Government Old-Age Support and Labor Supply: Evidence from the Old Age Assistance Program*

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Abstract

Many major government programs transfer resources to older people and implicitly or explicitly tax their labor. In this paper, we shed new light on the labor-supply effects of such programs by investigating the Old Age Assistance Program (OAA), a means-tested and state-administered pension program created by the Social Security Act of 1935. Using newly available Census data on the entire US population in 1940, we exploit the large differences in OAA programs across states and the rules that governed eligibility for OAA within states to estimate the labor supply effects of OAA. Our estimates imply that OAA reduced the labor force participation rate among men aged 65–74 by 5.7 percentage points, relative to a base of roughly 50 percent. Estimating a standard model of labor supply, we find that the majority of the OAA-induced reduction in late-life labor supply was due to income effects, despite the high implicit tax rates imposed by OAA's earnings tests. Our results suggest that OAA and Social Security could account for a significant share of the large reduction in late-life work during the mid-20th century.

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1 Introduction

Many of the most important government programs—including Social Security and Medicare—transfer resources to older people and tax their labor relative to that of younger people.[1] Standard economic theory predicts that such programs reduce late-life labor supply. Understanding the size and nature of such effects on labor supply is an increasingly important issue, as demographic trends have increased both the aggregate importance of and the potential labor supply of the elderly, while simultaneously increasing the need for reforms to government old-age support programs. This raises two important questions. What are the effects of government old-age support programs on late-life labor supply? And what is the relative importance of the two key features of these programs—the transfers to older people and the taxation of their labor—in determining these effects?

We address these questions by investigating Old Age Assistance (OAA), a program introduced in the 1930s alongside Social Security. In addition to being the largest source of government transfers to the elderly until being surpassed by Social Security in the 1950s, OAA was a state-administered program with considerable variation across states in eligibility and benefit levels. Cross-state variation in coverage and benefits provides useful empirical leverage that is seldom available in more recent periods, when most similar programs have been national in scope and near-universal in coverage. Moreover, analyzing this historical policy variation allows us to shed new light on the extent to which the introductions and expansions of OAA and Social Security contributed to the large decline in elderly male labor force participation over the 20th century. The suggestive time-series correlation between these two trends has motivated a substantial literature investigating the effects of Social Security on retirement (Coile, forthcoming). Our estimates suggest that OAA contributed substantially to this decline in labor force participation, and the structure of OAA—which included features similar to the strict earnings test of the early Social Security program—allows for a natural extrapolation to estimating the contribution of Social Security to this decline in labor force participation as well.

OAA was a means-tested welfare program for the elderly created by the Social Security Act of 1935, the same Act that created Social Security. Until the 1950s, OAA was large both absolutely—22 percent of people age 65 and over received OAA in 1940—and relative to Social Security, whose total payments were smaller than those from OAA for the first fifteen years of their mutual existence. OAA shares many features in common with Social Security and other important social insurance programs of the present day, which raises the likelihood

[1]For details about how Social Security taxes the labor of older people relative to younger ones even without an earnings test, see Goda, Shoven and Slavov (2009). For Medicare, see Goda, Shoven and Slavov (2007).

that lessons learned from studying OAA will shed light on important current policy issues.[2] OAA was a state-run program with federal matching funds, and as a consequence there were large differences in some of the important features of OAA programs across states (Lansdale et al., 1939). State recipiency rates and average benefits per recipient both varied by a factor of more than five (recipiency rates in 1939 ranged from 8 percent to 49 percent, while average annual benefits per recipient ranged from $1,121 to $6,165 in 2010 dollars).

We take advantage of recently-released data on the entire US population at this time from the 1940 US Census. Two advantages of this dataset over previously available data are its large sample size (over 6 million men aged 55–74) and its precise geographic information. The rare combination of large policy variation and a large dataset allows us to perform a wide range of empirical tests of the effects of OAA on labor supply. Our main empirical tests make use of two sources of variation. The first is the age eligibility requirement that existed in all states, almost always limiting eligibility for OAA to individuals 65 or older. Importantly, other modern-day programs that use age 65 as a cutoff, including Social Security, were either small or non-existent at the time. The second source of variation we use is cross-state variation in the size of OAA programs, as measured by the total OAA payments per person 65 and above. Our main empirical analysis tests whether there is a differentially large reduction in labor force participation after age 65 in states with larger OAA programs relative to states with smaller OAA programs. Because our OAA measure could be influenced in part by unobserved population characteristics, our preferred estimates limit comparisons to individuals living in counties on either side of a state border.

The results suggest that OAA significantly reduced labor force participation among older individuals. The basic patterns that we explore in the data are evident in Figure 1, which plots male labor force participation by age, separately for states with above- and below-median OAA payments per person 65 and above. Up to age 65, the age pattern of labor force participation was extremely similar in states with larger and smaller OAA programs. At age 65, however, there was a sharp divergence in labor force participation between states with larger OAA programs relative to those with smaller programs, and this divergence continued at older ages. In quantitative terms, our regression results suggest that raising state OAA payments per person 65 and above by one standard deviation would have led to a roughly 3.3 percentage point decline in labor force participation among men aged 65–74, which is

[2] The key features of OAA for determining its impact on labor supply are that it increases late-life non-labor income and decreases late-life net wages by reducing benefits for people with greater earnings. These features are shared by many important programs, including Social Security, Medicare, and Medicaid, among others. Although Social Security has gradually reduced the extent to which it taxes late-life work, it imposed a strong earnings test for much of its history and continues to tax the late-life work of many people through its tax and benefits formulas still today (see, e.g., Goda, Shoven and Slavov, 2009; Gelber, Jones and Sacks, 2013). Medicare's secondary payer status (Goda, Shoven and Slavov, 2007) and Medicaid's means-testing rules mean that they implicitly tax late-life work at significant rates as well.

about 7 percent of the observed labor force participation rate among this group of roughly 50 percent. The results also indicate that an important share of this reduction in labor supply from an increase in OAA payments would come from men on the margins of labor force participation: We estimate that between one-fifth and one-quarter of the reduction in labor force participation was due to exit from unemployment, and about one-fifth due to exit from employment in work relief programs.

We estimate a variety of alternative specifications that support an interpretation of these results as the effect of OAA on labor force participation. First, we show that when we restrict the sample to non-US citizens—who were eligible for OAA in some states but not in others—we find similar reductions in labor force participation after age 65 in states in which non-citizens were eligible for OAA, but can reject comparable reductions in states in which they were ineligible. Second, we find that in 1930, prior to the passage of OAA, states that would have higher OAA payments in 1940 did not have differentially large reductions in labor force participation after age 65.

In order to investigate the drivers of the effect of OAA on labor supply of the elderly, and to shed light on the broader question of how government old-age support programs affected late-life work during the middle of the 20th century, we use our findings on OAA to estimate a model of lifetime labor supply and retirement. A key input to the model is the latent distribution of retirement ages predicted to arise in the absence of any old-age support programs. This distribution is an important determinant of the effects of government old-age support programs and other policies that create non-linearities in the lifetime budget constraint (Moffitt, 1986). Since there were few sources of government old-age support in 1940 other than OAA, and private and government employee pensions covered only a small share of the population, our setting provides an unusual opportunity for estimating this latent distribution using quasi-experimental variation.

Standard economic theory predicts that OAA reduced elderly labor supply through some combination of expanding the budget sets of eligible individuals and implicitly taxing their labor by imposing means tests. Understanding the relative importance of these two factors is important both for predicting the effects of policy changes and for understanding the welfare consequences of the program. Simulations of our estimated model imply that for the typical OAA program, income effects accounted for a majority of the reduction in labor supply. Although substitution effects comprised a non-negligible share of the overall reduction in labor supply, we find that OAA's earnings tests did not significantly reduce the value of the program to recipients.

In the final section, we ask what the estimated model suggests about the role of government old-age support—and Social Security in particular—in the growth of earlier retirement over the mid-20th century. Studying OAA in 1940 is a natural way to learn about the early Social Security program, partly because of the similarity between the income tests of OAA and the strict earnings test of Social Security.[3] Given the nonlinearities that both OAA and Social Security created in people's budget sets, it is particularly useful that we are able to estimate the latent distribution of retirement ages. Our approach is to simulate the effects of a counterfactual, smaller-than-actual Social Security program in order to try to estimate a lower bound for the likely effects of the actual Social Security program. The predicted effects on retirement of this relatively modest Social Security program are quite similar to those of OAA on the subset of the population eligible for OAA, although the effects of Social Security are driven by substitution effects to a greater extent since higher-earnings groups had higher rates of eligibility for Social Security. Given that eligibility for Social Security eventually became much greater than eligibility for (means-tested) OAA, these results imply that the predicted aggregate effects of Social Security on retirement are potentially quite large. Collectively, our reduced-form and structural results suggest that Social Security had the potential to drive a significant share of the mid-century decline in late-life labor supply.

This paper is most closely related to Parsons (1991) and Friedberg (1999), both of whom analyze the labor supply effects of OAA.[4] Our work complements this earlier work in that we are able to take advantage of newly-available data and recently-developed empirical techniques to compare more narrowly-defined groups (such as those across state boundaries and those just below and just above the OAA eligibility age) and to test a wider range of predictions. Moreover, with a larger and richer dataset we are able to make more progress toward separately identifying the key parameters that govern intertemporal labor supply. To the best of our knowledge, no previous work has been able to separate the income and substitution effects of OAA or Social Security over this time period, which is critical for understanding the effects of these programs on behavior and welfare.

Much of the literature on government old-age support and labor supply has focused on Social Security (for reviews, see Diamond and Gruber, 1999; Feldstein and Liebman, 2002; Krueger and Meyer, 2002; Coile, forthcoming). Our paper contributes to two important branches of this literature. One branch seeks to decompose the labor-supply effects of Social Security into those due to income transfers and those due to changes in marginal incentives to work due to the earnings test and other aspects of the tax and benefit rules (e.g., Burtless and Moffitt, 1985; Krueger and Pischke, 1992; French, 2005; Friedberg, 2000; Gelber, Jones and

[3]Between 1939 and 1950, for example, Social Security's earnings test limited benefits to people who had less than $15 of monthly earnings—about $230 in 2010 dollars. People who earned more would have their benefits withheld, without any compensating increase in future benefits.

[4]Papers that analyze other aspects of OAA include Costa (1999), who finds that OAA increased the propensity of elderly women to live independently; Stoian and Fishback (2010), who find that OAA had little effect on elderly mortality in the early years of the program; and Balan-Cohen (2008), who finds that OAA reduced elderly mortality in the later years of the program.

Sacks, 2013). Our findings complement and extend this earlier work by taking advantage of the greater policy variation exhibited by OAA and by investigating a different historical period in which there were many fewer other factors affecting the relative returns to labor supply at different ages.

A second branch of the literature more directly considers the role of government old-age support programs in reducing late-life work around the middle of the 20th century (Moffitt, 1987; Costa, 1998; Lee, 1998, in addition to Parsons, 1991 and Friedberg, 1999). Our findings are especially relevant for the important issue of how to interpret the time-series relationship between government old-age support programs and late-life labor supply from 1940 onwards. Moffitt (1987) in particular finds that the timing of Social Security benefit increases from the 1950s onwards does not closely match that of reductions in late-life labor supply, at least over short time intervals.[5] Our estimation and simulations of a structural model of labor supply suggest that marginal increases in benefits over this period would be expected to have a rapidly diminishing effect on labor supply once replacement rates exceeded a relatively low threshold, around 25 percent. This finding can potentially help reconcile the seeming contradiction between the weakness of the precise time series relationship and our reduced-form results that OAA significantly reduced late-life labor supply.

2 Background on the Old Age Assistance Program (OAA)

The New Deal legislation of the mid-1930s marked a major expansion of the role of the federal government in the economy and laid the foundations of many of the most important social insurance programs that continue to this day (Fishback, 2007). This was especially true of government programs providing old-age support. The Social Security Act of 1935 established two old-age support programs. One was Old Age Insurance, a payroll tax-financed pension program that in 1939 became Old Age and Survivors' Insurance (OASI) and came to be known as Social Security. Social Security was originally designed as a funded program, and relatively few of the elderly at the time were to receive benefits from it. To provide for more immediate relief, the Social Security Act separately provided for federal matching funds for state-administered, means-tested old age support programs for the low-income elderly through the Old Age Assistance (OAA) Program.

These programs were associated with a major and rapid expansion in government old-age support. In 1929, just seven states had old-age assistance laws in effect. By 1939, every state

[5] Separately, Costa (1998) notes that labor force participation rates for men 65 and above had begun to decline by the end of the 19th century (mostly, however, between 1880 and 1910, with a leveling off between 1910 and 1930).

did. This rapid growth was encouraged by the availability of a 100 percent federal match up to a relatively high limit on state spending on qualifying OAA programs. Although Social Security eventually became the larger of the two programs, OAA was much larger than Social Security for many years. In 1940, about 22 percent of people aged 65 and over received OAA payments, and about 93 percent of the combined OASI and OAA payments were OAA grants.[6] Even in 1950, the majority of the combined OASI and OAA payments went to OAA. Both in terms of recipiency rates and average benefit levels, OAA was large relative to other programs at the time and to welfare programs today. The average annual OAA benefit in 1940 was $232 (about $3,615 in 2010 dollars), about 25 percent of 1939 median wage and salary earnings for 60-64 year olds earning a wage, and slightly over half of 25th percentile wage earnings.

The variation in state OAA policies offers an unusual source of variation to investigate the effects of old-age support. We combine information from a variety of sources to better understand and measure the OAA policies in effect in different states, including state legislation, administrative data on state OAA payments, and research reports about how the programs worked in practice. Unfortunately, in many cases the laws and descriptions of state OAA programs are not sufficient to determine exactly how OAA affected the opportunity set facing any given individual. We deal with this issue by taking two complementary approaches. One approach is to implement tests that do not require precise knowledge of budget constraints. The other approach, which we adopt for tests that require precise knowledge of budget constraints, is to restrict the sample to states for which we have sufficient information about the details of their OAA programs.

States had significant discretion in how to shape their own OAA programs, subject to some broad conditions for federal matching funds set in the Social Security Act. The key features of OAA programs were their eligibility requirements and benefit levels. The main eligibility requirements were having little income, the exact level of which varied across states, and being at least as old as a minimum age threshold, set at 65 years of age in almost every state.[7,8] In almost all states, benefits were set in such a way as to provide either an income

[6]The source of the facts about payments in this sentence and the next is Carter et al. (2006), Series Bf395 and Bf634.

[7]The Social Security Act set limits on the eligibility age states could set and still qualify for the federal match. States were permitted to use minimum age requirements as high as 70 years of age until January 1, 1940 and as high as 65 years of age thereafter.

[8]Other common eligibility requirements included having been a resident of the state for at least a minimum length of time, being a US citizen, having no legally responsible relatives able to provide support, and having less than certain levels of various assets. In addition, the state residency requirements, which were imposed by all states, prevented people from migrating to states with high benefit levels and claiming benefits soon thereafter. These residency requirements, together with the low rate of migration among the elderly, suggest that systematic migration across states in response to differences in OAA was unlikely to have been quantitatively important, as also noted by Costa (1999) and Friedberg (1999).

floor or a consumption floor, both of which implicitly tax recipients' income at a 100 percent rate, as benefits are phased out one-for-one in income.[9] The way this worked in practice was that either state or local OAA staff evaluated the "needs" and resources of each applicant, sometimes using a standard amount of $30 per month (i.e., $360 per year or about $5,600 per year in 2010 dollars) for the needs. The excess, if any, of needs over resources determined the size of the payment, up to a maximum level.[10,11] The maximum benefit level was $30 per month in most states, with a range from $15 to $45 (plus a few cases with no legislated maximum).

