 1939; Fetter, 2017; Fishback, 2020). Usually, the federal funding share was about 30–50 percent, with the rest funded by states and local government units.

From its beginnings, the scale of coverage was substantial: within 5 years, about one-quarter of all US citizens older than 65 years received OAA benefits, averaging about $20 per month ($371 in 2020 dollars). As figure 1 shows, there was a good degree of heterogeneity across states and, in 1939, monthly OAA benefits ranged from $5 in Virginia ($94 in 2020 dollars) and $6.2 in Arkansas ($116) to $29 in Colorado ($540) and $31 in California ($572).[1] While most states passed OAA legislation in 1935 or 1936, some states such as Arizona, Georgia, and Kansas, passed legislation in 1937 and in 1938 in the case of Virginia. OAA transfers were set up as either an income or consumption floor (the latter including all means of resources). State or local OAA administrators compared needs minus resources and the difference determined the size of the payment, up to a maximum monthly level of about $30 ($558 in 2020 dollars) but ranging from $15 to $45, according to state laws, and with eight states having no statutory maximum. While none of the above sums spell anything approaching abundance, it furnished the minimum necessary to keep a foothold.

[1] Monetary units in parentheses refer to 2020 dollars.

By 1940, males were slightly better covered than females (as 52 percent of OAA recipients accepted in 1939/1940 were males).[2] Additionally, 43 percent of the recipients were also married; 38 percent, widowed; 10 percent, single; and 8 percent, divorced or separated. Of those married, 49 percent reported having a partner who did not receive OAA. In total, 76 percent also reported to have some kind of living arrangement, with 24 percent not living with relatives, 23 percent living alone, and 3 percent in institutions or similar. The OAA covered both urban and rural areas; 52 percent of the recipients were living in urban centers and 48 percent in rural settings.[3] On their physical conditions, 87 percent reported being able to care for themselves, 11 percent reported not being bedridden but requiring considerable care from others, and 2 percent were incapacitated. Additionally, almost one-quarter of the respondents were under medical care, supervised by physicians, or remaining in clinics and hospitals and 89 percent of the respondents also reported not receiving other type of assistance simultaneously.[4]

While there has been an extensive analysis of the impact of OAA on labor market outcomes (primarily early retirement) (Parsons, 1991; Fogel and Costa, 1997; Costa, 1999; Friedberg, 1999; Fetter and Lockwood, 2018), there is surprisingly little on demography and public health.[5] Stoian and Fishback (2010) showed that local programs for the elderly poor that existed before states passed OAA legislation had a little impact on death rates among the elderly. As already seen, despite the OAA being signed in the summer of 1935, it took 4 years after the passage of the SSA for all states to pass OAA laws. This expansion is consistent with the idea that it was not until states passed OAA laws and the program started to grow that old-age mortality declined. In many ways, our work is a continuation of Stoian and Fishback's paper, exploring the early expansion of the OAA programs and the departure from the earlier, old means of support. Our work also connects with Balan-Cohen's (2008) unpublished paper that tested for the contemporaneous effect (using panel data with fixed effects) of OAA on old-age mortality between 1935 and 1955. We compare our results with hers later in the paper.

More broadly, Fishback *et al.* (2007) showed that the New Deal spending (which included OAA payments after 1935) negatively correlated with mortality and Arthi (2018) showed that, for people who lived in the Dust Bowl during the 1930s, New Deal relief helped to reduce the negative effects of the "storm". There is also evidence that aid to dependent children (ADC), another program of the SSA, reduced infant and non-infant mortality (Galofré-Vilà, 2020); while mortality at older ages was unaffected by cash transfers to poor mothers. In Germany, there is also evidence that the introduction of compulsory German health insurance in 1884 (which was largely based on the Old Age and Disability Insurance Bill) reduced old-age mortality (Bauernschuster *et al.*, 2020).

It is highly plausible that such a large and enduring expansion under the OAA could reduce old-age mortality rates, for three income-related reasons: greater ability to afford adequate

[2] Statistics refer to the year 1940.

[3] An urban place is defined as places with more than 2,500 inhabitants.

[4] For those who received other assistance, 7 percent referred to general public assistance; 2 percent, work program earnings; and less than 1 percent, aid to dependent children with the other small categories being aid to the blind and assistance from a voluntary agency.

[5] For instance, Costa (1999) showed that higher OAA benefits allowed a higher share of women to live on their own and Friedberg (1999) showed that higher OAA payments helped the elderly to exit the labor force. Fetter and Lockwood (2018) showed that OAA reduced the labor force participation rate among men aged 65–74 years by eight percentage points.

nutrition, so lowering susceptibility to infectious diseases including tuberculosis, nephritis, whooping cough, and influenza, all endemic at the time; better access to health care, reducing "avoidable mortality", or deaths that should not occur in the presence of effective medical care; and improving heating and housing access and clearing people out of poorhouses (and unhealthy workplaces) further reducing susceptibility to winter-related diseases from damp, mold, and cold.

