Means-tested old age support and private behavior: Evidence from the Old Age Assistance Program*

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Abstract

A major source of the expansion of governments over the last several decades has been their role in operating social insurance programs. Most of these programs are implemented at the national level and in the recent past have been only rarely subject to large reforms, creating a major challenge for learning about their effects. In this paper, we investigate the Old Age Assistance Program (OAA), a means-tested and state-administered pension program created by the Social Security Act of 1935. OAA was the primary source of government old age support through the 1930s and 1940s, remaining much larger than Social Security until the 1950s. Using newly available complete-count Census data from 1940, we exploit the large differences in OAA programs across states and the detailed rules that governed eligibility for OAA within states to estimate the labor supply effects of OAA. We find that OAA significantly reduced labor supply, with our main estimates indicating that OAA led to a 5.7 percentage point reduction in labor force participation among men aged 65–74, or 11 percent relative to the base of roughly 50 percent participation. Estimating a standard model of life cycle labor supply, we find that about three-fourths of the OAA-induced reduction in late-life labor supply was due to income effects and about one-fourth was due to substitution effects from OAA's earnings test. Simulations of the model suggest that Social Security (the Old-Age and Survivors Insurance program that continues to this day) had large effects on retirement once it started making payments, and that substitution effects from Social Security's earnings test accounted for about 40 percent of the effects of Social Security on labor supply.

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1 Introduction

Many government programs create incentives for hastening transitions from the labor force into retirement. Government pensions programs, health insurance programs, disability insurance programs, and even unemployment insurance programs often lead people to retire earlier than they otherwise would (e.g., Wise, 2014). The effects of these policies on labor supply—and the extent to which the effects are due to income or substitution effects—is a crucial input to the welfare analysis of such policies and is a core question in labor economics and public finance. The rapid aging of many nations' populations increases the urgency of understanding the effects of these programs.

Two major challenges confront efforts to credibly estimate the effects of such programs. The first is the relative lack of policy variation. Most of these programs are administered at the national level and create relatively little variation in incentives within otherwise-similar groups of people. In addition, most of the major changes to these programs occurred far in the past, when there tends to be less data available. This is unfortunate from a research perspective since marginal contractions or expansions in already-mature programs may not be very informative about how behavior would respond to larger changes (Chetty, 2012), particularly since contractions or expansions are often phased in only gradually. The second major challenge for learning about the effects of these programs is the demanding data requirements imposed by some of what would otherwise be the most attractive empirical approaches.

In this paper, we address both of these challenges by analyzing the early years of the Old Age Assistance program (OAA) in the US using newly-available data on the entire population in 1940. OAA was a large, means-tested welfare program for the elderly created by the Social Security Act of 1935, the same Act that created Social Security. OAA was a large program—22 percent of people age 65 and over received OAA in 1940—and was larger than Social Security for the first fifteen years of their mutual existence, until the 1950s. OAA shares many features in common with Social Security and other important social insurance programs of the present day, which raises the likelihood that lessons learned from studying OAA will shed light on important current policy issues.[1] OAA was a state-run program

[1]In 1974 OAA became the Supplementary Security Income program (SSI), which remains in force to this day, albeit on a much smaller scale than OAA's scale from the late 1930s through the 1950s. In addition to being the direct predecessor to SSI, OAA also shares many features in common with other important modern social insurance and welfare programs, including Social Security, which imposed a strong earnings test until 1972 and whose current earnings test appears to continue to be (sometimes wrongly) perceived to be taxing work effort even today (Gelber, Jones and Sacks, 2013); SSDI, given that during the period around 1940 on which we focus disability and retirement were even more closely linked than they are today and given that some OAA programs conditioned eligibility on assessments of earning ability; Medicaid, since OAA offered means-tested medical benefits in certain states and times; and also means-tested cash- or near-cash- welfare

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). Even within states, OAA created widely varying incentives for otherwise-similar groups. All OAA programs limited eligibility to the low-income elderly. Most OAA programs further limited eligibility to US citizens and long-time state residents. The non-universal nature of OAA makes possible many fine-grained empirical tests of OAA's effects.

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 theory of 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 now-important 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. 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.