The large differences in the administration of OAA programs across states were reflected in large differences across states in both recipiency rates and payments per recipient. Table 1 shows summary statistics on recipiency and payments in December 1939. States varied widely in the share of the population 65 and above that received OAA, from 8 percent in the District of Columbia to 49 percent in Oklahoma, as well as in payments per recipient, from 6 dollars per month in Arkansas to 33 dollars per month in California. State payments per recipient and recipiency rates were weakly positively related to one another across states, but not strongly correlated, with a correlation coefficient of 0.17. This generated significant variation in OAA payments normalized by the population 65 and above: Virginia gave 1.01 dollars per person 65 and above while several western states gave 8 dollars or more (with Colorado at the maximum of 13.17). Much of the variation in payments was related to differences in legal maximum payments. In some states the maximum was far from binding for most payments, however, and the eight states with no legal maximum often had a *de facto* maximum that was well in line with other states' legal maxima. To infer these *de facto* maxima in both cases, we use summary tables on the distribution of grants to new recipients in fiscal year 1938-39 (from U.S. Social Security Board (1939)) to calculate an approximate 95th percentile payment by state.[12] These 95th percentile payments were broadly similar to the legal maxima, but in some cases significantly different: Georgia, for example, had a legal maximum of 30 dollars per month but 95 percent of payments were for 15 dollars or less.

[9]The difference between an income floor and a consumption floor is that an income floor takes into account only income when determining benefits, whereas a consumption floor takes into account all of the resources available to an individual, including not only income but various assets as well.

[10]Illinois's OAA laws contained wording typical of OAA programs in many states in defining the (eligible) needy: "Has not sufficient income to provide reasonable subsistence compatible with decency and health" (U.S. Social Security Board, 1940*a*, pp. 9).

[11]Lansdale et al. (1939) report that in most OAA programs, cases were re-evaluated regularly, usually every six months. and a non-trivial share of cases were closed due to the recipient becoming self-supporting or his or her relatives becoming able to provide adequate support. For recipients who wished to continue receiving OAA benefits, regular re-evaluations meant that any behavioral effects of the program were likely to be largely permanent.

[12]This publication reports the share of payments in 5-dollar bins, so we cannot always calculate the 95th percentile precisely. Instead we calculate the smallest number such that we can be certain that at least 95 percent of payments were below that amount, and take the smaller of that number and the legal maximum.

3 Theoretical Predictions about the Effects of OAA on Labor Supply and Retirement

The simplest model for understanding how OAA might affect the timing of retirement is a model of the lifetime budget constraint relating total lifetime consumption to the length of retirement, as illustrated in Figure 2.[13] OAA expands the set of consumption-leisure opportunities available to potential OAA recipients by paying recipients $\bar{y}$ for each period they do not work after the OAA eligibility age. OAA has an income effect that tends to hasten retirement and, for people who in the absence of OAA would retire after the OAA eligibility age, a substitution effect that also tends to hasten retirement.

By reducing the private return to work after the OAA eligibility age but not before, OAA introduces a convex kink in the lifetime budget constraint at that age. At ages younger than the OAA eligibility age, working an additional year increases total lifetime consumption by the full amount of earnings, w. At ages older than the OAA eligibility age, working an additional year increases total lifetime consumption by just the excess, if any, of earnings over the OAA benefit level, $\max\{0, w - \bar{y}\}$. OAA therefore imposes an implicit marginal tax on earnings after the OAA eligibility age, with implicit tax rate $\tau = \min\{1, \bar{y}/w\}$. With a smooth distribution of preferences for consumption versus leisure in the population, such a convex kink attracts more people than nearby allocations on the budget constraint. We measure the extent of such "excess bunching" of retirements at the OAA eligibility age in our empirical work. We use these estimates to estimate a model of lifetime labor supply in order to decompose the effects of OAA into income and substitution effects.[14]

Another key prediction of the model is that OAA leads to a hollowing out of the distribution of labor earnings among people who are eligible for OAA, as earnings levels between zero and somewhat above the OAA benefit (demogrant) are replaced by zero earnings. This can be seen most easily by inspecting the within-period budget constraint, which relates income to leisure hours in a given period (e.g., a month). Such a budget constraint is shown in Figure 3. People whose optimal earnings levels in the absence of OAA fall between zero and not much above the OAA income floor would be better off exiting the labor force, since working would involve giving up much leisure for little if any gain in income.[15]

[13] This framework is better-suited to analyzing OAA programs that provide income floors than programs that provide consumption floors, since the latter might also distort the timing of consumption.

[14] In the US today there are a variety of reasons that retirements might exhibit bunching at age 65, including Medicare and private pensions. Many of these factors either did not exist in 1940 or were much less important than they are today. In our empirical work, we implement a variety of tests to assess the extent to which any observed bunching of retirements at OAA eligibility ages are due to OAA as opposed to other factors to accurately estimate the relevant elasticities.

[15] This simple model predicts that no one who is eligible for OAA would choose to earn less than the OAA benefit level. In our empirical implementation of this test, however, there are reasons to expect non-zero

4 Data and Empirical Approach

4.1 Data

The key data source that enables many of our empirical tests is the full-count microdata from the 1940 Census, which was digitized in its entirety by Ancestry.com and the Minnesota Population Center. The data include all individuals enumerated in the Census and includes information on basic demographic characteristics for all individuals, as well as basic employment and income information for all individuals age 14 and older. In addition to the large size of the sample, an advantage relative to previously available datasets is precise geographic location, which enables empirical tests that would not be possible with other datasets.

We focus on men aged 55 to 74, who were all within ten years of the typical OAA eligibility age of 65. We restrict attention to states in which the OAA eligibility age was 65 for all individuals in 1939.[16] Within these ages and states, we further restrict the sample to men with non-missing information on birthplace, race, citizenship status, marital status, and years of education. Our analysis below investigates two sets of outcomes: work behavior at the time of the 1940 Census and work and income outcomes in 1939. Restricting attention only to men with non-missing information on all outcomes of interest would drop a significant share of the sample, so for each set of outcomes we exclude from the sample only those men with missing information on work (or income) outcomes in the relevant year.[17]

As discussed in more detail below, our main empirical tests rely on comparability of age-work profiles across states with different OAA policies. To help assure that differences in age-work profiles across states are not due to differences in unobserved population characteristics, some of our specifications limit comparisons to counties on either side of a state boundary. The "border county" sample is derived from the full sample by limiting to counties that bordered other states (except for counties bordering the four states excluded from the full sample).

mass at these earnings levels. The most important reason for this is that in the data we do not observe all of individuals' characteristics that determine eligibility, which means that we will not be able to limit our tests to people who are eligible for OAA. Another reason is that we only observe full-year income, so someone who spent the first half of the year earning twice the OAA benefit level and the second half not earning anything and instead receiving OAA would wrongly appear to be violating this stark theory. Finally, even among people who are eligible for OAA, it is possible that a lack of awareness about OAA might have caused some people who would have been better off with OAA to not claim benefits.

[16] This restriction excludes men residing in three states—Missouri, New Hampshire, and Pennsylvania—that had an OAA eligibility age of 70 in 1939, all of which reduced the eligibility age to 65 on January 1, 1940. It also excludes Colorado, in which long-term residents became eligible at age 60.

[17] Hence, our analysis relies on two different but largely overlapping samples. One comprises the 6,722,869 men aged 55 to 74 with non-missing 1940 labor supply and basic demographic information; the other comprises the 6,283,146 men with non-missing 1939 work and income information as well as non-missing basic demographic information.

Table 2 describes the characteristics of the men in our sample. The men included in the full sample had about 7 years of education on average, although the median individual had completed primary schooling (at least eight years). About 92 percent where white, and about 95 percent were United States citizens. About 75 percent were married at the time of the Census. 71 percent of men were in the labor force, and 65 percent were employed. An important component of overall employment in the late 1930s was 'public emergency' employment—employment through one of the federal programs that provided work-based relief to the unemployed, such as the Work Projects Administration (WPA). For men in our sample, about 62 percent were employed in either private or non-emergency government work, indicating that about 4 percent were employed in public emergency work. About 72 percent of men reported they had worked in 1939. The 1940 Census was the first federal census to ask about income, and it asked separately about wage and salary income and income from other sources. About half of men reported receiving any wage or salary income in 1939.[18] Including those who reported zero wage and salary income in 1939, the average reported income was $557 (corresponding to about $8672 in 2010 dollars). There was no question on the amount of income from sources other than wage or salary, but there was a question to each individual asking whether he or she received income from these sources of $50 or more (about $780 in 2010 dollars).[19] Slightly more than half of men reported that they did.

A comparison of means across the full and border county samples indicates only small differences between the two. Men in the border county sample were about two percentage points less likely to have completed primary school, and the various measures of labor force attachment were higher by about 1 to 1.5 percentage points in the border sample. These differences are quite small relative to their respective means, suggesting that inferences drawn from the border county sample can be reasonably applied to the population as a whole.

In our empirical tests below we also use state- and county-level data on OAA. State-by-month level data on the number of OAA recipients and OAA payments from 1936 through 1939 come from the 1939 *Social Security Yearbook* (U.S. Social Security Board, 1940*b*). We also digitized county-level data on the number of OAA recipients and the amount of OAA payments in December 1939, reported in U.S. Social Security Board (1940*c*).

[18] The share of men reporting receipt of wage and salary income is smaller than the share of men who were employed because, as indicated in the instructions to enumerators, the former excluded income earned by businesspeople, farmers, and professionals through business profits, sale of crops, or fees.

[19] The instructions to enumerators indicated that non-wage income included, among other things, income from business profits or professional fees, income from roomers or boarders, cash relief payments, regular contributions from family members not in the same household, in-kind income, and commodities consumed from the individual's own business.

4.2 Empirical Approach

We use two key sources of variation to investigate the effects of OAA. The first of these is the age-based eligibility requirement that was a feature of OAA programs in all states, nearly always providing assistance only to persons 65 or older.[20] OAA was by far the largest means of old age support for which 65 was a cutoff age as of 1940. In more recent periods, changes in behavior at or around age 65 could be associated with any of a number of factors, such as eligibility for Social Security or Medicare. However, Medicare did not exist until 1965, and monthly payments under Social Security (OASI) did not begin until January 1940, and even in 1940 went to less than two percent of the population 65 and above. Social Security did make lump-sum payments in the first three quarters of 1939, prior to the 1939 amendments to the Social Security Act.[21] These payments would have been relevant only for workers who turned 65 in that year, however, and only about 7 percent of 65 year olds received them in 1939. Further, they were smaller than OAA: the average OASI lump-sum payment at age 65 in 1939 was about 77 dollars, whereas the average annual OAA payment per recipient was 232 dollars. The other major sources of old age pensions at the time were private pensions, state and local government pensions, federal civil service pensions, and railroad pensions. However, some of these plans had retirement ages either earlier or later than 65, and the total number of beneficiaries of these plans was only about 5 percent of the population 65 and above in 1940. Average payments under these plans were also much larger than OAA (between 750 and 950 dollars per year) and were likely primarily relevant for people higher in the income distribution than OAA recipients.[22]

[20]Most states did not have mandatory birth certificates for the cohorts in our sample, but in addition to birth certificates a range of other means were used to determine age-eligibility. What records were valid depended on state law or administrative procedure. They often included marriage records, school records, earlier Census records, or earlier voter registration records; in some cases the affadavit of a 'reputable person' with knowledge of the applicant's age would be accepted in the absence of the normal documentary proof. Given the absence of nationwide mandatory birth records, Lansdale et al. (1939) acknowledge that verification of age was sometimes difficult. Indeed, Ransom and Sutch (1986), among others, note that Census counts of 65-74 year olds in 1940 were somewhat higher than would be expected given the number of 55-64 year olds in 1930, and suggest that the excess may have been due to incentives to misreport one's age after the passage of the Social Security Act. Although this may have been the case, we argue in Section 5.2 that the absence of apparent anticipatory effects among people below the eligibility age suggests that misreporting of age is not a major concern for our results.

[21]The original Social Security Act excluded work done after age 65 from coverage, and required a certain number of years of coverage in order to receive regular benefits. Hence, those who turned 65 between 1936 and 1939 received lump-sum payments to reimburse them for taxes collected before they reached 65. These payments ended after the 1939 Amendments to the Social Security Act extended coverage to work above age 65.

[22]In 1940 there were about 160,000 monthly beneficiaries of private pensions (Carter et al. (2006) Series Bf848). McCamman (1943) estimates that there were about 158,000 beneficiaries of state and local government pensions, but notes that a significant share of these were for police and firemen, who typically had retirement ages before 65. There were about 141,000 beneficiaries of railroad retirement benefits (Carter et al. (2006), Series Bf753) and about 32,000 beneficiaries of federal civil service pensions with a retirement age of 65 (Reticker, 1941). By way of comparison, slightly more than 9 million people were aged 65 and

The second key source of variation that we use is the heterogeneity in state policy discussed in Section 2. Variation in both the conditions of eligibility and the generosity of benefits allows comparison of labor supply behavior of individuals of the same age but facing different state policies. Combining variation in both age-based eligibility and state policy, we can control flexibly for any age-specific effects common across states or the possibility that state OAA policies were correlated with unobserved factors also affecting labor force participation, provided that they do so in a way common across ages.

We expect that, especially during the late 1930s, the population likely to be eligible for OAA had little access to the formal financial sector to shift consumption forward prior to reaching age 65. Nevertheless, anticipatory responses of this sort might be possible to the extent that, for example, people close to reaching 65 and likely to qualify for OAA might informally borrow from their children. Further, OAA means tests could have provided an incentive to change behavior prior to reaching eligibility in order to increase the likelihood of receiving OAA once one reached age 65. Because we rely on age eligibility for identification, we do not directly identify anticipatory effects, and our estimates of the effects of OAA are net of such effects. Differential trends across states in the age profile of labor force participation, however, will provide some indication of the likely size of anticipatory effects, and will also speak to the relative size of the net-of-anticipatory effects between the young elderly (those just turning 65) and older individuals.

The main results reported below use state OAA payments per person aged 65 and above as a summary measure of the generosity of state OAA programs. Ideally, variation in this measure would be associated solely with variation in state OAA policies rather than also with variation in population characteristics that also influence labor market behavior. One concern that arises is that idiosyncratic factors that led some individuals to exit the labor force would mechanically increase OAA recipiency rates or payments per recipient, and through either one increase payments per person 65 and above. To correct for this potential mechanical relationship between labor hours and the size of the state OAA program, the measure we use to relate any individual's labor force status to OAA generosity excludes his own payments and recipiency status. In particular, for an individual i in state s and county c we measure the payments per person 65 and above across all counties other than c in state s, and estimate equations of the form

$$y_{iacs} = \alpha_a + \beta_c + \sum_{a \neq \bar{a}} \gamma_a * \log(\text{payments per person 65+})_{s \backslash c} + \Lambda' \mathbf{x}_{iacs} + \varepsilon_{iacs} \qquad (1)$$

where a indexes age (either in single years or groups of years), $\bar{a}$ is a reference age, $\mathbf{x}_{iacs}$ is a vector of controls, and the variable of interest, $\log(\text{payments per person 65+})_{s \backslash c}$, is the log

above in the 1940 Census.

of the December 1939 OAA payments per person 65 and above in state s outside of county c, which we refer to as a "rest-of-state" payment per person.[23]

Identification relies on the standard differences-in-differences assumption: without additional controls we would assume that once we have corrected for the mechanical relationship of OAA payments and labor supply, the age profiles of labor force participation would have been parallel across states in the absence of OAA. A threat to identification might take the form of differential underlying trends of disability with age across states that would lead to both lower labor force participation and higher payments or rates of OAA receipt. In estimating equation (1) we first weaken the identification assumption by introducing controls in the vector $\mathbf{x}_{iacs}$ to limit comparisons of age profiles to more similar groups: these include race-by-age and years of education-by-age fixed effects and Census region-by-age fixed effects.