To test these hypotheses more rigorously, after a brief review of the origins and developments of the OAA (Section 2), we take advantage of variation in state benefits under the OAA and in the roll-out of the program to quantify the effects of pensions on mortality risks (Section 3). Section 4 concludes.

2. The OAA: a brief review

By the 1920s, there was no comprehensive system of social security in the United States. What existed was inspired by the English Poor Laws. Support for vulnerable and disenfranchised old-age groups was seen as the responsibility of their families and local administrations, with a key role for private organizations such as Poor Houses, philanthropic organizations, and charities such as churches (Fishback, 2020; Trattner, 1999). Montana was the first state to pass legislation in 1923 and ten states enacted social laws before 1930. But, as noted by Fishback (2020, 11), "state government allotted no funds" and Patterson (1969, 12) calculated that, by 1931, only 75,000 elderly Americans received help and that "pensions were very small". Indeed, these programs were restrictive and sweeping (i.e., asking for residency of 15 years). Commenting on early means of support for the elderly, Costa (1998, 16) said that, "in the past retirees were largely dependent on their own savings and on their families for support. Private pensions were rare, and old-age assistance programs had not yet been instituted." It was a patchwork system which was not inadequate for a massive catastrophe, such as the Great Depression (Costa, 1998; Fishback *et al.*, 2007; Fishback, 2017, 2020). Civil War pensions were a major source of old-age support for a time in the late nineteenth century but they only covered war veterans and their dependents and were not inclusive (Costa, 1998).

The New Deal spread immediate relief for social suffering across the United States. In 1933, President Roosevelt passed the New Deal, starting with the May 1933 Emergency Relief Act. The Federal Emergency Relief Administration used federal funds administered by states and local unites to provide work to those who had no jobs, as well as direct relief (Patterson, 1969). However, this initial plan became controversial because of the considerable discretion it gave to states and its targeting mostly of jobless people (Patterson, 1969; Wallis, 1991; Friedberg, 1999). An extension of relief was launched in November 1933, providing work relief to young Americans with the Civilian Conservation Corps and the Civil Works Administration. Overall, these temporary emergency programs were calling for something permanent and a redesign of relief in the US landscape, pushing the states and the federal government into a new role covering the elderly. As Costa (1998, 168–170) commented, "the Great Depression provided social reformers with a unique political opportunity to enact comprehensive social legislation" where "the Great Depression revived the old-age pension movement and eroded opposition to old-age pensions among employers, trade unions, and the general population."

Social security for the elderly came in the summer of 1935, with the launch of the SSA. The lion's share of the SSA was the OAA for the elderly poor, providing access to health care, pensions, improved conditions of the labor market for retirement, and allowed the elderly

to live independently.[6] Although, to our knowledge, state-level tabulations on payments or recipients prior to 1935 do not exist, using city-level data for 116 urban areas, Baird (1942) showed a sharp rise of aid for the elderly after the passage of OAA, with payments moving from negligible amounts in 1930, to less than 2 million in 1934 and more than 12 million in 1938 (figure A1).

Even though some New Deal programs were critiqued for inherent racism, excluding non-white populations, we find that the OAA was a fairly neutral program and although it did not do much to be inclusive, it understood that African-Americans should be represented, or even overrepresented relative to their share of the population.[7] American officials working at the US Social Security Board, using the language of that time, commented that "Among recipients accepted in both 1936-37 and 1937-38, the proportion of Negroes was large in relation to the total number of Negroes 65 and over ... Negroes as a group constitute a less privileged portion of the population, and it is extremely unlikely that the number aided is disproportionate to the number of aged Negroes requiring public assistance to maintain a minimum standard of living." (US Social Security Board, 1939, 24). Yet, by 1939, just 11 percent of OAA recipients were African-American citizens with African-American represented around 10 percent of the US population. As depicted in figure 1, the average payment in the southern states was also lower than the national payment. Quadagno (1988) argues that southern states kept average pensions low out of fear that old-age pensions might subsidize Afro-American families, thereby raising labor costs in cotton agriculture. Similarly, Alston and Ferrie (1985, 116) pointed out that southern legislators chose not to accept all the federal money to which they were entitled, to maintain cheap labor and "assure that those most needed in cotton cultivation were kept off the welfare rolls."