Our results suggest that OAA significantly reduced labor force participation among older individuals. We first show that 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 is a sharp divergence in labor force participation between states with larger OAA programs relative to those with smaller programs, and this divergence grows larger and continues at older ages. In quantitative terms, the results suggest that raising state OAA payments per person 65 and above by a standard deviation would have led to a roughly 3.3 percentage point decline in labor force participation among men aged 65–74, which is 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 would come from men on the margins of labor force participation. Specifications with employment and employment excluding work relief programs suggest 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.

programs such as TANF and food stamps.

We estimate a variety of alternative specifications that support an interpretation of the results as the effect of OAA on labor force participation, rather than unobserved factors that both decrease labor force participation and increase OAA recipiency or payments. As one example, 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.

We use the observed breaks in labor force participation at the OAA eligibility age to estimate a standard life cycle model of labor supply and retirement. The model fits the observed responses to OAA quite well. The results imply that for the typical OAA program, income effects accounted for about three-fourths of the reduction in labor supply and substitution effects due to OAA's earnings tests accounted for the other one-fourth. Although substitution effects were an important share of the overall reduction in labor supply, we find that recipients valued the program highly, with the average recipient valuing his OAA benefits at about 87 percent of their present value.

Motivated by the close similarity between the effects on budget constraints of OAA and the early Social Security program, we also simulate the effects of Social Security. In particular, we simulate the effects of a counterfactual Social Security program that remained fixed after the 1939 Amendments, whereas the actual Social Security program underwent substantial expansions in the 1950s and later years. The predicted effects on retirement of this relatively modest Social Security program are quite similar to those of OAA on the (relatively small) subset of the population eligible for OAA, although the effects of Social Security are driven by substitution effects to a greater extent (40 percent vs. 28 percent for Social Security and OAA, respectively).[2] 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 quite large. Our main results based on the relatively low Social Security benefits of the 1939 Amendments suggest that Social Security reduced average retirement ages among people eligible for Social Security by about seven years.

This paper is most closely related to Parsons (1991) and Friedberg (1999), both of whom analyze the labor supply effects of OAA.[3] Our work complements this earlier work in that

[2]Social Security imposed a strict earnings test for much of its history, especially in the early years of the program. Between 1939 and 1950, for example, Social Security's earnings test limited benefits to people who had less than $15 of monthly earnings. People who earned more would have their benefits withheld.

[3]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.

we take advantage of newly-available data and recently-developed empirical techniques to compare more narrowly-defined groups (such as 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. We are aware of no previous work that has been able to separate the income and substitution effects of OAA or Social Security over this time period, which critical for understanding their welfare benefits and costs.

Our work is also closely related to work on the labor supply effects of other government old-age support programs, especially those with meaningful means tests. One example of such a program is the US Social Security program, whose earnings test comprised a significant tax on labor earnings for much of the program's history. The effects of the earnings test and other aspects of Social Security on labor supply have been studied by Burtless and Moffitt (1985); Gelber, Jones and Sacks (2013); and many others (see Krueger and Meyer, 2002, for a review).

Finally, this paper also contributes to the literature on the labor supply effects of a wider variety of government programs, including means-tested welfare programs (see Moffitt, 2002, for a review) and disability insurance programs (see Bound and Burkhauser, 1999, for a review). Relative to much of this literature, we are able to perform finer-grained empirical tests because of the detailed nature of OAA eligibility rules (e.g., the age eligibility threshold and, in some states, the citizenship requirement and asset tests) and the large dataset we employ.

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 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.[4] 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.[5,6] In almost all states, benefits were set in such a way as to provide either an income

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

[5]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.

[6]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,

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.[7] 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.[8,9] 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.[10] These 95th percentile payments were broadly similar to the legal maxima, but in some cases significantly different: Georgia, for example, had a legal

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).

[7]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.

[8]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).

[9]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.

[10]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.

maximum of 30 dollars per month but 95 percent of payments were for 15 dollars or less.

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 1.[11] 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.[12]

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 2. People whose optimal earnings levels in the absence of OAA fall between zero and not

[11] 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.

[12] 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.

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.[13]

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.[14] 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.[15]

[13]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 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.

[14]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.

[15]Hence, our analysis relies on two different but largely overlapping samples. One comprises the 6,667,929 men aged 55 to 74 with non-missing 1940 labor supply and basic demographic information; the other comprises the 6,217,191 men with non-missing 1939 work and income information as well as non-missing basic demographic information.

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).

Table 2 describes the characteristics of the men in our sample. The men included in the full sample had about 7.2 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. 72 percent of men were in the labor force, and 66 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 73 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.[16] Including those who reported zero wage and salary income in 1939, the average reported income was $580 (corresponding to about $9030 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).[17] 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 1.6 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.