To further reduce concerns that differences in underlying population characteristics drive our results, in our preferred specifications we limit comparisons of age profiles to counties lying on either side of a state boundary.[24] In this specification we limit the sample to counties lying on the boundary with another state and estimate equations of the form

$$y_{iacsb} = \beta_c + \delta_{ba} + \sum_{a \neq \bar{a}} \gamma_a * \log(\text{payments per person } 65+)_{s \backslash c} + \Lambda' \mathbf{x}_{iacs} + \varepsilon_{iacsb} \qquad (2)$$

where a border segment b between two states is the set of all counties in either state that touch the boundary between the two. Since some counties border two or more different states, in this specification a county (and hence all the individuals in it) will appear in the data as many times as there are states that it borders. The border segment-by-age fixed effects then limit comparisons of age profiles to men living on either side of the same border.

[23]State-level payments per person 65 and above exhibit a right skew, motivating a specification in logs rather than levels. Using a rest-of-state measure excludes the District of Columbia from our analysis. We use the county population 65 and above in April 1940 to scale December 1939 OAA payments.

[24]One obvious alternative to this approach would a simulated IV strategy (Currie and Gruber, 1996). Unfortunately, neither eligibility nor recipiency is directly observable in the Census. There is some information relevant to eligibility in the Census and in the 1935-36 Survey of Consumer Purchases, but several factors that determined eligibility are unobserved. Neither dataset provides estimates of eligibility that have a compelling first stage relationship with observed state-level recipiency in the 1939 or 1940 cross-section.

5 Results

5.1 Age eligibility, state generosity, and OAA receipt

We first show that passing the age eligibility cutoff was a meaningful determinant of OAA receipt and that it was correlated with the basic policy measure we use in our main regression specifications. In the 1940 Census, there was no question directly inquiring about whether an individual received a payment through OAA. However, as noted above, each individual aged 14 and above was asked whether he or she received more than $50 in income other than from wages and salaries in 1939. Figure 4 shows the share of men receiving non-wage and salary income by age in 1939, for states with above- and below-median payments per person 65 and above. Although receipt of non-wage income at these ages was common and became more so with age, there is a clear break at age 65, suggesting that aging into eligibility was indeed associated with an increase in available resources.[25] The increased receipt of non-wage income at age 65 could not have been driven by OASI monthly payments, which did not begin until 1940; the OASI lump-sum payments at age 65 that were made in 1939 and earlier would not explain the elevated level of non-wage income past age 66. Moreover, the fact that the increase is greater in states with larger OAA programs, and opens up only after age 65, provides a strong indication that it is due to OAA receipt.

This 'first stage' result also holds conditional on the finer comparisons that we make in investigating the effects of OAA on labor supply. In Figure 5 we plot estimates on the age-payment interaction from equation (2). The trend in coefficients is quite flat prior to age 65 and increases sharply from ages 65 through 67. The similarity of trends prior to age 65 further suggests state OAA generosity was not correlated with unobserved factors driving differential trends in receipt of non-wage income by age.

Table 3 shows corresponding estimates from estimating equations (1) and (2). To obtain a summary measure of these patterns allowing more statistical precision and economy of presentation, we group ages into 5-year bins, with ages 60-64 the reference age. Columns (1)-(3) show estimates of (1) in the full sample. The results confirm that in states with larger OAA programs, there was a differential increase after age 65 in receipt of non-wage income that is highly statistically significant. The point estimates change only modestly with the addition of region-by-age fixed effects and are essentially unchanged with the addition of education-by-age and race-by-age fixed effects. Although there is some indication of a slight differential increase prior to age 65 in states with larger OAA programs in the specification

[25] It is likely that OAA displaced other types of assistance payments for some people, as emphasized by Stoian and Fishback (2010); however, the break at age 65 indicates that there were some people for whom OAA represented an increase in available transfer payments, at least among the young elderly.

with no controls, the interaction between OAA payments and ages 55 to 59 declines in magnitude and becomes statistically insignificant at conventional levels with the addition of region by age fixed effects. In specification (3), including all controls in the full sample, the point estimates on the interactions of OAA payments with age indicate that a standard deviation increase in log payments per person 65 and above—an increase of about .62 log points—was associated with a differential increase in the probability of receiving non-wage income of 3.6 percentage points at ages 65-69 and 5.6 percentage points at ages 70-74, both highly statistically significant.

The same patterns are also evident in specifications that limit comparisons to the border sample. Column (4) estimates equation (2) on the border county sample with no additional controls, by way of comparison to column (1). It gives very similar estimates, suggesting that using the border sample comes at little cost in terms of representativeness. Column (5) introduces border segment by age fixed effects and results in a small reduction in the magnitude of the coefficients, but they remain both highly statistically significant and economically meaningful. The estimates in column (5) imply that a standard deviation increase in the size of a state OAA program was associated with a differential increase in the probability of receiving non-wage income of about 3 percentage points at ages 65-69 and 4.3 percentage points at ages 70-74. Inclusion of education-by-age and race-by-age fixed effects leads to no meaningful change in the coefficients.

5.2 Effects of OAA on labor market outcomes

Analogous specifications provide evidence that eligibility for OAA also translated into reduced labor force participation. Figure 6 plots the coefficients on the age-payment interactions from equation (2), which limits comparisons to counties on either side of a state border. The coefficients are all quite close to zero at ages up to 64, supporting the assumption that states with different payments per person were comparable in their underlying trends of labor force attachment with age. At age 65, states with larger OAA programs exhibit a sharp decline in male labor force participation that levels out around age 69 at about -0.05, indicating that a 10 percent increase in the OAA payments per person 65 and above was associated with a reduction in labor force participation of about 0.5 percentage points.

Table 4 shows estimates from estimating equations (1) and (2) using 5-year age bins. All specifications indicate that in states with larger OAA programs, there were differentially large reductions in labor force participation after reaching the age of OAA eligibility. The estimates in columns (1) through (3), estimated on the full sample, give estimates of about -0.06 at age 65-69 and -0.07 at ages 70-74, both highly statistically significant. These estimates are fairly stable across specifications: adding region by age, education by age, and race by age fixed effects has only modest effects on the estimated coefficients. In these specifications there is evidence of a slight differential reduction in labor force participation prior to the age of eligibility: states with 10 percent higher OAA payments saw a reduction in labor force participation from ages 55-59 to ages 60-64 that was greater by about 0.18 percentage points. In principle, these reductions prior to eligibility could reflect anticipatory effects of OAA, but may also indicate that some portion of the difference in age-work profiles after age 65 reflects differential underlying trends in labor force participation that were correlated with state OAA generosity.

To address this concern, columns (4)-(6) provide estimates of equation (2) based on the border county sample. These results provide strong evidence that most of the relative decline in labor force participation after age 65 in states with larger OAA programs was indeed due to OAA. Column (4) presents estimates in the border sample without border segment-by-age fixed effects, and gives estimates very close to the analogous specification in the full sample. Column (5) introduces border segment by age fixed effects, limiting comparisons to counties across state borders. Here there is no evidence of any differential trend across states prior to age 65.[26] The estimates for ages after age 65, moreover, are highly statistically significant and indicate substantial reductions in labor force participation in states with larger OAA programs. In particular, they suggest that a one standard deviation increase in log payments per person 65 and above (about .62 log points) was associated with a 3 percentage point reduction in labor force participation at ages 65-69, and a 3.5 percentage point reduction in labor force participation at ages 70-74. Unsurprisingly, given the tight geographic restrictions on comparisons in column (5), differences across states in demographic characteristics do not drive the results. Inclusion of education by age and race by age fixed effects in column (6) leaves the coefficients virtually unchanged.

The similarity of the regression coefficients (in opposite directions) in Figures 5 and 6 suggest that receipt of non-wage income and exit from the labor force were tightly linked. To investigate this pattern further and provide additional evidence that it was OAA driving exit from the labor force, we take a simple approach to estimating the bunching of retirements at age 65 and its relationship to the receipt of non-wage income. In particular, we estimate

[26]The lack of any significant pre-trend also suggests that misreporting of age is not a major concern for our results. It is possible that false reporting of age could have been more common in states with more generous benefits, and if men with high disutility of labor were differentially more likely to misreport that they were eligible, it could elevate measured labor force participation below the eligibility age and depress it above the eligibility age. However, it seems reasonable to assume that falsely reporting an age above 65 was more common among men aged 60-64 than for men aged 55-59, for example. If so, we should also see elevated labor supply of 60-64 year olds relative to 55-59 year olds in more generous states relative to less generous states, but in fact we do not. Testing for differential pre-age 65 trends back to ages 50-54 gives a similarly flat pre-trend.

the following model to quantify the 'break' at age 65, separately by state:

$$y_i = \alpha + \beta \mathbf{1}(\text{age}_i \geq 65) + \gamma(\text{age}_i - 65)\mathbf{1}(\text{age}_i < 65) + \delta(\text{age}_i - 65)\mathbf{1}(\text{age}_i \geq 65) + \varepsilon_i \quad (3)$$

where the outcome is either receipt of non-wage income or labor force participation.[27] In Figure 7 we plot the estimated breaks at age 65 from equation (3) for receipt of non-wage income against estimated breaks in labor force participation. The results illustrate the degree of variation across states in the overall drop in labor force participation at age 65, from nearly zero in Arkansas to 15 percentage points in Oklahoma. Moreover, declines in labor force participation line up strikingly well with increases in receipt of non-wage income, consistent with OAA income substituting for labor income as men aged into eligibility.

The main specifications suggest that as of 1940, OAA significantly reduced total labor supply among men aged 65 to 74. Re-estimating the state-border specification using the level rather than the log of OAA payments per person 65 and above yields coefficients of -0.013 for ages 65-69 and -0.016 for ages 70-74. These are reasonably similar to the log specifications at the mean level of OAA payments: the overall average amount of OAA payments per person 65 and above is close to four dollars (either weighting states equally or by population), so that a 10 percent increase in OAA payments per person relative to the mean of 4 is associated in the level specification with a 0.52 percentage point reduction in labor force participation for ages 65-69 and a 0.64 percentage point reduction for ages 70-74, reasonably close to the predicted changes in the log specification. Based on the level specification, reducing the OAA payment per person from four to zero dollars would have increased labor force participation by 5.2 percentage points at ages 65-69 and by 6.4 percentage points at ages 70-74. Approximately 60 percent of 65-74 year olds were between 65 and 69, so these estimates imply that OAA reduced labor force participation among 65-74 year olds overall by about 5.68 percentage points. By way of comparison, 5.68 percentage points is about 11 percent of the overall 50 percent labor force participation rate of men aged 65-74 in 1940.

5.3 Robustness

As noted earlier, the major concern in interpreting the results is that underlying differences across states in the propensity to exit the labor force both drives down labor force participation and increases OAA receipt, rather than OAA inducing exit from the labor force. Focusing comparisons to state boundaries makes this sort of alternative interpretation un-

[27] The 1940 Census has information only on age in completed years at the time of the Census, meaning that individuals who were 65 at the time of the Census may or may not have been eligible for OAA during 1939, the time period covered in the non-wage income question. Hence, in estimating the break in non-wage income we omit 65-year-olds.

likely, especially given that with this restriction there is no evidence of a differential trend in labor force participation across states with different levels of OAA generosity. To address any residual concern, however, we provide further support for our interpretation in two ways: by examining the labor force participation of non-US citizens, who were ineligible for OAA in many but not all states, and by testing for differential age trends in labor force participation in 1930.

Because of the relatively small number of non-US-citizens at these ages, estimates of the effect of OAA on non-citizens are extremely imprecise when comparisons are limited to state boundaries. Hence, in these results we use the full sample. The left panel of Figure 8 plots estimates of equation (1) for non-US-citizens separately for states that required US citizenship (of which there are 20 in our sample) and for states that did not require US citizenship or long-term residency in the United States (of which there are 17 in our sample). Here we include Census region-by-age fixed effects and group ages into 5-year bins for statistical precision.

The results provide striking confirmation that our main results are not driven by underlying differences in retirement behavior across states. In states in which non-citizens were eligible, more generous OAA programs were associated with larger reductions in labor force participation after age 65, with statistically significant coefficients on the order of -0.09 at ages 65-69 and 70-74. In contrast, in states in which non-citizens were ineligible for OAA, larger state OAA programs show no sign of being associated with lower labor force participation of non-citizens: coefficients are close to zero and statistically insignificant for all age interactions. In contrast, the right panel shows that estimates across the two sets of states are quite similar for US citizens. Provided that men who were not US citizens would have exhibited trends in disability status (or in other factors that would determine labor force participation) similar to citizens, these results suggest that the main estimates reflect OAA-induced exit from the labor force rather than OAA take-up being driven by reduced labor force participation.

Analysis of labor force outcomes in the 1930 Census provides further evidence that differential trends in the underlying propensity to exit the labor force do not drive our results. If they did, it is likely that we should see the same patterns in 1930. We use the 1930 complete-count Census data to estimate equation (2) to test whether observed payments in 1940 have a similar relationship with labor force outcomes in 1930.[28] Because a handful of states did

[28]The 1940 Census was the first Decennial Census to use the concept of 'labor force participation,' which was based on a person's employment or unemployment status in the last week of March 1940. The 1930 Census provides information on the closely related but distinct concept of 'gainful employment,' measuring whether an individual reported having had an occupation in the previous year. Costa (1998) provides further details and Moen (1988) an extensive discussion.

have old-age assistance laws even in 1930, we omit the nine states included in our 1940 sample that also had programs in 1930. Panel (a) of Figure 9 indicates that age profiles of work behavior in states with larger OAA programs in 1940 exhibited little difference from those in states with smaller OAA programs. For comparison, in Panel (b) we show estimates from 1940 using the same sample of states and find results very similar to our main estimates, suggesting that the absence of differences in 1930 is not an artifact of using a different set of states.

Another possible concern with the results is that individuals with high disutility of labor chose to move to states with more generous OAA programs when they became eligible, or migrated out of more generous states at a lower rate. In either case, our empirical test would overestimate the reduction in labor supply upon aging into eligibility. The minimum residency requirements imposed by almost all states makes the first type of migration less likely, but to address both the possibility of higher in-migration and lower out-migration we test for such effects using information on state of residence in 1935. Appendix Table A1 reports estimates of the baseline specifications with the dependent variable indicating whether an individual lived in a different state in 1935. Point estimates are quite small, and the 95% confidence intervals suggest that a one standard-deviation increase in generosity was associated with no more than half a percentage point greater or lower probability of having moved since 1935, a magnitude substantially smaller than our labor supply results.[29] Hence, net migration of individuals with lower baseline levels of labor supply to more generous states after aging into eligibility is unlikely to explain our results.

5.4 Who left the labor force because of OAA?

Especially in the context of labor markets of the 1930s—with high unemployment rates and the importance of work-based relief through programs such as the WPA—it is interesting to ask how much of the decrease in labor force participation after age 65 was associated with a transition from unemployment to retirement as opposed to a transition from employment to retirement.[30] Also important in this context was public emergency work—through the WPA, for example—as opposed to private or public non-emergency employment. Table 5 shows estimates of equation (2) using overall employment as an outcome variable, as well

[29]If someone under age 65 migrated to a more-generous state in anticipation of taking up OAA benefits upon reaching age 65, but continued to work while still ineligible, the baseline specification may not pick up such migration. To assess how much migration of this sort would influence our results, we have also estimated an alternative specification that restricts comparisons to state borders and simply tests for differences in the probability of migration within each age group (as in equation (4), below). The results of this alternative specification are similarly small in magnitude.