3. The OAA effects on mortality

To explore the effects of OAA on mortality, we make use of four empirical strategies.[8] First, we use an event study design using data from 1927 to 1944 as our main source of causality (Section 3.1). This is followed by a difference-in-differences analysis to show that states that passed more generous OAA laws after 1935 had greater declines in old-age mortality (Section 3.2) and panel data with fixed effects between 1935 and 1944 that allowed us to look at thin age and race groups and observed payments per recipient along with recipiency rates (Section 3.3). Finally, to control for local shocks and potential endogeneity in OAA policy (i.e., differences in policy correlated with other unobserved population characteristics), in a spirit similar to Fetter (2017) and Galofré-Vilà (2020), in a cross-sectional setting for 1937 and 1939, we exploit county policy comparisons across state borders (Section 3.4).[9]

[6] A fundamental feature of the OAA was the shift away from local provision of transfer payments to state and federal provision. Fetter (2017) calculated that the federal intervention increased recipiency rate by around 20 percent.

[7] For instance, some components of the New Deal, such as the Agricultural Adjustment Administration, were perceived as potentially discriminatory on race grounds (Lieberman, 1998; Fishback *et al.*, 2001; Katznelson, 2013).

[8] A limitation in our setting is that mortality is only one reflection of population health and, ideally, morbidity data capturing disability would be available. A strength, however, is that surveillance of mortality, especially all-cause mortality, is consistent across US states at this time, and death is an unambiguous event.

[9] On the border discontinuity, see also Dube *et al.* (2010) and Galofré-Vilà *et al.* (2021).

3.1. Event study specification

We begin by exploring the impact of OAA on mortality with an event study design. We take advantage of the roll-out of the program to specify the OAA effects on mortality risks. For additional causal interpretation, since for being eligible one needed to be older than 65 years, we split the sample into those above the age of 65 years (eligible) and those just immediately below, between 55 and 64 years but otherwise similar (control group).[10] Moreover, cause-specific death rates also enable us to look at the mechanisms behind the effect of OAA on the elderly death rates. The baseline estimating equation for the main empirical specifications is

$$\log \mathrm{CDR}_{\mathrm{stai}} = \alpha + \sum \beta_{\mathrm{k}} \, \mathrm{OAA}_{\mathrm{st}} + \Lambda' \, \mathrm{X}_{\mathrm{st}} + \mu_{\mathrm{s}} + \delta_{\mathrm{t}} + \mu_{\mathrm{s}} \times \mathrm{t} + \mathrm{e}_{\mathrm{st}}, \tag{1}$$

where the dependent variable is the logarithm of the crude death rate in the state s and year t (t = 1927, . . . , 1944), in the age group a (a = 55–64 and above 65 years), and cause of death i (i = all, cancer, influenza, and nephritis). We stop in 1944, close to the end of World War II when Roosevelt died, as under Truman's administration, OAA was extensively reformed. Mortality data come from a novel dataset using data from the *Vital Statistics of the USA*. For each year and state, we adjusted the number of deaths for the population in the age group a. As defined by k, in the event study, we use a binary indicator of treatment equal to 1, with leads and lags before and after the target year in which the states made their first federal subsidized OAA payments under the SSA. Since k = 0 differs by state, the dummy variables will take effect in (or have been in effect for) 1, 2, 3 years, and so on. For instance, if the state of New York made its first payments in 1936, we entered dummies for years 1927–1935 and 1937–1942, with 1936 being the omitted category. Additionally, $\Lambda' \, \mathrm{X}_{\mathrm{st}}$ are state- and time-varying controls. Here, we use the basic controls in demography and the literature of the New Deal (see Fishback, 2017). We control for income per capita using the data from Fishback and Kachanovskaya (2015) and the urban share (using census data). Additionally, we also apply state-fixed level effects (μ_{s}), year fixed effects (δ_{t}), and state-specific year trends ($\mu_{\mathrm{s}} \times \mathrm{t}$). Robust standard errors are clustered at the state level as OAA was organized by each state. Descriptive statistics for all variables are available in table A1.

Figure 2 shows that the passage of state OAA legislation coincided with a persistent and statistically significant reduction in old-age mortality. For those older than 65 years, after 9 years of intervention, OAA reduced mortality by 39.7 percent (95% CI: from −71.2 to −8.25). By contrast, those below the age of 65 years (those not eligible) are unaffected by the passage of the OAA, as results are not statistically significant before or after the intervention. Standard errors also increase after 1935, indicating growing heterogeneity in OAA laws and programs after 1935.