[16]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.

[17]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.

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*).

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.[18] Importantly, 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.[19] 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. Some private pensions may also have made payments beginning at age 65, but the share of the elderly receiving private pensions at the time was also quite small relative to the share receiving OAA. In 1940 there were about 160,000 monthly beneficiaries of private pensions and deferred profit-sharing plans for employees of industrial and nonprofit organizations (estimated in Series Bf848 of Carter et al. (2006)), only about 1.8 percent of the total population 65 and above.

The second key source of variation that we use is the heterogeneity in state policy discussed

[18]Lansdale et al. (1939) acknowledge that verification of age was difficult, given the absence of mandatory birth certificates for these birth cohorts. 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.

[19]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.

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 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.[20]

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.[21] In this specification we limit the sample to counties lying on the boundary with another state and estimate equations of the form

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

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.

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. In the 1940 Census, there was no question directly inquiring about whether an

[20] 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.

[21] 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.

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 3 shows the share of men receiving non-wage and salary income by age in 1939. Receipt of non-wage income at these ages was common and became more so with age: slightly more than 40 percent of 55 year-olds reported receiving non-wage income, and close to 70 percent of 74 year-olds. Since non-wage income could come from several sources other than OAA payments, the level of this variable does not necessarily indicate OAA recipiency, and the change in the level at age 65 does not necessarily measure the share of the age 65 population receiving OAA. That said, there is a visible break at age 65, suggesting that aging into eligibility was indeed associated with an increase in available resources.[22] 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.

To further investigate whether the increase in receipt of non-wage income at age 65 is due to OAA receipt, it is useful to quantify the size of the increase. We estimate a model of the following form:

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

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.[23]

Figure 4 plots estimated breaks for all men and separately for each number of reported years of education. For all men together the increase in the probability of receiving non-wage income at age 65 is about 6 percentage points. Consistent with this increase being driven by OAA, which targeted those with the lowest permanent income, the estimated breaks are largest for men with a primary education or less and diminish for those with higher levels of

[22] It is likely that OAA displaced general 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.

[23] One potential complication that arises in estimating breaks in behavior at age 65 is the well-known phenomenon of age binning on multiples of 5 in historical Census data, in a way that is correlated with levels of human capital. In our sample we do observe excess mass on multiples of 5, and what appears to be too little mass on ages ending in 1 or 6; reported years of schooling also appears low for ages ending in 0 or 5 and high for ages ending in 1 or 6. To evaluate the importance of this phenomenon to our analysis, we have also estimated models allowing separate level shifts for ages ending in 0 or 5, 1 or 6, 2 or 7, and so on. Ultimately this complication does not appear to be very important for the outcomes we consider; all results look very similar in the alternative specifications.

education.[24]

Comparison of age profiles across states provides additional evidence that changes in receipt of non-wage income at age 65 were associated with OAA. The left panel of Figure 5 plots the share of men receiving non-wage income separately for states with below- and above-median OAA payments per person 65 and above. At ages below 65, the trends with age are nearly identical despite a difference in levels. After age 65, states with larger OAA programs show a marked divergence in the share of men receiving non-wage income.

This 'first stage' result also holds conditional on the finer comparisons that we make in investigating the effects of OAA on labor supply. In the right panel of 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 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

[24]Appendix Figure A1 offers another piece of evidence indicating that the break at age 65 is associated with OAA receipt. The figure plots estimated breaks in the probability of having non-wage income separately by state of residence, and shows that larger state OAA recipiency rates are associated with larger estimated breaks in our 'first stage' variable.

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. The left panel of Figure 6 plots the share of men in the labor force at the time of the 1940 Census, separately for states with above- and below-median payments per person 65 and above. In both levels and trends, labor force participation rates are extremely similar across the two types of states up to age 64, with a notable divergence beginning at age 65 that is equally large in absolute amount (and larger in relative terms) at older ages. The right panel investigates this pattern further, plotting 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, consistent with the similarity of trends in the left panel. This result supports 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 faster 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.[25] 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, in Figure 7 we plot estimated breaks at age 65 from equation (3) for receipt of non-wage income against estimated breaks in labor force participation.[26] The estimates line up strikingly well, consistent with non-wage income substituting for labor income as men aged into eligibility for OAA.