[30]This question provides a historical parallel to the finding in more recent periods that Social Security serves in part as a form of unemployment insurance for older workers (Coile and Levine, 2007).

as employment in private or public non-emergency work.[31] Columns (4)-(6) present the preferred specifications, which limit comparisons to state borders and control for race by age and education by age fixed effects. Comparison of the point estimates for different outcome variables suggests that between 50 and 60 percent of the reduction in labor force participation was associated with exit from private or non-emergency public employment, but exit from unemployment and exit from public emergency work played important roles. At ages 65-69 about 26 percent of the reduction in labor force participation was associated with exit from unemployment and about 21 percent with exit from public emergency work. At ages 70-74 these figures are 21 percent each from unemployment and public emergency work.

6 Understanding the Effects of OAA and Assessing the Role of Government Old-Age Support in Reducing Labor Supply during the Mid-20th Century

The results so far suggest that OAA significantly reduced the labor supply of men aged 65–74. Given that only about 22 percent of people aged 65 and over received OAA and that a large fraction of men were not eligible for OAA, the effect among men who actually were either receiving or planning to receive OAA benefits was larger still. This raises two sets of questions.

The first set of questions concerns understanding the effects of OAA. Why did OAA reduce labor supply so much? The two key features of OAA—and of most other government old-age support programs, including Social Security—are that it increases late-life income and decreases late-life net-of-tax wages. Understanding the relative importance of these distinct features is crucial for understanding the welfare effects of the programs and for predicting the effects of policy changes, such as the elimination of earnings tests. Related to this is the question of how valuable OAA was to its recipients. To the extent that people would have responded similarly to an otherwise-equivalent OAA program that did not tax late-life labor earnings, OAA benefits would have tended to be more valuable to recipients. But to the extent that recipients "earned" their benefits by reacting to the earnings test, OAA benefits would have tended to be less valuable.

The second set of questions concerns the role of government old-age support programs—especially OAA and Social Security, but later also Medicare and Medicaid—in causing the large reduction in late-life labor supply during the middle of the 20th century. The relative

[31] Appendix Figures A1 and A2 show means and estimates of equation (2) by single years of age.

importance of these programs, of productivity growth, and of other changes in the economy in explaining this major change in labor supply is the subject of a long-running and active debate. This debate is fueled in large part by the view that understanding this important historical episode will inform the relative desirability of alternative policy reforms today.

This section seeks to shed light on these questions. We begin by using a standard life cycle model to interpret the evidence about the effects of OAA on labor supply. This directly addresses the first set of questions, concerning the effects of OAA. It also prepares the key ingredients necessary for addressing the second set of questions, concerning the role of government old-age support programs in reducing late-life labor supply around the middle of the 20th century, to which we turn thereafter.

6.1 Model

Consider a standard model of lifetime labor supply in which people choose how much to consume at each date and when to retire. Individual i at age t maximizes the discounted sum of utility from age t forward,

$$U_{it} = \sum_{s=t}^{T} \beta^{s-t} u_{is}(c_{is}, h_{is}),$$

where

$$u_{is}(c_{is}, h_{is}) = \frac{c_{is}^{1+\eta}}{1+\eta} - \delta_i \mathbb{1}(h_{is} = \bar{h}),\ \ \eta \leq 0,$$

subject to a constraint on work hours, $h_{is} \in \{0, \bar{h}\}$ (so there is only an extensive-margin labor supply decision), and a dynamic budget constraint,

$$a_{it+1} = (1+r)(a_{it} + N_{it} + w_{it}h_{it} + b_{it} - c_{it}) \geq 0.$$

a_{it} are assets, N_{it} is non-labor income, $w_{it}h_{it}$ is labor earnings, and b_{it} is OAA benefits. The last inequality reflects the constraint that the individual cannot borrow.

Effects of OAA on the individual's budget constraint.— We consider an "income-focused" OAA program that provides an income floor of $\bar{y}_{it}$ to individual i at age t:

$$b_{it} = \max\{0,\ \bar{y}_{it} - w_{it}h_{it}\},$$

where $\bar{y}_{it}$ is the OAA benefit available to individual i in the period in which i is t years old. This is a simplified version of a typical OAA program in 1940.

6.2 Parameter Values

To keep things as simple as possible and to preserve degrees of freedom for validation tests, we adopt standard parameter values for the widely-used parameters and test the robustness of the results to alternative values.[32] The discount rate equals the interest rate, and both are 3 percent per year. The discount factor is therefore $\beta = \frac{1}{1.03} \approx 0.97$. Utility of consumption is log utility, which corresponds to $\eta = -1$.

Two factors play especially important roles in determining the predicted effects of OAA. The first is eligibility for the program. Both the level of overall eligibility and the distribution of a given level of eligibility across different wage groups determine the labor-supply effects of the program and the relative importance of different aspects of the program in driving these effects. For example, the income effect of the program on labor supply tends to be larger for lower-wage groups, since a given benefit buys more years' worth of foregone earnings for lower-wage individuals. Unfortunately, eligibility for OAA is difficult to predict given available data, and so we estimate eligibility by interpreting the observed effects of OAA through the lens of the model. We discuss this procedure in detail below.

The second key factor in determining the predicted effects of OAA is the distribution of people along the budget constraint, i.e., the distribution of retirement ages under some counterfactual policy regime, say, the regime in which there is no OAA program.[33] To predict the distribution of people along the budget constraint under a counterfactual policy regime, we use a slight variation on our earlier empirical strategy. We compare labor force participation profiles across state boundaries, and we make the stronger assumption that if OAA levels were the same in two states, the *levels* of labor force participation would be the same on either side of the boundary (whereas our main analysis only required equal *trends*). Formally, we estimate

$$y_{iacsb} = \alpha_{ba} + \sum_a \gamma_a * (\text{payments per person 65+})_{s\backslash c} + \varepsilon_{iacsb} \tag{4}$$

where the summation is over all age groups (that is, with no omitted age). The predicted level of labor force participation with payments per person set to zero in all states yields the counterfactual no-program relationship between age and labor force participation in Figure 10. It is noteworthy that using this approach, we find reductions in labor force participation

[32] Our tests of the robustness of the results to plausible changes to the model are still in progress. What tests we have completed so far indicate that the main conclusions are robust, but this conclusion is only tentative since we are still in the process of completing further tests.

[33] This is simply the standard result that the distribution of people along a non-linear budget constraint plays a key role in determining how changes in the constraint translate into changes in average behavior (e.g., Moffitt, 1986).

after age 65 similar to our main estimates, and any anticipatory effects of OAA on labor supply before age 65 appear to be quite small.

Although this strategy requires a somewhat stronger assumption than the strategy we employed in our main analysis, we view the availability of a compelling strategy for predicting the counterfactual distribution of people along the lifetime budget constraint to be an important advantage of our setting. 1940 was a low point for the importance of private pensions and other non-OAA factors that might affect late-life labor supply, as private pensions decreased significantly during the Great Depression and government old-age support at this time was mostly limited to OAA. It is particularly helpful—and in some ways not surprising—that there were relatively few confounding factors on the eve of the major mid-20th-century expansions in Social Security. This fact helps us identify a key input to predicting the effects of changes in pension programs—the counterfactual distribution of people along the lifetime budget constraint—and so facilitates understanding the role of government old-age support programs in reducing late-life market work during the middle of the 20th century.

Heterogeneity in retirement behavior among people who face the same budget constraint is driven by heterogeneity in the disutility of labor, $\delta_i \sim F(\delta)$. We estimate the $F(\delta)$ distribution by using the model to invert the (counterfactual) distribution of retirements without OAA, which we estimate as just described.[34,35]

[34] The Census data do not contain all of the information that would be required to construct individuals' lifetime budget constraints. For example, the data contain only incomplete information about assets (just housing wealth) and non-labor income (just an indicator about whether it exceeds \$50 per year). This means that unobserved heterogeneity in assets or non-labor income could help explain the observed heterogeneity in labor supply among people who share the same observable components of lifetime budget constraints. As a robustness exercise, we will make alternative assumptions about the underlying source of heterogeneous labor supply behavior among people who share the same observable components of lifetime budget constraints, such as assuming that the underlying source of heterogeneity is heterogeneity in initial assets.

[35] In order to estimate the full $F(\delta)$ distribution, we need to know the full latent retirement distribution, out to the maximum age at which the person with the lowest disutility of labor would work if he could. (In the model, everyone lives to exactly age 75 and so cannot work beyond that age. So for any given budget constraint, there exists a range of δ values that lead the individual to work until age 75, from the threshold δ such that the individual is just indifferent between retiring at age 74 and 75 down to $\delta = 0$ (people to whom work provides no disutility and so would continue working as long as possible). People with low enough δ values would work longer if they could. They can be said to have a negative latent demand for retirement, where the latent demand for retirement is the number of years an individual would choose to enjoy leisure (not work) were it possible to consume negative amounts of leisure, i.e., to work longer than one's full lifetime. Working longer than one's lifetime has the benefit of increasing consumption through higher earnings and the cost of incurring the disutility of work in the "extra" periods.) The latent retirement distribution is fundamentally unobservable, and the data become progressively less informative about this object at greater ages due to the small number of individuals at these ages and the bias induced by selective survival. We therefore use the estimated relationship between labor force participation and age from age 50 to 84 to fit a polynomial out to the age at which labor force participation becomes zero. This polynomial serves as our estimated distribution of latent retirement ages, from which we infer the distribution of the disutility of labor, $F(\delta)$. An important assumption implicit in this procedure is that the cross-sectional relationship between labor force participation and age is similar to what the age profile of retirements would have been for a single cohort (had government policies and other factors been held constant at their 1940 values).

6.3 The Effects of OAA on Labor Supply and the Ex-post Value of OAA to Recipients

This section has two main goals. The ultimate goal is to understand the effects of OAA on labor supply and the ex-post value of OAA to its recipients. The proximate goal, which serves the ultimate goals of both this section (understanding the effects of OAA) and the next (understanding the effects of government old-age support programs in the middle of the 20th century), is to test and validate the model by comparing its predictions about the effects of OAA to a variety of patterns in the data.

6.3.1 Eligibility for OAA: Estimation and Validation

As discussed above, the remaining key ingredient necessary to use the model to analyze OAA is eligibility for OAA. The first difficulty in doing so is that even in the absence of any behavioral response to OAA, the program's detailed eligibility rules make it difficult to determine which particular individuals were eligible. The main challenges are the demanding data requirements and the discretion of state and local officials in the application process (Lansdale et al., 1939). For example, while the Census data include information about an individual's citizenship status and housing wealth, the data do not include information about non-housing wealth. There is also likely to be no data source that would allow one to accurately determine whether an individual would be eligible on the basis of relatives' responsibility laws, given both the demanding data requirements involved (detailed information about the financial conditions of all of an individual's responsible relatives) and the uneven application of these requirements (Lansdale et al., 1939). The second major difficulty is that the model requires a measure of "eligibility" exclusive of the earnings test — that is, one needs to know if an individual would have been eligible if he had no earnings (which he might not be due to asset tests or an administrator's judgment that he could still work if he chose to).

We therefore infer eligibility by interpreting the estimated responses to OAA through the lens of the model. In particular, we assume that the probability that a randomly-chosen individual with (potential) wage w_i and potential OAA benefit $\bar{y}_i$ is eligible for OAA is a piecewise-linear function in the ratio of the individual's potential wage to potential benefit,

$$Pr(\text{eligible}_i | w_i, \bar{y}_i) = \max\{0,\ \min\left\{1,\ \alpha_0 + \alpha_1 \frac{w_i}{\bar{y}_i}\right\}\}.$$

We estimate the parameters governing the eligibility-wage relationship, α_0 and α_1, by measuring the bunching of retirements at the OAA eligibility age for groups with different wage rates. This approach is a natural way to learn about eligibility. As already discussed, OAA creates a convex kink point at the OAA eligibility age in the lifetime budget constraint relating lifetime consumption to retirement length. With a smooth distribution of values of the disutility of work, $F(\delta)$, this convex kink in the lifetime budget constraint leads to bunching of retirements at the OAA eligibility age, as some of the people who would have retired somewhat after the OAA eligibility age in the absence of OAA choose to hasten their retirements due to the income and substitution effects of OAA. The greater the observed bunching, the greater the inferred eligibility.

It is important to keep in mind the ways in which this notion of "eligibility" departs from the standard one. First, as the model requires, it is exclusive of the earnings test: we call an individual "eligible" if and only if he would receive a positive OAA benefit if he had no earnings. Second, it bundles many different things together that are conceptually distinct and not necessarily related to the usual meaning of the word "eligibility." For example, it includes any unmodeled factors, such as incomplete information and stigma, that limit take up of OAA benefits.

Potential earnings (w) are unobserved for those out of the labor force, so our approach instead is to approximate differences across earnings groups in bunching of retirements using changes in the distribution of earnings at the OAA eligibility age. We create separate indicator variables for reporting 1939 wage and salary income of zero, of \$1–100, of \$101–200, and so on in multiples of 100. We then estimate equation (3) with an indicator for each level of earnings as a separate dependent variable, testing for changes in the share of men reporting each amount upon reaching age 65.[36] In this specification, men just below the age eligibility cutoff provide a counterfactual for what men who just aged in to eligibility would have earned had they not yet been eligible for OAA. Making the additional assumption that actual earnings in 1939 measures potential earnings, we then measure of the probability of retirement at age 65 for each level of potential earnings as β/α; that is, we scale the estimated breaks by the estimated limit from below in the share of men who earned the specified amount.[37]

[36] We use a uniform kernel and use the Imbens and Kalyanaraman (2012) approach to select a bandwidth separately for each dependent variable. The results are robust to alternative choices on these dimensions. As in the estimation of equation (3) above, since we observe only a person's age at the time of the Census (in April 1940) we cannot determine whether a given 65 year old would have been eligible for OAA in 1939. Hence, we omit 65 year olds from the regression.

[37] Note that this approach simply measures a change at age 65 and does not necessarily difference out factors other than OAA that may have induced retirements at 65. As we discussed in Section 4, the other sources of old age support that would have started making payments at age 65 were smaller in scale than OAA. Other old age pensions also tended to make significantly larger payments than OAA, and hence were likely relevant for individuals higher in the income distribution. As we shall see, we find displacement primarily for lower wage groups.

To focus on situations as similar as possible to the model, we analyze bunching in Massachusetts, a state whose OAA program appears to have closely approximated an income floor with a constant level across individuals.[38] The left panel of Figure 11 shows estimated breaks in the share of Massachusetts men earning each amount from zero up to $1,800. The vertical line indicates an annual amount of $360, the prevailing benefit level in Massachusetts at the time. Aging into eligibility was associated with an increase of 8 percentage points in the probability of having no wage or salary income. Hence, there was a meaningful shift of mass in the earnings distribution to an earnings level of zero. The (positive) levels of earnings from which this mass shifted primarily cluster at and just above the level of the income floor. The right panel of Figure 11 show these estimated breaks scaled by the share of men predicted to earn the given level of earnings just below the eligibility age: the point estimates suggest that at levels of potential earnings up to $800 per year, about 20 percent more men retired at age 65 than would have been expected based on general trends in labor force participation by age.

We estimate the two parameters governing eligibility for OAA using the Method of Simulated Moments. The target moments are the age-65 breaks in the earnings distribution in Massachusetts that we just discussed. We weight each moment by the inverse of its variance; more-precisely estimated moments receive greater weight in the estimation. Table 6 summarizes the model and estimation. Further details about the model and estimation are in the appendix.