For comparison, Stoian and Fishback (2010) reported that previous means of support to the elderly poor accounted for between 9 and 29 percent (according to specification and use of fixed effects) of the decline in mortality for people aged 75 years and older. Balan-Cohen

[10] The use of 65 years as the age of retirement has a long history. Union Army veterans were also at least 65 years old, and many of the state old-age pension laws enacted before 1933 had a pension at the age of 65 years and railroad retirements were also set at age 65 years in 1934 (Costa, 1988). A limitation in this setting is that although in the 1940s payments were given jointly to husbands and wives, it is possible that a husband or a wife could also enjoy the program if his/her partner received OAA support (despite being younger than 65 years). Yet, our results using 5-year age bands in Section 3.3 did not detect any statistically significant association that would have been expected if this was an issue in our setting.

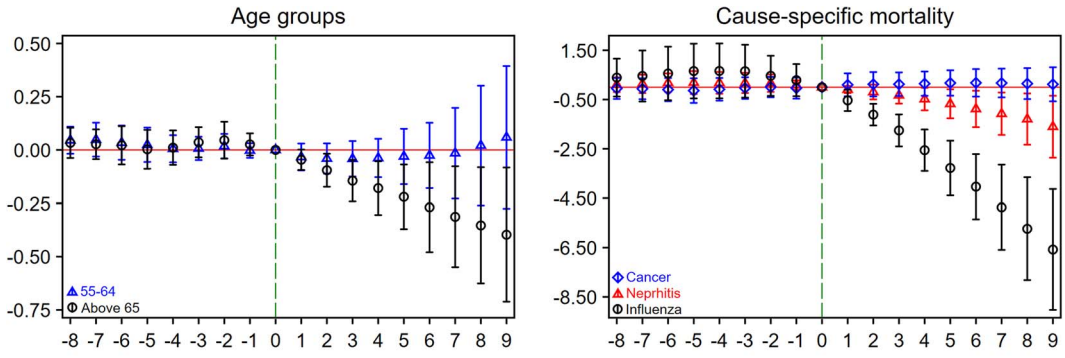

Figure 2. *State-level event study on the effect of OAA on mortality rate (in logarithms) by age groups (55/64 and above 65 years) and cause-specific mortality for those older than 65 years, 1927–1944*. The outcome variable in the crude death rate in different age groups (55–64 and above 65 years) and in logarithms. The cause-specific mortality analysis (right figure) only displays data for those aged 65 years and older. For each state, we use a binary indicator of treatment equal to 1, with leads and lags before and after the target year in which the states made their first OAA payments under the SSA. For details, see text. Results are conditional on income per capita and the urban share. We also add state and year fixed effects and state-specific year trends with robust standard errors clustered at the state level.

(2008) estimated that OAA benefits reduced elderly mortality by just 22 percent. While this is also a sizeable effect, our results are larger because the age groups we compare are different and she tested for the contemporaneous effects of OAA with panel data and fixed effects over a longer period (1934–1955).[11] Instead, we look at the launch and implementation of the program and its early effects. In our setting, in principle, we can discount the effects of antibiotics, as they were not introduced widely until the late 1940s (Stoian and Fishback, 2010; Bhalotra and Venkataramani, 2011; Floud *et al.*, 2011). Our effect sizes are also smaller than those from the studies of Medicaid initiation and expansion in the 1960s and 1970s that reduced child mortality by between 30 and 90 percent (Currie and Gruber, 1996a, 1996b; Goodman-Bacon, 2018). The same is true for ADC, a much smaller program than the OAA, organized alongside OAA, which reduced child and maternal mortality (those between 20 and 49 years) by more than 20 percent between 1935 and 1944 (Galofré-Vilà, 2020).

We also show that OAA was mainly associated with reductions in infectious and communicable diseases such as influenza and nephritis. Placebo tests reveal that some causes of death unlikely to be affected by OAA funds, such as deaths from cancers (which would have a long lag between carcinogenesis and death), were uncorrelated with OAA. Influenza and nephritis were important causes of death back in 1940. For instance, in all age groups, deaths from nephritis accounted for just below 7 percent of all deaths and for 11 percent for those older than 65 years. These are causes that could plausibly be linked to short-term economic stress, with many deaths avoidable with effective care and nutrition, or avoided

[11] Costa (1998, 168) commented that before the OAA, the "elderly risked becoming dependent on outdoor relief or on the almshouse, an institution increasingly regarded as inhumane."

with better housing conditions. As noted by Costa (1999), Fetter and Lockwood (2018), Friedberg (1999), and Parsons (1991), it is also likely that the ability to exit the labor force at an earlier age also allowed the elderly to escape unhealthy places such as factories and sewing workshops. Overall, our results point to the OAA being able to reduce old-mortality rates by providing better nutrition, improving heating and housing access, and clearing people out of poorhouses (and unhealthy workplaces), further reducing susceptibility to winter-related diseases from damp, mold, and cold.