[25]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.

[26]As before, these state-specific estimates of the break in non-wage income in 1939 omit men aged 65 at the time of the 1940 Census, since only some of them would have been eligible for OAA in 1939. We observe labor force participation at the time of the 1940 Census, however, and therefore could include all men in these regressions. For consistency of the sample we also omit 65-year-olds in the labor force participation regressions. Including them in the sample slightly flattens the slope but does not substantially change the relationship.

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 unlikely, 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 by examining the labor force participation of non-US citizens, who were ineligible for OAA in many states.

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 (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 under-

lying 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.

Another possible concern 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.[27] 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

[27]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.

a transition from unemployment to retirement as opposed to a transition from employment to retirement.[28] 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 as employment in private or public non-emergency work.[29] 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 on Labor Supply

The results so far suggest that OAA significantly reduced the labor supply of men aged 65–74. Given that a large fraction of men were not eligible for OAA, the effect among men who actually were eligible was larger still. This raises several questions. First, why did OAA reduce labor supply so much? A priori, there are reasons to think that both income and substitution effects may have been large. Income effects may have been large because OAA significantly expanded the budget sets of eligible individuals at a time relatively soon after the Great Depression when many people's labor supply might have been driven to a large extent by subsistence concerns. Substitution effects may have been large because OAA's strict means tests implicitly taxed labor earnings at a high rate. Second and related, how valuable was OAA to recipients? To the extent that OAA benefits were inframarginal to recipients (in that they would have received a similar amount even if they did not adjust their behavior in response to OAA), OAA benefits would have tended to be more valuable. But to the extent that recipients "earned" their benefits by reacting to the earnings test in a costly way, OAA benefits would have tended to be less valuable. Finally, what do the results suggest about the likely effects of Social Security on late-life labor supply? Social Security affected people's budget constraints in ways very similar to OAA and expanded significantly during the middle of the twentieth century, a period that also featured significant reductions in labor force participation among older individuals. In this section, we use a standard life

[28] 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).

[29] Appendix Figures A2 and A3 show means and estimates of equation (2) by single years of age.

cycle model to shed light on these questions.

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,

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

where

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

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

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

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

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.[30] The discount rate equals the interest rate of 3 percent per year, so the discount factor is $\beta = \frac{1}{1.03} \approx 0.97$. Utility of consumption is log utility, which corresponds to $\eta = -1$.

Heterogeneity in retirement behavior among people who face the same budget constraint is generated 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 estimated (counterfactual) distribution of retirements without OAA. In order to obtain a counterfactual distribution of retirements in the absence of OAA, we take a stronger stand on estimation of labor supply effects prior to the age of eligibility than in the main estimates. Our approach is to rely on comparisons

[30] 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 we plan to complete many more tests soon.

across state boundaries, and to make the stronger assumption that if OAA levels were the same in two states, the *levels* of labor force participation within each age group would be the same on either side of the boundary. Formally, we estimate

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

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 relationship between age and labor force participation in Figure 9. It is noteworthy that using this approach, we find reductions in labor force participation after age 65 that are similar to our main estimates, and any anticipatory effects of OAA on labor supply before age 65 appear quite small.

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.[31] 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 and the Ex-post Value of OAA to Recipients

We consider an OAA program that provides an income floor. Individuals who are eligible for OAA (i.e., who are at least the minimum age of eligibility, who meet any citizenship

[31] 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.

and residency requirements, whose assets are no larger than the maximum allowable level, who do not have any family members who are able to support them in states with relatives responsibility laws, etc.) receive an OAA benefit of

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

where $\bar{y}_{it}$ is the maximum OAA benefit level in i's state in the period in which i is t years old.

To focus on situations as similar as possible to the model, we limit attention to states whose OAA programs were as close as possible to income floors set at a common level across individuals. 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, it was certainly the case that in many states, payments varied substantially even across people with no other source of earnings. This issue is illustrated in Appendix Figure A4, 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.[32] 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. We use data from Massachusetts to estimate the parameters of the model; in ongoing work we plan to use data from California as a validation check on the predictions of the model based on the estimated parameters.

6.3.1 Eligibility for OAA

A key challenge in learning about the effects of OAA is determining who was eligible for OAA. OAA's detailed eligibility rules make it difficult to determine even the fraction of the

[32] 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.

population that was eligible, much less which particular individuals were eligible. The key difficulties are the demanding data requirements and the reportedly uneven application of some of the eligibility requirements (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. Moreover, it is hard to imagine any 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 reportedly uneven application of these requirements (Lansdale et al., 1939).