The estimation is well-behaved and yields plausible results. Figure 12 shows that the simulated age-65 breaks in the earnings distribution track very closely the corresponding empirical breaks. The model matches the empirical pattern that much of the missing mass comes from earnings levels between $0 and about 2.5 times the OAA benefit level (or about $900 in this

[38]Although most OAA laws set benefits as the difference between 'needs' and 'resources,' suggesting a consumption or an income floor, to the extent that 'needs' varied across people according to unobserved characteristics, it need not have been the case that the resulting floor was at the same level for all individuals, as is assumed in the model. In practice, in many states payments varied substantially even across people with no other source of earnings. This issue is illustrated in Appendix Figure A3, which is based on data from U.S. Social Security Board (1939). In Ohio, among new recipients in 1939, only about 10 percent of payments were at the legal maximum of $30 per month, even among recipients with no other source of income. (We do not directly observe payments to those with no other source of income, but rather the unconditional distribution of payments and the share of recipients with no other source of income. We assume that the recipients with other source of income received the lowest payments.) However, a few states did have programs that more closely resembled an income floor set at a common level across people. As examples, California and Massachusetts had legal minimum amounts for the sum of income and benefits. For recipients with no other source of income, these states saw payments cluster right around this minimum. For new recipients in Massachusetts in 1939, for example, close to 70 percent of recipients with no other source of income received payments of $30 per month. California had an even clearer income floor—its program specified both a maximum and minimum income plus benefit of $35 per month—but also had a $15 earnings disregard that slightly complicates the nature of the budget constraint relative to the model setup. Although we do not find any apparent effects of the earnings disregard in California, we focus on the simpler program in Massachusetts to estimate the parameters of the model.

case of a $360 benefit level). The results indicate that roughly 21 percent of the population was eligible for OAA, with eligibility declining from about 38 percent among those with the lowest potential earnings to about 20 percent for people with potential earnings of $2,000; fitting a linear relationship suggests that no one with potential earnings greater than about $4,320 would have been eligible. We also simulate the cross-sectional relationship between age and labor force participation in 1940 and find that the simulated profile matches its empirical counterpart quite closely.[39]

6.3.2 Implications for the Effects of OAA on Labor Supply and the Value of OAA to Recipients

The results above suggest that the model can provide a useful benchmark for simulating and decomposing the effects of OAA on the labor supply of various groups. We do this by simulating the behavior and outcomes of a particular cohort of the US population—that aged 55 in 1940—under a variety of budget constraints based on state OAA programs in existence in 1940. We then use these simulated data to calculate statistics about the predicted effects of OAA on labor supply and to decompose these effects into income and substitution effects for various groups in the population. Two important caveats are relevant for interpreting the results. First, we assume that the relationship between eligibility and the wage is the same in all states and equal to the relationship we estimated using data on Massachusetts alone. Second, the model is based on an "income-focused" OAA program that does not limit benefits based on assets, other than any limitations that operate through our estimated model of eligibility. Details of all of the calculations in this section are reported in the appendix.

Results from simulating the model match well our reduced-form estimates. The results suggest that OAA significantly reduced the labor supply of eligible individuals. They further suggest that while substitution effects played an important role, the majority of the effects of OAA on labor supply were due to income effects, and that recipients valued OAA benefits fairly highly. Figure 13 shows the simulated labor force participation age profile under three scenarios: no OAA, actual OAA, and a counterfactual unconditional OAA program, i.e., a program that pays the same fixed benefit regardless of the individual's current earnings. Among this cohort, average labor supply between the ages of 65 and 74 is 6.8 percentage points lower with OAA than without it. Simulations based on the counterfactual unconditional OAA program indicate that about 32 percent of this reduction in labor supply is due to OAA's earnings tests. Decomposing the effects of OAA on labor supply into income and substitution effects, we find that 54 percent of the effects of OAA on labor supply are due

[39] These results are available from the authors upon request.

to income effects and 46 percent are due to substitution effects. We also estimate the equivalent variation of OAA. The estimates indicate that OAA's earnings tests had a relatively modest effect on the value of OAA to recipients (the average recipient valued $1 of benefits equivalently to about $.96 of unconditional late-life income), but that the inability to borrow against future OAA benefits reduced their value to recipients relative to an up-front cash transfer more significantly (the average recipient valued $1 of present value worth of OAA benefits at about $.69 in assets at age 50).[40]

Figure 14 shows how the effects and values of OAA vary across groups of individuals who face different effective "replacement rates" from the program, $\bar{y}/w$. The results in the first panel reveal the key role of the replacement rate in determining the extent to which the effects of OAA on labor supply are driven by income vs. substitution effects. For groups facing relatively low replacement rates, most of the effect of OAA on labor supply is due to substitution effects due to the implicit taxation of late-life work. For groups facing higher replacement rates, most of the effect of OAA on labor supply is due to income effects. The second panel shows that, as expected, heterogeneity in the gap between the equivalent variation of OAA and the present value of benefits received matches closely the heterogeneity in substitution effects. For groups that face relatively low replacement rates, a big share of their labor supply response is due to substitution effects and the gap between the present value of benefits that they receive and their equivalent variation of these benefits is at its maximum.[41]

This heterogeneity in the effects and values of OAA points toward an important aspect of OAA: the targeting properties of its various eligibility requirements and restrictions on recipients. Our estimates of eligibility suggest that among the population of men working at age 64, just 21 percent were eligible for the program (in the sense that they would receive benefits if their earnings were low enough) and that eligibility declines rapidly with potential earnings. Were everyone eligible for OAA, substitution effects would account for 55 percent of the total (vs. 46 under actual OAA). Thus, the finding that income effects account for a majority of the observed effects of OAA is partly due to OAA's eligibility requirements. OAA's eligibility requirements appear to have targeted benefits toward people for whom OAA was more valuable than it would have been for the population as a whole.

[40] Versions of the model with perfect capital markets predict larger effects of OAA on labor supply before age 65 than is observed empirically.

[41] Of course, this is only one component of a complete accounting of the welfare effects of OAA, as we have purposefully used a very simple model that excludes many factors relevant for a full welfare analysis of OAA, including the taxes required to finance the program, risk and the insurance benefits of OAA, and general equilibrium effects.

6.4 The Role of Government Old-Age Support in Reducing Labor Supply during the Middle of the 20th Century

The size and nature of the effects of Social Security and other government old-age support programs on labor supply are crucial issues about which many unanswered questions remain (see, for example, the reviews Krueger and Meyer, 2002; Coile, forthcoming). Several advantages of our empirical setting help us contribute to the evidence about these questions. Most important are the significant variation in OAA programs across states and across groups of people within states and the relative lack of other programs that specifically affected incentives around the OAA eligibility age. These features allow us to identify the counterfactual distribution of retirement ages in the absence of OAA and other programs. Because of the nonlinearities in the budget sets created by OAA and Social Security, this distribution is a key ingredient in predicting and understanding the effects of such programs. Finally, the similarities between the effects of OAA and the early Social Security program on people's budget constraints further facilitate using what we have learned about OAA to understand the effects of Social Security.

Most—though not all—of the key determinants of the labor-supply effect of government old-age support programs suggest that the mid-century expansions of these programs would be expected to significantly reduce late-life labor supply. Most important, OAA and Social Security underwent significant expansions during the 1940–1960 period, both in terms of recipiency rates and benefit levels.[42] The large effects we find of the comparatively small and highly-targeted OAA program of 1940 suggest that the combined effects of the much larger OAA and Social Security programs of the 1950s and 1960s could be quite large.

We investigate the *potential* importance of government old-age support programs in reducing mid-century labor supply by simulating the effects of a modest Social Security program on the same cohort we used for the OAA simulations: people aged 55 in 1940. The predicted potential labor supply effects of government old age support programs from these simulations should be conservative for two main reasons. The first is that they ignore OAA entirely, including the large expansions of OAA during the 1940s. The second is that they understate Social Security benefits and eligibility.[43] To be clear, the goal of this exercise is to learn

[42]Other considerations that tend to increase the predicted labor-supply effects of the mid-century government old-age support programs relative to OAA in 1940 include: (i) People had more time to build these programs into their plans—and so optimally save and shift labor supply earlier in life—than they had to plan for OAA in 1940, which was only about four years in the median state; (ii) Health improvements, by reducing rates of disability and increasing life expectancy, would tend to increase retirement ages; and (iii) Any stigma of receiving benefits and not working may have been lower as more people did it and as government old-age support shifted from the means-tested OAA program to the "entitlement" Social Security program.

[43]To project Social Security benefits, we use the 1939 Social Security benefits formula, which implied much lower benefits than subsequent benefit formulas introduced in 1950 and later years. We use wage rates

whether the government old age support programs of the mid-20th century were sufficient to significantly reduce labor supply, not whether they were necessary. Answering the harder question about whether they were necessary and parsing out their marginal contribution on top of other factors would require modeling all of the other factors that changed over this period and might have affected labor supply, which is beyond the scope of this paper.[44]

The results indicate that even this conservative representation of mid-century government old-age support programs would significantly reduce late-life labor supply. This program would reduce labor force participation among members of this cohort during the ages of 65–74 by about twice as much as the predicted effect of the average OAA program in 1940. Further results indicate that about two-thirds of these effects are due to the Social Security earnings test. The share of the effects due to substitution effects is greater for Social Security than for OAA: 64 percent vs. 46 percent. This is primarily due to the fact that Social Security benefits increase in lifetime earnings and so have a larger effect than OAA on higher-earning individuals, for whom substitution effects comprise a greater share of the total effects. This result about the potential importance of the earnings test is qualitatively consistent with the reversal in the downward trend in late-life labor supply that occurred around the year 2000, when the Social Security earnings test was abolished.

These results suggest that government old-age support programs may have accounted for a significant share of the large decline in late-life labor supply during the middle of the twentieth century. Although this is consistent with earlier extrapolations of the effects of OAA (Parsons, 1991; Friedberg, 1999), it is by no means a consensus.[45] An important piece of evidence against the view that government programs accounted for much of the mid-century reduction in late-life work is that the timing of the expansions of Social Security do not line up well with the timing of reductions in labor supply (e.g., Moffitt, 1987; Lee, 1998). Two features of our results have implications for this issue. First, we find that the comparatively small OAA programs of 1940 had large effects on labor supply. Second and related, our simulation results point to an important difference between the total effects of a program and the marginal effects of program expansions. The results in the first panel of Figure 14

in 1940, which were much lower than those prevailing around 1950 and 1960 and so translated into lower benefits. We also ignore supplemental benefits, which increased by 50 percent the benefits of beneficiaries with a spouse or dependent. To project eligibility for Social Security benefits, we assume that only those individuals whose 1940 occupations were covered by Social Security as of the 1939 Amendments were eligible, thereby ignoring the large expansions in coverage during the 1950s and ruling out the possibility that more people worked in covered occupations after 1940. We therefore analyze a counterfactual policy path that was not actually realized. The predicted effects of the actual Social Security policy path including the post-1939 expansions would be larger still.

[44] The main consideration that may have reduced the impact of mid-century government old-age support on labor supply is the possible growth in the demand for retirement due to other factors, including productivity growth (if income effects dominated substitution effects of higher wages) and private pensions.

[45] See, for example, Costa (1995) and Costa (1998) on the role of income growth and leisure complements, and Stock and Wise (1990) and Samwick (1998) on the role of private pensions.

show that even programs with relatively low replacement rates are predicted to significantly decrease labor supply—which is consistent with our estimates of the effects of OAA—but that marginal increases in benefits beyond a replacement rate of 25 percent or so have a much more modest effect. For example, increasing the replacement rate from zero to one-third increases time spent in retirement by almost five times as much as further increasing it from one-third to two-thirds. A key reason for this diminishing effect of benefit increases is the importance of substitution effects, which tend to decrease once replacement rates reach about 25 percent. This is one reason that benefits and labor supply might not track each other closely in the time series. Another, and related, reason is program interactions: given the existence of OAA as a pre-existing source of old-age support (especially after the expansions of OAA in the late 1940s), expansions of Social Security crowded out OAA benefits rather than increasing net old-age support. These considerations, together with our results about the large effects of the comparatively modest OAA programs of 1940, suggest a potentially large role of Social Security and OAA in the mid-twentieth century reduction in late-life labor supply.

7 Conclusion

Many of the most important government programs transfer resources to older people and tax their labor. In this paper, we analyze the labor-supply effects of the Old Age Assistance program. OAA was an important program in its own right, and it also helped pave the way for many of the important social insurance programs of the present day. From a research perspective, OAA presents many valuable opportunities for learning about the effects of government old-age support programs, since it varied significantly across states and across otherwise-similar groups of people within states. Moreover, focusing on the early years of the OAA program allows us to take advantage of the newly-released data on the entire population from the US Census.

We find that OAA significantly reduced labor supply, with our baseline estimates indicating an OAA-induced reduction in labor force participation among people age 65–74 of about 5.7 percentage points, or about 11 percent relative to this group's observed labor force participation rate of 50 percent. Analysis based on a standard life cycle model indicates that a majority of the overall reduction in labor supply from OAA was due to income effects, despite the high implicit taxation of labor from OAA's earnings tests. Simulations of our model suggest that OAA and Social Security may have accounted for a significant share of the large mid-century decline in late-life labor supply. In ongoing work, we are investigating the targeting properties of different OAA policies—including the earnings test, asset tests, and relatives' responsibility laws—in order to better understand the insurance benefits of OAA and similar programs.

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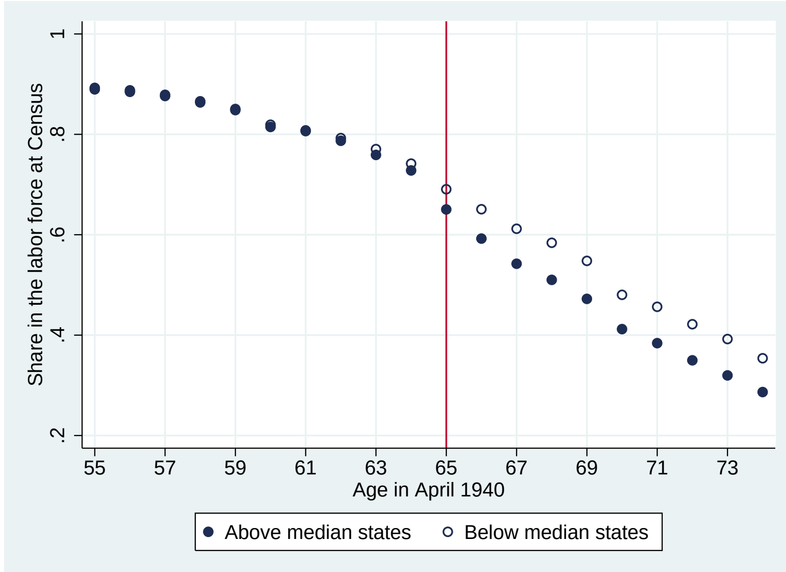
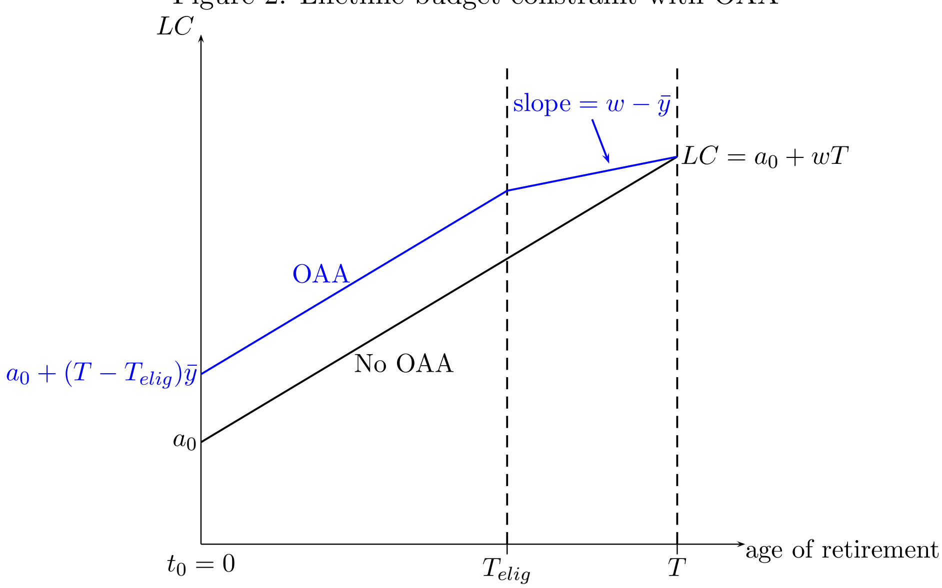
Tables and Figures

Figure 1: Labor force participation in 1940, by age and state OAA payments per person 65+



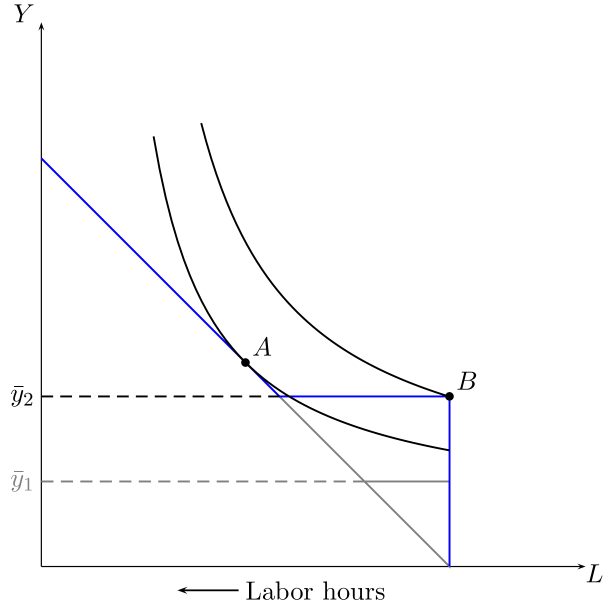
Notes: Figure shows share of men in the labor force at the time of the 1940 Census, in states with above- and below-median OAA payments per person 65+ in 1939, for states with an eligibility age of 65 in 1939.