In figure A2, we also show that our results look very similar without controls. This is because one threat to interpreting our findings is that average payments could track state incomes quite strongly and those can change differentially across states over time (in principle directly affecting mortality).[12] Another robustness we pursue in figure A2 is to control directly for OAA benefits levels in order to show that old-age mortality trends were common not only between states that implemented OAA at different times but also between more and less generous states. Since, to our knowledge, state-level tabulations on OAA payments or recipients prior to 1935 do not exist, we rely on the city-level data from Baird (1942), to proxy state-level payments before and after the passage of the SSA (from 1929 to 1941). Our bottom line is that even after controlling for OAA benefits and showing unadjusted results, our baseline findings presented in figure 2 remain unchanged.

3.2. Difference-in-differences

We next show that our results are unlikely to reflect common shocks as states that had similar health conditions but had different OAA plans differed in the scale of mortality. Using a difference-in-differences framework, we distinguish between states based on generosity. Specifically, we compare mortality rates before and after the OAA implementation (first difference) and between states with above or below median payments per recipient (second difference).[13] As in the event study, the post-treatment period begins in the years in which states made their first OAA payments. The payment generosity variable is defined by the median value of OAA payments per capita between 1935 and 1944, with an indicator equal to 1 if payments were above the median value and 0 otherwise. Results are consistent with alternative cut-offs such as the lower quartile of the distribution, or the median value of OAA payments per recipient in a specific year, with results not being driven by how the second difference is defined (unreported here). We add the same controls as in the event study (i.e., income per capita and urbanization) with state and year fixed effects, year trend, and standard errors clustered at the state level.

Table 1 depicts the differential effects between high- and low-spending states and shows that old-age mortality rates (above 65 years) declined faster in states that adopted more

[12] It is also possible that margins in the presidential elections might have mattered in the distribution of OAA funds (Balan-Cohen and Ban, 2015). However, since the OAA was a means-tested and state-administered pension program, issues of political corruption are not a concern (Eichengreen, 2018). Troesken (2006) also opines that any type of regime change (from local to state/federal) disrupt existing links and thereby reducing corruption. Recent works from Fetter (2017) and Fetter and Lockwood (2018) show that we can also be confident that the level of discretion under the SSA might have been low. Indeed, as OAA operations were strictly controlled by an independent agency (the US Social Security Board), that minimized corruption and discretion in the allocation of funds, at least at the state-level. We can also discount issues of migration (i.e., people moving to state that offered better aid plans) as there were residence requirements for applying to OAA (most likely 5 years).

[13] As commented in Section 3.3, after 1935, the *US Social Security Bulletins* start to report state-level payments per recipient.

Table 1. *State-level panel data on the impact of differential effects of OAA on above 65 crude death rate (in logarithms), 1927–1944*

	(1)	(2)	(3)	(4)
Above median OAA payments × post-OAA	−0.322*** (0.081)	−0.319*** (0.083)	−0.291*** (0.083)	−0.331** (0.123)
Number of observations	861	861	861	861
R^2	0.847	0.848	0.850	0.897
Controls	No	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
State fixed effects	Yes	Yes	Yes	Yes
Census division × specific year trends	No	No	Yes	No
Census division × year fixed effects	No	No	No	Yes

The outcome variable is the above 65 crude mortality rates (in logarithms). In the difference-in-differences framework, the post-treatment period begins in the years in which states made their first OAA payments, with an indicator equal to 1 for the years that states made OAA payments and 0 otherwise. The payment generosity variable is defined by the median value of OAA payments for 1935–1944 with an indicator equal to 1 if payments were above the median's value and 0 otherwise. Results are conditional on income per capita and urbanization rates as defined in the text with standard errors (in parentheses) clustered at the state level and fixed effects as defined in the table. *** $p < 0.01$. ** $p < 0.05$. * $p < 0.1$.

generous and earlier OAA plans. In our more parsimonious specification (column 1), OAA accounted for 32.2 percent of the decline in the 65 years and older mortality rate (95% CI: from −48.5 to −15.9). These results can be interpreted as lower bounds of the full effect of OAA on old-age mortality as they are based on the difference between high- and low-spending states. These results hold across a range of specifications even after adding division-specific year trends and division-by-year fixed effects (columns 3 and 4) to capture any time-varying factors at the division level, such as geographic policy changes and preference for redistribution differences.