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 is eligible for OAA is

$$Pr(\text{eligible}_i) = \max\{0,\ \min\{1,\ \alpha_0 + \alpha_1 w_i\}\}.^{33}$$

We estimate the parameters governing the eligibility-wage relationship, α_0 and α_1, by using the estimated breaks in the age-labor force participation profiles (bunching of retirements) at the OAA eligibility age for groups facing different "replacement rates" from OAA, $\bar{y}/w$. Analyzing the bunching of retirements at the OAA eligibility age 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.

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. In this specification, men just below the age

[33]This measure of eligibility is exclusive of the earnings test: An individual is eligible if and only if his non-earnings characteristics do not preclude his eligibility, i.e., if and only if he would receive a positive OAA benefit if he had no earnings.

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 scale the breaks by the share of men at age 64 who earned the specified amount as a measure of the probability of retirement at age 65 for each level of potential earnings. Note that since we focus on a single state, the level of $\bar{y}$ is the same for all individuals.

We plot estimated breaks in the share of Massachusetts men earning each amount from zero up to $1800 in the left panel of Figure 10. The vertical line indicates an annual amount of $360, which we treat as the level of the income floor in Massachusetts for the purposes of the estimation. Aging into eligibility was associated with an increase of slightly under 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 10 show these estimated breaks scaled by the share of men at age 64 reporting the given level of wages: the point estimates suggest that at levels of potential earnings up to $800 per year, about 20 percent of men retired at age 65.

We estimate the two parameters governing eligibility for OAA using the Method of Simulated Moments, where the target moments are the age-65 breaks in the earnings distribution. We weight each moment by the inverse of its variance, so 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. The results indicate that roughly 26 percent of the population was eligible for OAA, with eligibility declining from about 42 percent among those with the lowest potential earnings to about 10 percent for people with potential earnings of $2,000; fitting a linear relationship suggests that no one with potential earnings greater than about $2,600 would have been eligible. The estimated model matches well the age-65 breaks in the earnings distribution, as shown in Figure 11. The model also 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 case of a $360 benefit level).

6.3.2 Implications of the Model for the Effects of OAA on Labor Supply

The results reported above suggest that the model can provide a useful benchmark for simulating and decomposing the effects of OAA on various groups. We use the model to

simulate behavior under a variety of budget constraints. 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. We focus on the cohort aged 50 in 1940. (Details of all of the calculations in this section are reported in the appendix.)

The results imply that among this cohort, OAA reduced the average retirement age by 1.8 years, of which 1.3 years (or 72 percent) were due to income effects and 0.5 years (28 percent) were due to substitution effects. Among people eligible for OAA, the effects were four times greater (7.5, 5.4, and 2.1, respectively). The predicted effects of OAA on retirement—both the overall effects and the shares due to income and substitution effects—are highly heterogeneous across groups with different levels of potential earnings. The effects of OAA are greater among groups for whom the OAA benefit is greater relative to (potential) earnings. Figure 12 shows how the effects of OAA vary with (potential) wage rates among people eligible for OAA. The effect of OAA on retirement is greatest for people with the lowest wages but remains large (about six years) at wages of ten times the OAA benefit level. (It should be noted, however, that the estimation results suggest that few individuals with such high potential earnings were eligible for OAA.) This is consistent with our empirical findings that the effects of OAA were greatest among people with lower potential earnings and among people in states with greater OAA benefits. The composition of the effects of OAA between income and substitution effects differs systematically across the wage distribution as well. Among people eligible for OAA with the lowest wages, OAA hastens retirement by almost nine years, virtually all of which is an income effect. But for people eligible for OAA with wages of more than about $1,300, OAA primarily hastens retirement through a substitution effect due to the earnings test. Thus, the finding that income effects account for most of the observed effects of OAA is partly due to OAA's eligibility requirements. OAA's eligibility requirements appear to target benefits toward people for whom the effects of OAA are to a greater extent income effects than they would be for the population as a whole. Were it not for these requirements, a greater share of OAA's effects on labor supply would be due to substitution effects.