Figure 2: Lifetime budget constraint with OAA



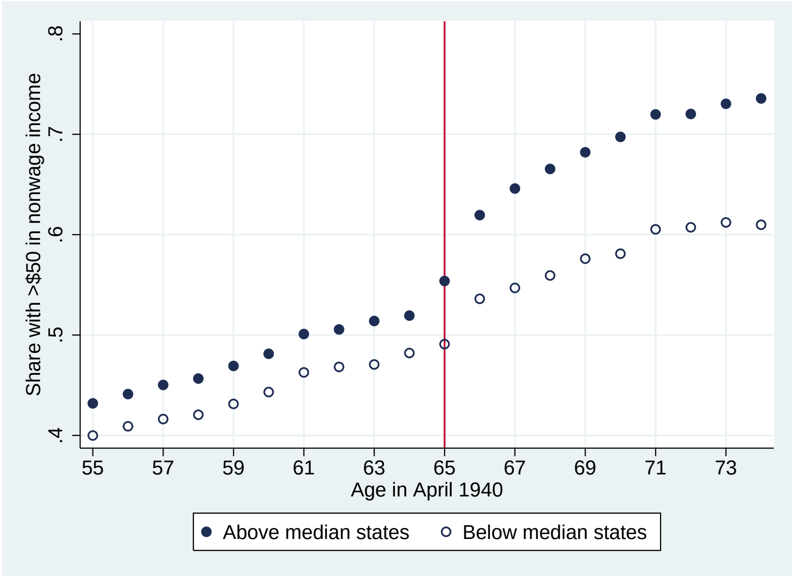
Lifetime budget constraint relating the present value of lifetime consumption (LC) to age at retirement, with and without OAA. The OAA program depicted is an income-floor program with eligibility age T_{elig}, which implicitly taxes labor earnings at a 100 percent rate from the first dollar (by phasing out benefits dollar-for-dollar with labor income).

Figure 3: Period budget constraint with OAA



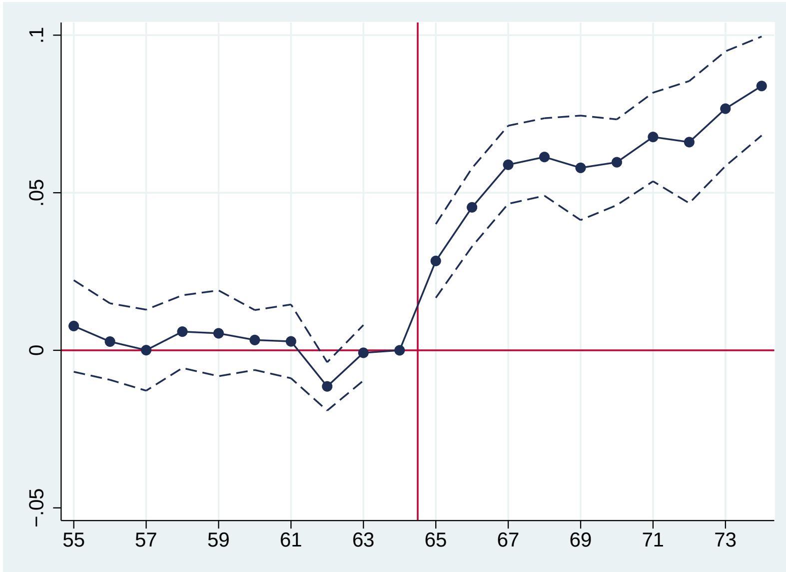
Period budget constraint relating income (Y) to leisure L, with and without OAA. The OAA program depicted is an income-floor program, which implicitly taxes labor earnings at a 100 percent rate from the first dollar (by phasing out benefits dollar-for-dollar with labor income).

Figure 4: Receipt of non-wage/salary income in 1939, by age and state payments per person 65+



Notes: Figure shows share of men receiving more than $50 in non-wage income in 1939 in states with above- and below-median OAA payments per person 65+ in 1939, for states with an eligibility age of 65 in 1939.

Figure 5: Regression estimates for receipt of non-wage/salary income in 1939

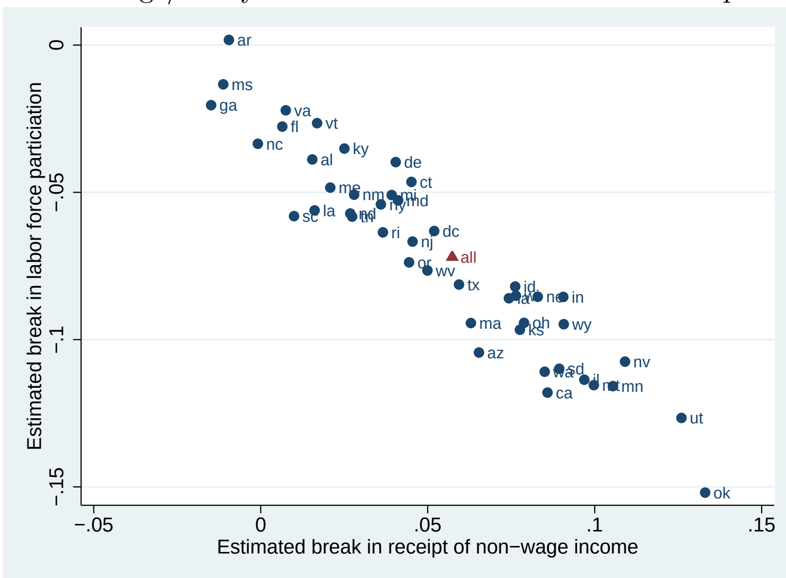


Notes: Figure shows point estimates and 95% confidence intervals on age-payment interactions from estimation of equation (2) on border county sample. Standard errors clustered at the state level. $N = 2178112$.

Figure 6: Regression estimates for labor force participation in 1940

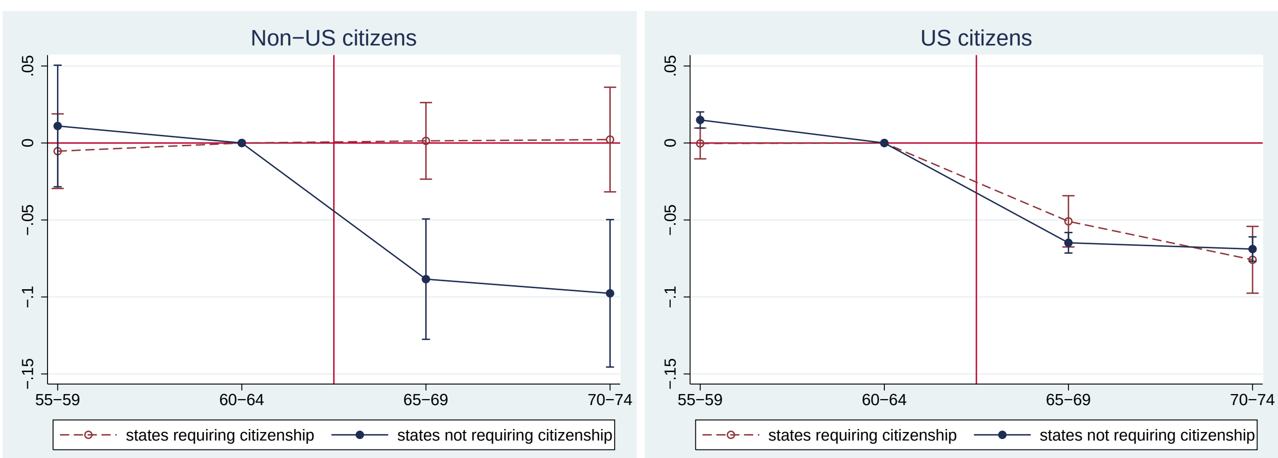
Notes: Figure shows point estimates and 95% confidence intervals on age-payment interactions from estimation of equation (2). Standard errors clustered at the state level. $N = 2334689$.

Figure 7: Breaks in non-wage/salary income versus breaks in labor force participation, by state



Notes: Figure shows point estimates from estimation of equation (3) for receipt of non-wage income in 1939 against estimates for labor force participation in 1940, separately by state. Sample: men aged 56-64 or 66-73 at 1940 Census, in states with an eligibility age of 65 in 1939; breaks in receipt of non-wage income estimated on sample of men with non-missing 1939 income information ($N = 5277150$) and breaks in labor force participation estimated on sample of men with non-missing 1940 labor force participation information ($N = 5649733$).

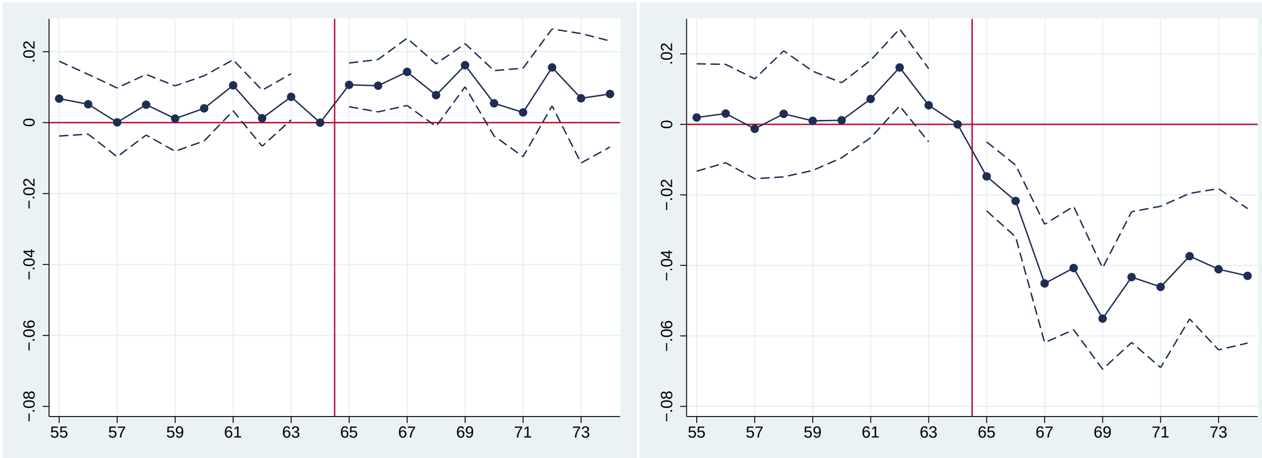
Figure 8: OAA and labor force participation by citizenship and state citizenship requirements



Notes: Figure shows point estimates and 95% confidence intervals from estimation of equation (1) separately by US citizenship status, grouping ages into 5-year bins. 'States requiring citizenship' are those limiting eligibility to US citizens in both 1939 and 1940. 'States not requiring citizenship' are those with no requirement for citizenship or long-term residency in the United States in either 1939 or 1940. In both cases sample is limited to men aged 55 to 74 in states with an eligibility age of 65 in 1939, and with non-missing rest-of-state payments per person 65+. Specification is on full sample, with Census region by age group interactions. For non-citizens in states requiring citizenship $N = 296189$, for non-citizens in states not requiring citizenship $N = 49016$. For citizens, samples sizes are $N = 3876204$ and $N = 1778002$ respectively.

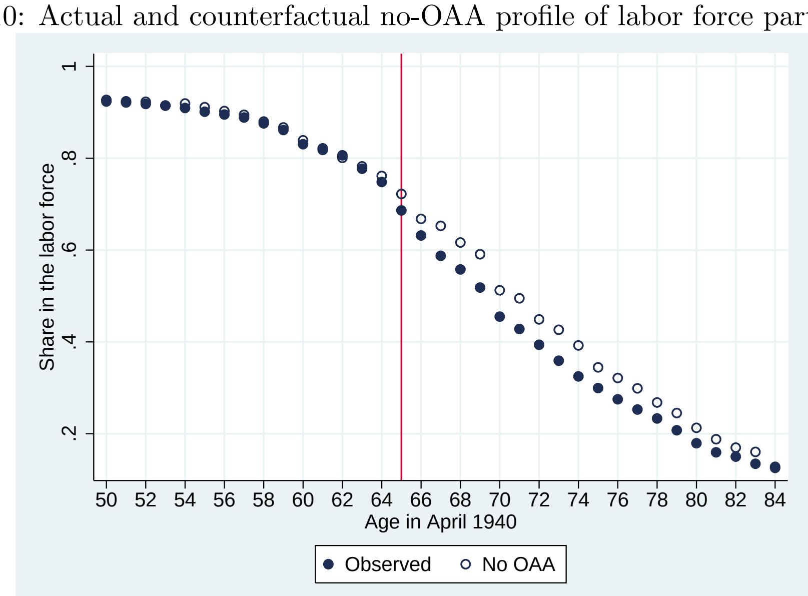
Figure 9: 1940 OAA payments are not associated with differential age trends in 1930

(a) 1930 coefficients (b) 1940 coefficients for same states



Notes: Panel (a) shows point estimates and 95% confidence intervals on age-payment interactions from estimation of equation (2) using 'gainful employment' in 1930 as the outcome and 1940 rest-of-state payments as the payment variable. Sample includes only those states that had no old-age assistance program in 1930. For comparison, panel (b) shows analogous estimates for 1940 labor force participation for the same sample of states. Standard errors clustered at the state level. For 1930 coefficients $N = 1578523$, for 1940 coefficients $N = 1893835$.