3.3. Panel data with fixed effects

While our main causal results come from the event study, we also use panel data from 1936 to 1944 with state and year fixed effects to test the contemporaneous impact of OAA on elderly mortality rates and describe in more detail the age discontinuity of the program. After the census of 1930, mortality was reported by thin age intervals allowing us to look at mortality by 5-year age bins. After 1935, the *US Social Security Bulletins* also reported the number of payments per recipient, allowing us to express the number of payments per recipient instead of per capita, or directly measure OAA policy by the recipiency rate. Specifically, using state-level slopes, we use the following equation:

$$\log \mathrm{CDR}_{\mathrm{star}} = \alpha + \beta_1 \log \mathrm{OAA}_{\mathrm{st}} + \Lambda' \mathrm{X}_{\mathrm{st}} + \mu_{\mathrm{s}} + \delta_{\mathrm{t}} + \mathrm{e}_{\mathrm{st}}, \quad (2)$$

where CDR is the crude death rate defined by the number of deaths adjusted by the population in 1940 (in logarithms and per thousand) in the state s (s = 1, ...,49), year t (t = 1938, ...,1944), age group a (a = 50–54, 55–59, 60–64, 65–69, 70–74, +75 years) and race r (r = all, whites, and non-whites). For OAA, we use the tabulation of the *US Social*

Security Bulletins measuring the variable OAA as payments per number of recipients (also logarithms). As in the previous settings, $\Lambda' X_{st}$ add the same state- and time-varying controls plus state (μ_s) and year (δ_t) fixed effects with standard errors clustered at the state level. Since we use fixed effects models, mortality here can be interpreted as excess mortality or deviations of mortality from its within sample mean.

Table 2 reports the main results, adding different levels of controls. We first display the results of equation 2 (column 1) and then we add a year trend (column 2), census division-specific year trends (column 3), and census division year fixed effects (column 4). As already seen, these latter controls mop up any time-varying factors at the division level. Results by different age groups show that none of the groups below the age of 65 years benefited from the new social scheme for the elderly in terms of health, while results for those 65 and 69 years old and above display statistically significant coefficients. Since we use data in logarithms, results in table 2 display elasticities; so for instance, in our most parsimonious specification (column 1), each percentage point of OAA payments per recipient is associated with a reduction in mortality rates of 10.6 percent in the 65–69 age band (95% CI: from −15.6 to −5.6), and in our most demanding model (column 4), the impact declines to 6.5 percent (95% CI: from −11.5 to −1.6). Note that between 1938 and 1944 mortality rates in the 65–74 age group declined by 3.4 percent.[14] Results by age bands fit with the coverage of the program, as the tabulations of the *US Social Security Board* (1940) show that 58 percent of those accepted during fiscal year 1939/1940 were between 65 and 69 years. As expected, the sizes of the coefficients are also larger for those above the age of 65 years when compared with younger cohorts.

In columns 5 and 6, we also split the results for white and non-white death rates, yielding two important results. The age discontinuity is still visible when looking at whites and non-whites, and while OAA affected both groups, the whites benefitted disproportionately more of the new social scheme in terms of health (with the effect for the 65–69 age groups being five times larger for whites). This is an important result and links with previous work on the impacts of the OAA on the labor market, where Costa (2010) showed that OAA helped early retirement for African-Americans and Fetter (2017) that improved access to old-age support. Our descriptive work also shows that the OAA somewhat helped to reduce non-white mortality, but their impact for reducing racial inequalities was rather more limited, as whites benefited more from the OAA (see Alston and Ferrie, 1985; Quadagno, 1988; Costa, 1998).

Since after 1935 the *US Social Security Bulletins* also reported the number of recipients, as robustness, we modify the way in which the impact of OAA policy is measured, and instead of using OAA payment per recipient, we just use the recipiency rate (table A2). The motivation for this change is that the observed payments per OAA recipient can be affected not only by policy changes but also by the composition of couples and families (i.e., labor supply) and levels of need (if, for example, states with worse health conditions were more likely to shift funding to the state level). Yet, when we make this change in the way we measure OAA policy, we show very consistent results with those presented in table 2. We further show that those below the age of 65 years were unaffected by OAA policy. In table A3, we point out that generosity of states mattered in reducing mortalities and that reductions in mortality in more

[14] In 1938, the crude death rate (the number of deaths in a specific group per thousand population of that group) was 47.1, and in 1944 it was 45.5. Data are from the *US Statistical Abstracts* (various issues). We report the data for the 65–74 age group, as in this source, the age group 65–69 was not reported.