The substitution effects indicate that people adjusted their behavior in order to increase their OAA benefits, which means that the amount of OAA benefits received tends to overstate how valuable those benefits were to recipients. We investigate this issue by using the model to calculate each recipient's equivalent variation of OAA. The results imply that the average recipient valued his OAA benefit stream at about 87 percent of its present value.[34] Of course,

[34]Two restrictions that OAA imposes on its recipients reduce the average value of OAA benefits to recipients relative to an unconditional cash transfer. The first is the earnings test, which requires that people earn little in order to qualify for OAA benefits. The second is the age requirement that recipients must be at least 65 years old in order to receive benefits. If people are unable to borrow against their future OAA

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 Effects of Social Security on Labor Supply

The model is well-suited to predicting the effects of Social Security on retirement. Social Security imposed a strict earnings test for much of its history, especially in the early years of the program, making Social Security's effect on budget constraints very similar to OAA's.[35] To investigate how Social Security would be expected to affect behavior, we simulate the effects of Social Security *as it was as of the 1939 Amendments* on the population of men aged 50 in 1940 who had Social Security Numbers at that time (and who therefore had covered earnings under Social Security).[36]

We find that the simulated effects of Social Security on retirement are quite similar to the simulated effects of OAA on the set of people estimated to be eligible for OAA. In the simulation, Social Security reduces the average retirement age among people eligible for Social Security by 7.1 years (vs. 7.5 years for the effect of OAA on people eligible for OAA), of which 4.3 years are due to income effects and 2.9 years are due to substitution effects. Perhaps surprisingly, the share of the reduction in retirement ages due to substitution effects is greater for Social Security than for OAA: 40 percent vs. 28 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. While much of the literature on the effects of Social Security on retirement has focused on the large income effects of the program for the early "initial old" generations, our results suggest that substitution effects were also likely to be quantitatively important.

benefits, receiving the same present value of benefits in the future may be worth less than receiving the benefits immediately. The results imply that allowing individuals to borrow in perfect capital markets would increase the average recipient's valuation of his OAA benefits from 87 to 93 percent of its present value.

[35]Between 1939 and 1950, Social Security's earnings test limited benefits to people who had less than $15 of monthly earnings. People who earned more had their benefits withheld. This is very similar to how California's OAA program in 1940 affected budget constraints, as it essentially set an income floor of $40 per month with an earnings disregard of $15 per month. We found little evidence that people took advantage of such income disregards in the few OAA programs that had them, which might be due to their very low level.

[36]To be clear, this analysis is about a counterfactual policy path that was not actually realized, rather than an attempt to estimate the historical effects of Social Security directly. Whereas we hold fixed Social Security policy as specified in the 1939 Amendments, the actual Social Security program underwent substantial expansions in the 1950s and later years. The predicted effects of the actual Social Security policy path including the post-1939 expansions would be larger still.