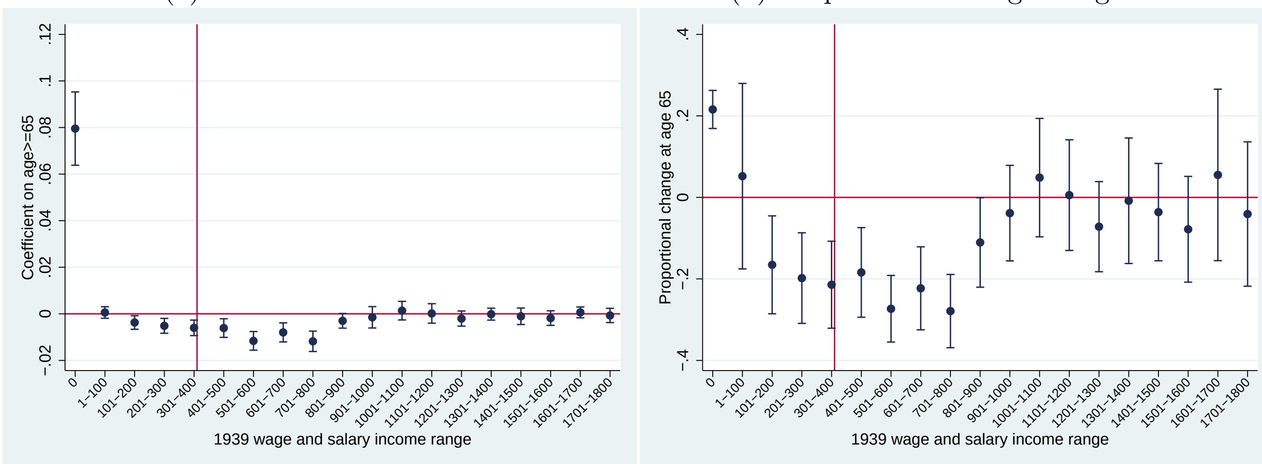
Figure 10: Actual and counterfactual no-OAA profile of labor force participation



Notes: Figure shows observed rates of labor force participation by age and estimated counterfactual rates of labor force participation in the absence of OAA, based on estimates of equation (4).

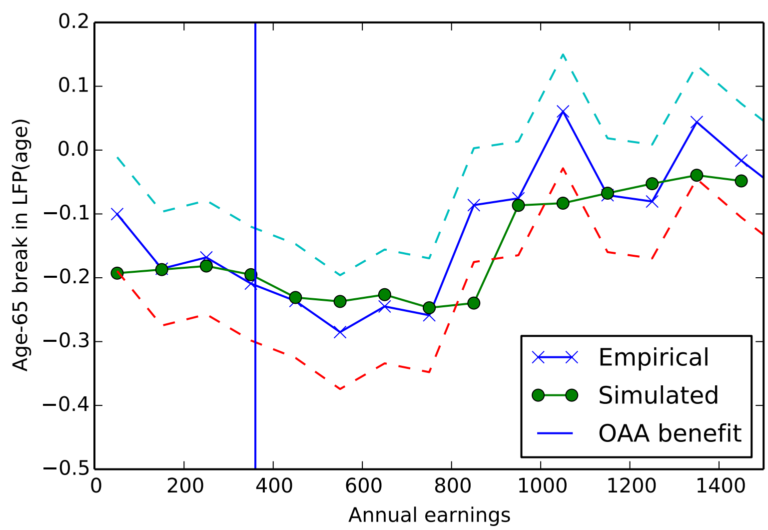
Figure 11: Breaks at age 65 in share of men with specified amount of wage/salary income in 1939

(a) Unscaled estimates (b) Proportional change at age 65



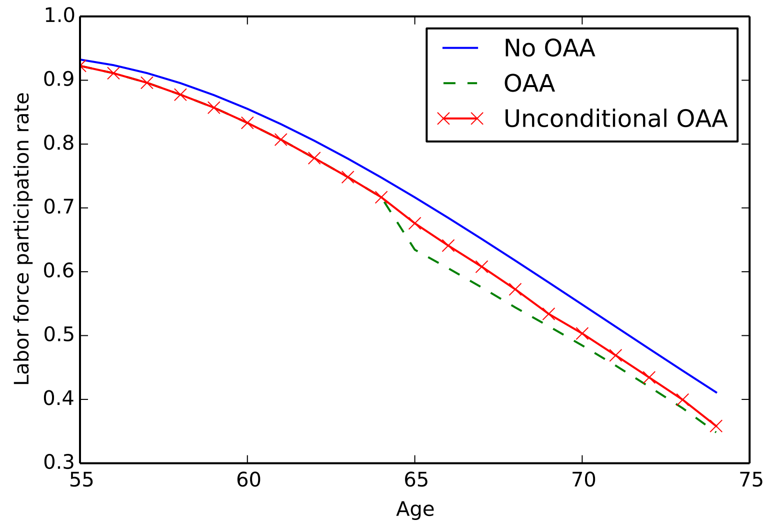
Notes: Figures show point estimates and 95% confidence intervals from separate estimations of equation (3), with dependent variable indicating wage/salary earnings of each specified amount in 1939. Sample: men within IK bandwidth around age 65 at 1940 Census in Massachusetts. Vertical line denotes 'income floor' of $360 per year. Standard errors clustered by years of age. Panel (a) shows unscaled estimates; Panel (b) shows proportional change at age 65 (with standard errors calculated using the delta method).

Figure 12: Empirical vs. simulated moments



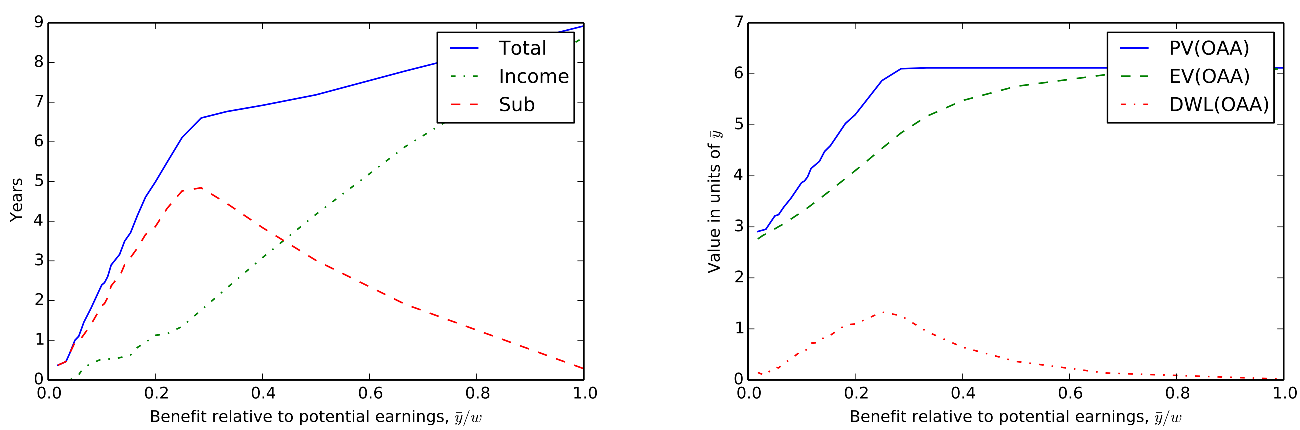
Notes:
Breaks at age 65 in the share of men with specified amount of wage/salary income in Massachusetts in 1939: simulated vs. empirical. The vertical line corresponds to the maximum OAA benefit in Massachusetts, $360 per year.

Figure 13: Simulated effects of OAA on labor force participation



Notes: Simulated life cycle labor force participation profiles of the cohort of people aged 55 in 1940 in the US under different OAA programs. The policy underlying the "Unconditional OAA" profile is a counterfactual OAA program that did not impose any means tests (such as tests of income and labor earnings) that reduced the return to late-life work.

Figure 14: Simulated effects and values of OAA among people eligible for OAA



Notes:
Left panel: Average total, income, and substitution effects of OAA on retirement as functions of the OAA replacement rate, $\bar{y}/w$. A total effect of three years means that OAA reduced the average retirement age among people facing that replacement rate by three years. The simulations are based on the entire cohort of people aged 55 in 1940 in the US.
Right panel: Averages of the present value of OAA benefits received, the equivalent variation of OAA, and the deadweight loss from OAA's earnings test as functions of OAA's replacement rate, $\bar{y}/w$.

Table 1: Basic features of state OAA programs

	Mean	Median	SD	Min	Max	N
OAA recipiency rate, December 1939	.23	.23	.09	.08	.49	49
OAA payment per recipient, December 1939	17.93	18.9	6.49	6.01	32.97	49
OAA payment per person 65+, December 1939	4.16	3.59	2.59	1.01	13.17	49
Legal maximum payment	29.38	30	5.34	15	45	41
95th percentile payment	28.26	30	5.78	15	45	49
95th percentile payment, states with legal maximum	27.96	30	5.49	15	45	41

Notes: Includes the 48 states and the District of Columbia. '95th percentile payment' is for new recipients in fiscal year 1938-39. Eight states had no legal maximum payment. Recipiency rate and payments per person 65+ are normalized by state population at 1940 Census. Sources: data on OAA dollar payments and number of recipients from U.S. Social Security Board (1940*b*), data on legal maximum payments from U.S. Social Security Board (1940*a*), data on 95th percentile payment from U.S. Social Security Board (1939).

Table 2: Summary statistics

	Full sample			Border county sample		
	Mean	SD	N	Mean	SD	N
Years of education	7.142	3.74	6722869	7.011	3.724	2000227
Completed primary school	.547	.498	6722869	.528	.499	2000227
Non-white	.079	.269	6722869	.089	.285	2000227
US citizen	.946	.227	6722869	.953	.211	2000227
Currently married	.755	.43	6722869	.756	.43	2000227
In the labor force	.713	.452	6722869	.725	.447	2000227
Employed	.651	.477	6722869	.666	.472	2000227
Employed, non-emergency work	.616	.486	6722869	.631	.483	2000227
Worked in 1939	.72	.449	6283146	.73	.444	1865908
Any wage/salary income in 1939	.48	.5	6283146	.478	.5	1865908
Wage/salary income in 1939	557	911	6283146	550	906	1865908
≥$50 in non-wage/salary income	.516	.5	6283146	.519	.5	1865908

Full sample: men aged 55-74 in states with 1939 eligibility age of 65 with non-missing demographic information (education, race, birthplace, citizenship, and marital status). For demographic variables and 1940 labor force and employment variables (reflecting labor force status in last week of March 1940), sample restricted to men with non-missing information on labor force status and non-missing demographic information. For 1939 employment and income variables, sample restricted to men with non-missing information for all 1939 employment and income variables and non-missing demographic information. State border county sample further limits to counties that border a state included in the sample.

Table 3: Receipt of non-wage income by state payments per person 65+ and age

	(1)	(2)	(3)	(4)	(5)	(6)
Log per-65+ payment	-0.010**	-0.008	-0.006	-0.007	0.005	0.006
× age 55-59	(0.003)	(0.005)	(0.004)	(0.004)	(0.005)	(0.005)
Log per-65+ payment	0.063***	0.057***	0.058***	0.064***	0.050***	0.051***
× age 65-69	(0.004)	(0.007)	(0.006)	(0.006)	(0.004)	(0.004)
Log per-65+ payment	0.092***	0.089***	0.091***	0.092***	0.070***	0.070***
× age 70-74	(0.009)	(0.009)	(0.010)	(0.009)	(0.005)	(0.006)
Observations	6252698	6252698	6252698	2178112	2178112	2178112
Sample	full	full	full	border	border	border
Census region × age fixed effects	no	yes	yes	no	no	no
Border segment × age fixed effects	no	no	no	no	yes	yes
Education × age fixed effects	no	no	yes	no	no	yes
Race × age fixed effects	no	no	yes	no	no	yes

Dependent variable: receipt of more than \$50 in non-wage income in 1939. Sample for columns (1)-(3): men aged 55-74 in states with 1939 eligibility age of 65 and non-missing rest-of-state payments per person 65+. Columns (4)-(6) include only counties on state boundaries and exclude counties on borders of excluded states. Unit of observation in columns (4)-(6) is a county-state border pair. All specifications include county fixed effects and 5-year age group fixed effects. All age-interactions are with 5-year age groups. Standard errors (in parentheses) are clustered at the state level. *: $p < 0.05$, **: $p < 0.01$, ***: $p < 0.001$

Table 4: Labor force participation by state payments per person 65+ and age

	(1)	(2)	(3)	(4)	(5)	(6)
Log per-65+ payment	0.018***	0.016**	0.016**	0.017***	-0.000	0.001
× age 55-59	(0.005)	(0.005)	(0.005)	(0.004)	(0.004)	(0.003)
Log per-65+ payment	-0.060***	-0.060***	-0.063***	-0.059***	-0.047***	-0.047***
× age 65-69	(0.004)	(0.007)	(0.007)	(0.006)	(0.005)	(0.004)
Log per-65+ payment	-0.067***	-0.069***	-0.074***	-0.071***	-0.058***	-0.059***
× age 70-74	(0.008)	(0.008)	(0.008)	(0.009)	(0.006)	(0.006)
Observations	6687910	6687910	6687910	2334689	2334689	2334689
Sample	full	full	full	border	border	border
Census region × age fixed effects	no	yes	yes	no	no	no
Border segment × age fixed effects	no	no	no	no	yes	yes
Education × age fixed effects	no	no	yes	no	no	yes
Race × age fixed effects	no	no	yes	no	no	yes

Dependent variable: in labor force at 1940 Census. Sample for columns (1)-(3): men aged 55-74 in states with 1939 eligibility age of 65 and non-missing rest-of-state payments per person 65+. Columns (4)-(6) include only counties on state boundaries and exclude counties on borders of excluded states. Unit of observation in columns (4)-(6) is a county-state border pair. All specifications include county fixed effects and 5-year age group fixed effects. All age-interactions are with 5-year age groups. Standard errors (in parentheses) are clustered at the state level. *: $p < 0.05$, **: $p < 0.01$, ***: $p < 0.001$

Table 5: Alternative labor force participation outcomes by state payments per person 65+ and age

	(1) In labor force	(2) Employed	(3) Non-emergency	(4) In labor force	(5) Employed	(6) Non-emergency
Log per-65+ payment	0.017***	0.016***	0.018***	0.001	0.001	-0.000
× age 55-59	(0.004)	(0.004)	(0.004)	(0.003)	(0.003)	(0.003)
Log per-65+ payment	-0.059***	-0.044***	-0.031***	-0.047***	-0.036***	-0.025***
× age 65-69	(0.006)	(0.006)	(0.005)	(0.004)	(0.005)	(0.005)
Log per-65+ payment	-0.071***	-0.048***	-0.036***	-0.059***	-0.046***	-0.035***
× age 70-74	(0.009)	(0.007)	(0.007)	(0.006)	(0.005)	(0.004)
Observations	2334689	2334689	2334689	2334689	2334689	2334689
Sample	border	border	border	border	border	border
Census region × age fixed effects	no	no	no	no	no	no
Border segment × age fixed effects	no	no	no	yes	yes	yes
Education × age fixed effects	no	no	no	yes	yes	yes
Race × age fixed effects	no	no	no	yes	yes	yes

Dependent variables: in labor force at 1940 Census (1 and 4), employed at 1940 Census (2 and 5), employed in private or non-emergency government work (3 and 6). Sample restricted to counties on state boundaries, excluding counties on borders of states with age eligibility requirement other than 65 in 1939. Unit of observation is a county-state border pair. All specifications include county fixed effects and 5-year age group fixed effects. All age-interactions are with 5-year age groups. Standard errors (in parentheses) are clustered at the state level. *: $p < 0.05$, **: $p < 0.01$, ***: $p < 0.001$

Table 6: Model and estimation details

Preferences

$U_{it} = \sum_{s=t}^{T} \beta^{s-t} u_{is}(c_{is}, h_{is}) = \sum_{s=t}^{T} \beta^{s-t} \left(\frac{c_{is}^{1+\eta}}{1+\eta} - \delta_i \mathbb{1}(h_{is} = \bar{h}) \right)$

$\beta = \frac{1}{1+r} = \frac{1}{1.03} \approx 0.97$

$\eta = -1$ (log utility: $u(c) = \log(c)$)

$\delta_i \sim F(\delta)$: Estimated in the "first stage" from predicted no-OAA retirement age distribution

Budget constraints

Initial age (beginning of working life): $t_0 = 21$

Initial assets: $a_{it_0} = 0\ \forall i$

Potential net wage path without OAA: $\{w_{it}\}_t = w_i\ \forall t$

Potential net wage path with OAA: $\{w_{it}\}_t = w_i\ \forall t < T_o$ and $\{w_{it}\}_t = \max\{0, w_i - \bar{y}\}\ \forall t \geq T_o$

Non-labor income profile without OAA: $\{N_{it}\}_t = 0\ \forall t$

Non-labor income profile with OAA: $\{N_{it}\}_t = 0\ \forall t < T_o$ and $\{N_{it}\}_t = \max\{0, \bar{y} - w_{it}h_{it}\}\ \forall t \geq T_o$

Per-period work hours, $\bar{h}$: full-time, full-year work

Eligibility for OAA: $Pr(\text{eligible for OAA}_i | w_i) = \max\{0,\ \min\{1,\ \alpha_0 + \alpha_1 w_i\}\}$, with α_0 and α_1 estimated in the "second stage" from breaks in the earnings distribution at age 65

A Model Appendix

This section presents details of the calculations underlying the simulations of the life cycle model discussed in Section 6. The goals of these calculations are to understand the observed effects of OAA (in particular, to what extent they are due to income vs. substitution effects) and to forecast the effects of OAA and Social Security. To this end, we simulate the model under various policies and calculate statistics of the simulated data. The key statistics concern the predicted effects of OAA and Social Security on retirement. We also decompose these effects into income and substitution effects. We focus on the cohort aged 55 in 1940.