Table 2. *State-level panel data on the impact of OAA on crude death rate (in logarithms) by different age groups and race, 1938–1944*

	All				Whites	Non-whites
	(1)	(2)	(3)	(4)	(5)	(6)
Ages between 50	−0.080	−0.022	−0.006	−0.018	−0.109	0.012
and 54 years	(0.060)	(0.035)	(0.036)	(0.050)	(0.068)	(0.018)
Ages between 55	−0.052	0.019	0.034	−0.010	−0.052	0.008
and 59 years	(0.040)	(0.036)	(0.036)	(0.048)	(0.042)	(0.138)
Ages between 60	−0.073	−0.018	−0.022	−0.052	0.097	0.067
and 64 years	(0.052)	(0.045)	(0.053)	(0.046)	(0.157)	(0.137)
Ages between 65	−0.106***	−0.057**	−0.045*	−0.065**	−0.325**	−0.069**
and 69 years	(0.025)	(0.024)	(0.026)	(0.025)	(0.140)	(0.029)
Ages between 70	−0.069**	−0.052	−0.056**	−0.051**	−0.188*	−0.064*
and 74 years	(0.034)	(0.031)	(0.027)	(0.021)	(0.105)	(0.032)
Ages above 75 years	−0.027	−0.003	−0.012	−0.050	−0.016	−0.021
	(0.025)	(0.029)	(0.034)	(0.033)	(0.145)	(0.032)
Observations	245	245	245	245	245	245
Baseline controls	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
State-level FEs	Yes	Yes	Yes	Yes	Yes	Yes
Time trend	No	Yes	No	No	No	No
Census division × specific year trends	No	No	Yes	No	No	No
Census division × year fixed effects	No	No	No	Yes	No	No

The outcome variable is the logarithm of the crude death rate in the different age groups (50–54, . . . , +75 years). Each model has been estimated independently. For the average payment in OAA, we divided the number of obligations incurred in payments to recipients by the number of recipients. Models are adjusted for income per capita and the urban share with robust standard errors (in parentheses) clustered at the state level and fixed effects as defined in the table. *** $p < 0.01$. ** $p < 0.05$. * $p < 0.1$.

generous states (defined as those where payments per recipient where above the median of all states between 1935 and 1944) were 2.5 times greater than in less generous states with statistically significant coefficients.

3.4. Cross-county border variation

Finally, to remove additional concerns on policy endogeneity and unmeasured confounders correlated with OAA payments, we restrict comparisons to counties on either side of a state border. We focus on county-state border pairs to compare areas that follow different state-level policies while holding aggregate population and economic shocks constant. Mortality data at the county-level are from the *Vital Statistics of the USA* and OAA county-level payments data are from research memoranda of the *US Social Security Board* for December 1937 and 1939 (Bureau Report, 1938, 1940). Unfortunately, at the county level, we cannot identify deaths of those older than 65 years (only the total number of deaths and infant deaths), but we rely on the fact that most deaths occurred after the age of 65 years. If by

1940, those older than 65 years only accounted for around 4 percent of the US population, they represented 41 percent of all deaths (data are from the *Vital Statistics of the USA*). Local fixed effects would also adjust for any time-invariant characteristics of the age distribution. We use the following equation:

$$\log \mathrm{CDR}_{cb} = \beta \log \mathrm{OAA}_c + \Lambda' \mathrm{X}_c + \mu_b + \delta_s + \mathrm{e}_{cb}, \quad (3)$$

where the dependent variable is the crude death rate in 1937 (panel A) and 1939 (panel B) expressed in logarithms in county c. Because some counties lie on more than one state border, the unit of observation is a county-state border pair with b indexing the state border groups. β is the coefficient of interest and OAA_c is the payment under OAA adjusted by the number of recipients in December 1937 and 1939 (in panels A and B, respectively). X_c is a vector of controls for other OAA characteristics, such as requirements for citizenship and residency along with a range of economic and demographic controls (see details in notes to table 3). Additionally, μ_b is a fixed effect for each border group and δ_s a state fixed effect and since local funding shares vary at the state level, standard errors are clustered at the state level. This level of clustering also accounts for the duplication of observations in counties lying on multiple-state boundaries, with e_{cb} being the error term.

Conditional comparisons for border counties with state border fixed effects in table 3 show that although the impact on OAA on mortality was only weakly statistically significant in 1937 (close to the time when states started to pass legislation and benefits were still modest), as the program expanded, we can see more clearly the negative impact of OAA on mortality by the end of 1939 where, even after controlling for the local economy and the share of population older than 65 years along with local characteristics of OAA, results are statistically significant at the 5-percent level. As a robustness check, in table A4, we show that mortality was unrelated to other SSA programs such as ADC or general relief and aid to the blind and their combination. To remove further concerns on omitted variables, in table A5, we also show that other New Deal programs for job creation and to carry out public works projects under the Works Progress Administration were unrelated to mortality using the border-pair strategy. In table A6, we also show the results measuring OAA policy as recipiency rate. In none of these settings, our findings differed from those presented in table 3. Moreover, since infant deaths (those below the age of 1 year) are also available at the county level, we discount infant deaths from the total mortality to match closer deaths in old-age. Results after this adjustment are also consistent with those in table 3 (unreported here).

4. Conclusion

The OAA program, which is now part of SSI, has played a key role in aiding the elderly poor for decades. The OAA presents a rare opportunity to quantify the effects of changes in access to federal intervention to support the elderly. Almost a decade after Roosevelt signed the SSA and states had passed OAA laws, providing support to about one-quarter of all US senior citizens, we show that OAA led to a sustained reduction in old-age mortality and helped to explain about 30–39 percent of the decline of 65–69 mortality, likely owing to better nutrition, better access to health care and improving heating and housing access and moving people out of poorhouses (and unhealthy workplaces) further reducing susceptibility to winter-related diseases. Our work links with the literature on the impact of OAA on labor market outcomes, which shows that OAA laws helped the elderly to exit the labor force (Costa, 1999; Friedberg,

Table 3. *Cross-county data on the impact of OAA on the total crude death rate (in logarithms) in a restricted sample of county-pairs located on opposite sides of the borders, 1937 and 1939*

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: outcome variable is the crude death rate in 1937						
OAA payment per recipient in December 1937	−0.128*	−0.110*	−0.145**	−0.074	−0.069	−0.069
	(0.069)	(0.060)	(0.064)	(0.061)	(0.062)	(0.062)
Counties	1,022	1,022	1,022	1,022	1,022	1,022
R^2	0.473	0.490	0.498	0.577	0.579	0.579
Panel B: outcome variable is the crude death rate in 1939						
OAA payment per recipient in December 1939	−0.259***	−0.241**	−0.279***	−0.211**	−0.209**	−0.209**
	(0.091)	(0.092)	(0.096)	(0.090)	(0.090)	(0.090)
Counties	1,090	1,090	1,090	1,090	1,090	1,090
R^2	0.453	0.466	0.476	0.577	0.577	0.577
Retail sales	Yes	Yes	Yes	Yes	Yes	Yes
Electricity	Yes	Yes	Yes	Yes	Yes	Yes
Unemployment	Yes	Yes	Yes	Yes	Yes	Yes
Temperatures	No	Yes	Yes	Yes	Yes	Yes
Urbanization	No	No	Yes	Yes	Yes	Yes
Above 65	No	No	No	Yes	Yes	Yes
Education	No	No	No	No	Yes	Yes
Religion	No	No	No	No	Yes	Yes
Policy controls	No	No	No	No	No	Yes
State-level FEs	Yes	Yes	Yes	Yes	Yes	Yes
Border FEs	Yes	Yes	Yes	Yes	Yes	Yes

The outcome variable is the number of deaths divided by the population (in thousands and expressed in logarithms). For the average payment in OAA (also in logarithms), we divided the number of obligations incurred in payments to recipients by the number of recipients. All models control for retail sales per capita measured in 1939, electricity as measured by the distance to the nearest power plant with at least 10 MW of nameplate capacity (data are from Lewis, 2018) and per capita total registered unemployed in 1937. Column 2 also controls for the average temperatures in 1940 (data are from Fishback *et al.*, 2011), column 3 for the urban share, column 4 for the share of population older than 65 years in 1940, column 5 for education as measured by the median years of schooling for men older than 25 years, and for the share of religious membership as measured in 1936. Column 6 add further controls for OAA policy including a dummy for relative responsibility requirement, a dummy for any property limitation, the local funding share, a scaling factor for joint recipiency, and the 99th percentile OAA payment. All these "Other OAA policy controls" are measured in 1939 and were originally collected and coded by Fetter (2017). For the rest of variables, otherwise stated, they were also organized by Fetter (2017). All models add state and border fixed effects with standard errors (in parentheses) clustered at the state level. *** $p < 0.01$. ** $p < 0.05$. * $p < 0.1$.

1999; Fetter, 2017; Fetter and Lockwood, 2018). Yet, despite the OAA had an enduring impact on the reduction of elderly's mortality, it mostly helped white senior citizens.

This historical event has an important contemporary policy relevance, as nations today confront the challenge of population aging. By 2050, the United Nations has estimated that the number of people worldwide aged 65 years and older will have doubled, from 10 to 20 percent. Yet, the issue is important not just in rich countries but also in today's poor

countries where current pensions systems leave uncovered, with the majority of citizens still dependent on informal employment after formal retirement (Willmore, 2007; Summers, 2016; Acemoglu and Restrepo, 2017). Since the OAA operated on the basis of cash transfers, rather than benefits in kind, it also generates insights relevant to how scarce sums can best be used to allow the world's poorest people to live in dignity in old age (Banerjee and Duflo, 2011; Haushofer and Shapiro, 2016).

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Supplementary material

Supplementary material is available at *European Review of Economic History* online.

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