A.0.1 Simulating the Effects of OAA

The key ingredient of the simulation of the effects of OAA is the joint distribution of potential earnings and potential OAA benefit levels among this cohort. Each individual's potential OAA benefit is the legislated maximum OAA benefit in 1940 in his state. For the distribution of potential earnings among individuals in a particular state, we use the observed distribution of earnings in 1940 among people aged 48–52 with positive earnings in that state. We further assume that potential earnings are constant over the relevant part of the life cycle (from age 50 on).

Given the subsequent changes in OAA over the 1940s (most of which increased OAA benefits), this simulation is not representative of the actual experience of any one cohort. Instead, it is meant to answer the question of what effects OAA would have been expected to have had it remained as it was in 1940.

A.0.2 Simulating the Effects of Social Security

The simulation of the effects of Social Security requires two key inputs. One is the distribution of potential earnings among people eligible for Social Security. We estimate the distribution of earnings in 1940 among people aged 48–52 with positive earnings who were in occupations in 1940 that were covered by Social Security by 1950.

The other key input is the Social Security tax and benefits rules. We use the rules as of the 1939 Amendments, which remained in force until the 1950s. Taxes were 1 percent of covered earnings. Total household benefits were the sum of primary benefits (for the worker) and supplementary benefits (for spouses and dependent children), up to a maximum of $85 or 80 percent of the average monthly wage (AMW), whichever was least. The primary monthly benefit was the sum of (i) 40 percent of the first $50 of the AMW plus 10 percent of the amount by which the AMW exceeds $50 up to an AMW of $250 and (ii) 1 percent of the amount in (i) multiplied by the number of years in which the individual earned at least $200 in covered employment. The minimum primary benefit was $10. Supplementary benefits for aged spouses and dependent children were one half of the primary benefit per person. To be conservative, we assume that nobody received any supplementary benefits. We assume that everyone had 15 years of covered employment regardless of when they retired.

Given the subsequent changes in Social Security in the 1950s (which increased benefits and expanded eligibility), this simulation is not representative of the actual experience of any single cohort. Instead, it is meant to answer the question of what effects a counterfactual, smaller Social Security program would have been expected to have had. The actual effects of Social Security on this cohort would be expected to be greater than suggested by these simulations.

A.0.3 Decomposition of the Effects of OAA and Social Security on Retirement into Income and Substitution Effects

We decompose the effects of OAA and Social Security into income and substitution effects using the following method. We solve for the optimal retirement age under three budget constraints: Program (OAA or Social Security), No Program, and "No Program with Compensation."[46] We consider two different "No Program with Compensation" budget constraints. Each is identical to the No Program budget constraint except for one change. In one case, initial assets are increased exactly enough that the individual is able to achieve exactly the same utility that he would achieve under the program. In the other case, non-wage income after the program eligibility age is increased exactly enough that the individual is able to achieve exactly the same utility that he would achieve under the program. If capital markets were perfect, these alternative compensation schemes would be entirely equivalent. But with borrowing constraints, individuals weakly prefer an increase in initial assets to a present value-equivalent increase in late-life income. The estimated equivalent variation of the program is therefore weakly greater under the late-life income compensation than it is under the initial assets compensation. In the text, we discuss the equivalent variation of the program based on both measures, but for measuring income effects we use initial-asset compensation.

The income effect of the program is the number of years earlier that people retire under the "No Program with Compensation" budget constraint relative to the No Program budget constraint due to being richer with the program.[47] The substitution effect of the program is the number of years earlier that people retire under the Program budget constraint relative to the "No Program with Compensation" budget constraint due to the taxation of late-life labor supply implicit in OAA's means tests and Social Security's earnings test.

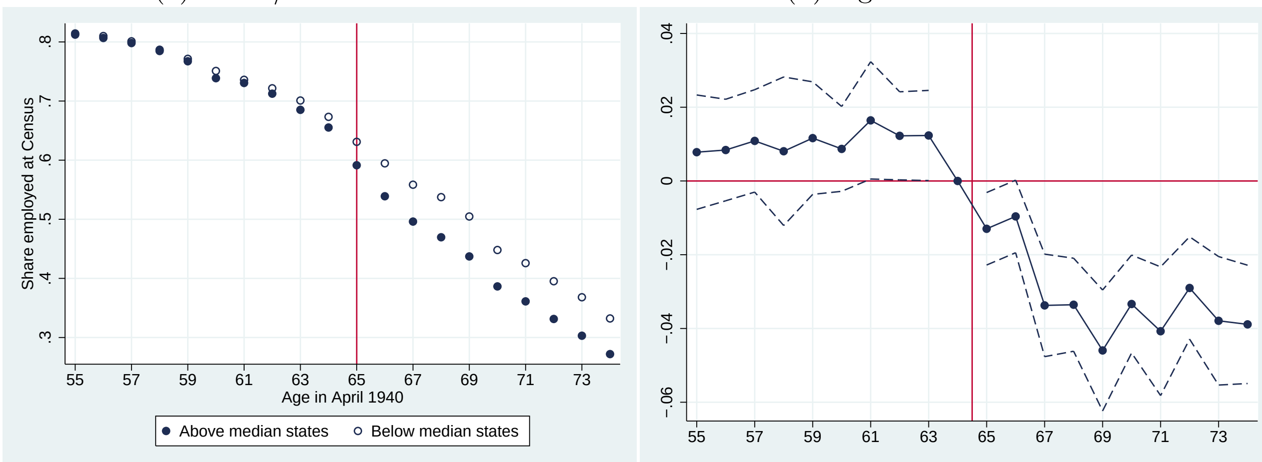
[46]We hold utility fixed at the level of utility the individual achieves with the program in order to ensure invertibility in the presence of borrowing constraints.

[47]Early recipients of OAA and Social Security paid little in taxes to finance these programs, so their opportunity sets were expanded by these programs. Later recipients of OAA likely had their opportunity sets expanded by OAA since OAA was means-tested. Later recipients of Social Security likely had their opportunity sets expanded by Social Security due to subsequent expansions of the program.

Results Appendix

Figure A1: Employment in 1940, by age and state payments per person 65+

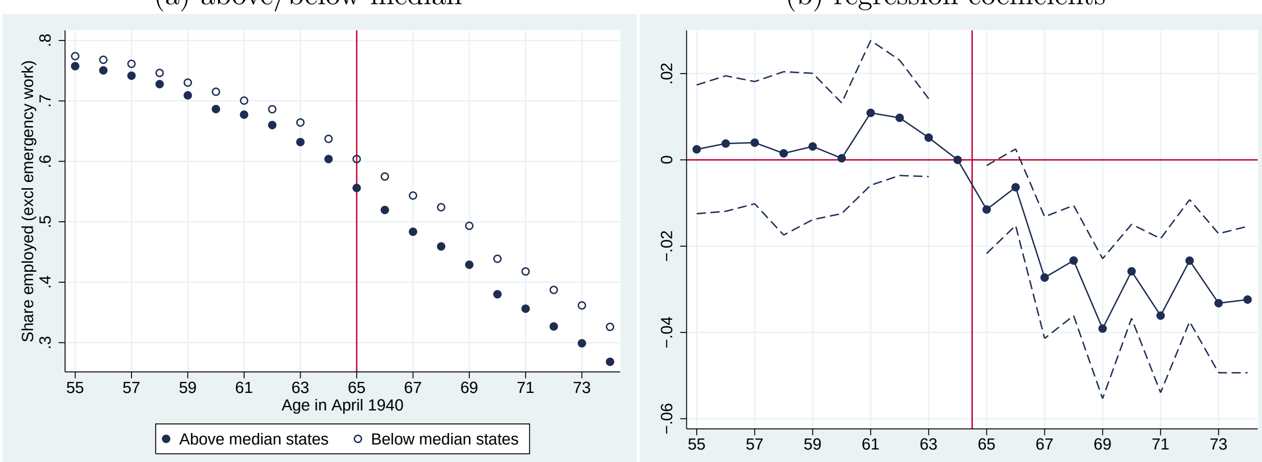
(a) above/below median (b) regression coefficients



Notes: Panel (a) shows share of men employed at the time of the 1940 Census, in states with above and below-median payments per person 65+ in 1939. Panel (b) shows point estimates and 95% confidence intervals on age-payment interactions from estimation of equation (2). Standard errors clustered at the state level. $N = 2334689$.

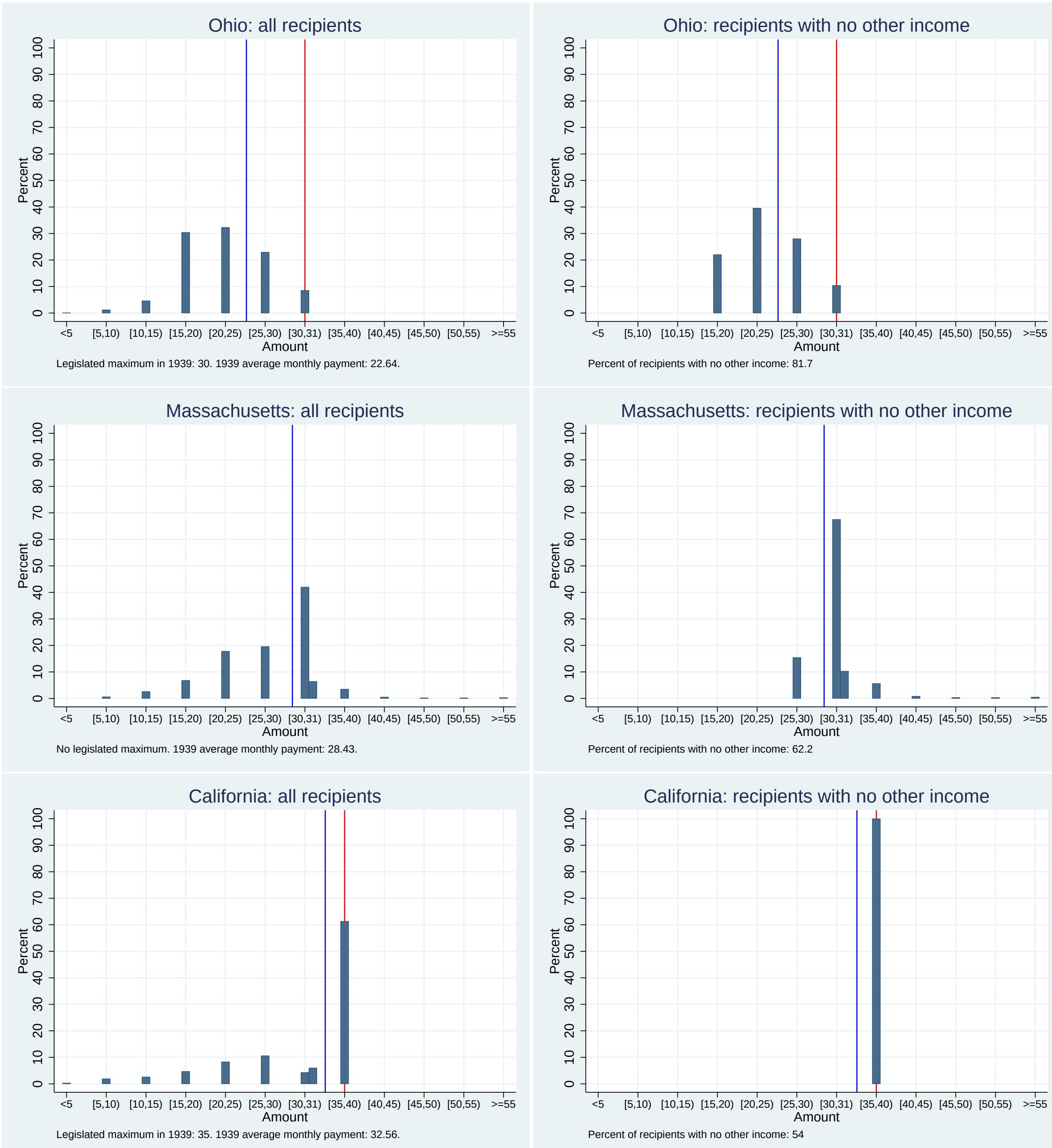
Figure A2: Private or non-emergency employment in 1940, by age and state payments per person 65+

(a) above/below median (b) regression coefficients



Notes: Panel (a) shows share of men employed in private or non-emergency government work at the time of the 1940 Census, in states with above and below-median payments per person 65+ in 1939. Panel (b) shows point estimates and 95% confidence intervals on age-payments interactions from estimation of equation (2). Standard errors clustered at the state level. $N = 2334689$.

Figure A3: Distributions of payments to new recipients in 1938-39, by state



Notes: Left figures show distributions of payment amounts to new recipients in 1938-39 by state, based on data from U.S. Social Security Board (1939). Right figures show estimated distribution for recipients with no other source of income, under the assumption that those with other sources of income received the lowest payments.

Table A1: Cross-state migration 1935-40 by state payments per person 65+ and age

	(1)	(2)	(3)	(4)	(5)	(6)
Log per-65+ payment	0.0010	-0.0023	-0.0024	0.0008	0.0009	0.0010
× age 55-59	(0.0009)	(0.0017)	(0.0016)	(0.0017)	(0.0010)	(0.0011)
Log per-65+ payment	-0.0008	0.0013	0.0014	-0.0019	0.0016	0.0017*
× age 65-69	(0.0013)	(0.0022)	(0.0022)	(0.0019)	(0.0008)	(0.0008)
Log per-65+ payment	-0.0021	0.0027	0.0028	-0.0026	0.0016	0.0016
× age 70-74	(0.0020)	(0.0034)	(0.0033)	(0.0034)	(0.0015)	(0.0015)
Observations	6585063	6585063	6585063	2297575	2297575	2297575
Sample	full	full	full	border	border	border
Census region × age fixed effects	no	yes	yes	no	no	no
Border segment × age fixed effects	no	no	no	no	yes	yes
Education × age fixed effects	no	no	yes	no	no	yes
Race × age fixed effects	no	no	yes	no	no	yes

Dependent variable: moved states between 1935 and 1940. Sample for columns (1)-(3): men aged 55-74 in states with 1939 eligibility age of 65 and non-missing rest-of-state payments per person 65+, 1935 state of residence, and 1940 employment information. Columns (4)-(6) include only counties on state boundaries and exclude counties on borders of excluded states. Unit of observation in columns (4)-(6) is a county-state border pair. All specifications include county fixed effects and 5-year age group fixed effects. All age-interactions are with 5-year age groups. Standard errors (in parentheses) are clustered at the state level. *: $p < 0.05$, **: $p < 0.01$, ***: $p < 0.001$