7 Conclusion

Many government old-age support programs and means-tested welfare programs have the effect of reducing market activity, both by directly taxing market activity in order to fund the programs and by indirectly taxing the market activity of benefit recipients by phasing out payments with market income. In this paper, we analyze the labor supply effects of the Old Age Assistance program. This program was an important program in its own right and also helped pave the way for many of the social insurance programs in the US still in effect to this day. From a research perspective, OAA presents many valuable opportunities for learning about the effects of retirement- and health-related programs as well as means-tested programs, since it exhibited so much variation across states and had many specific eligibility criteria that led to many cases of otherwise-similar groups of people being subject to very different incentives. 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 force participation among early recipients of the program, 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 about three-fourths of the overall reduction in labor supply from OAA was due to income effects, with the remaining one-fourth due to substitution effects from OAA's earnings test. Further analysis indicates that Social Security—whose earnings test implicitly taxed market work at a high rate through much of its history—had effects very similar to those that OAA had on people eligible for OAA. These results suggest that Social Security may have had a large impact on late-life market work, with our main estimate suggesting that Social Security reduced average retirement ages among people eligible for Social Security by about seven years. 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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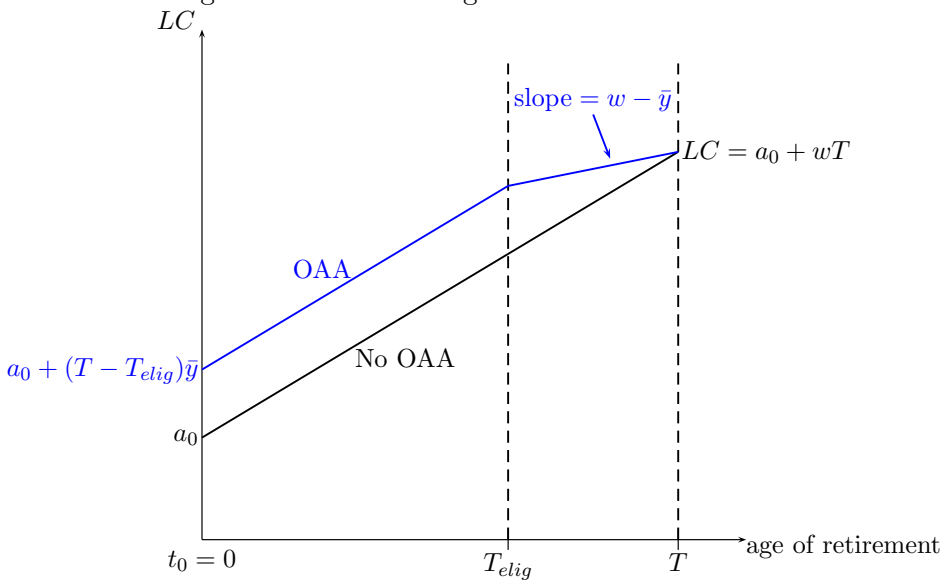
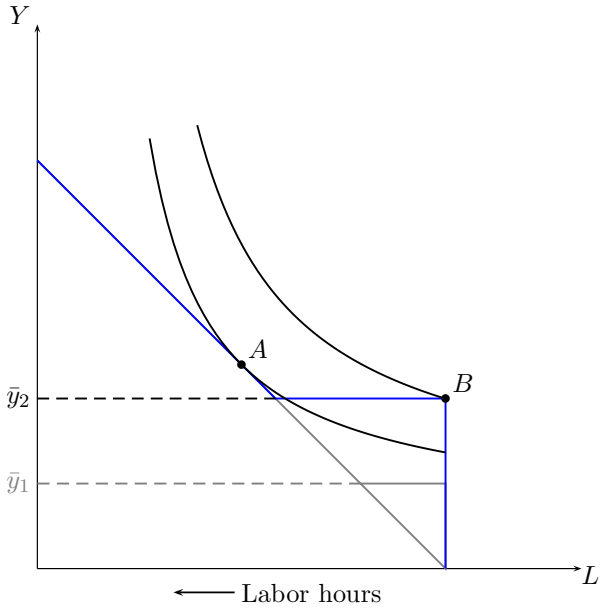
Tables and Figures

Figure 1: Lifetime budget constraint with OAA



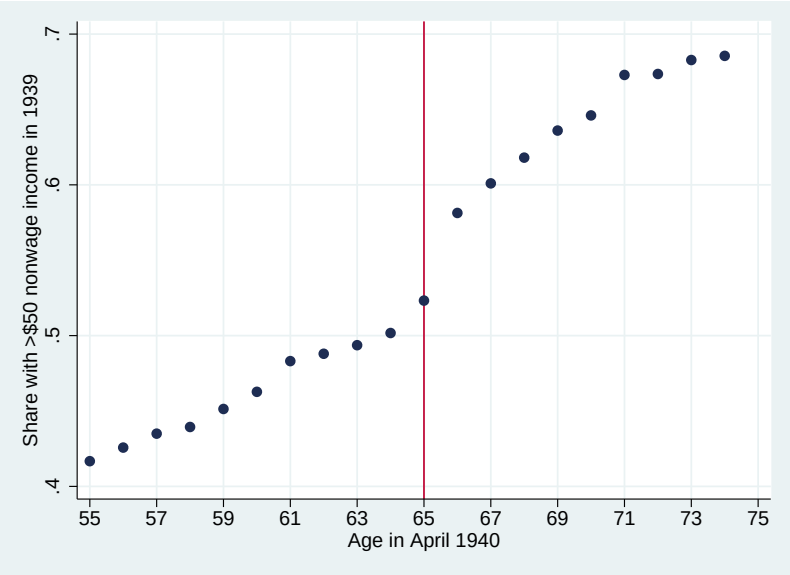
Lifetime budget constraint relating the present value of lifetime consumption (LC) to age at retirement, with and without OAA. The OAA program depicted is an income-floor program with eligibility age T_{elig}, which implicitly taxes labor earnings at a 100 percent rate from the first dollar (by phasing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

Figure 2: Period budget constraint with OAA



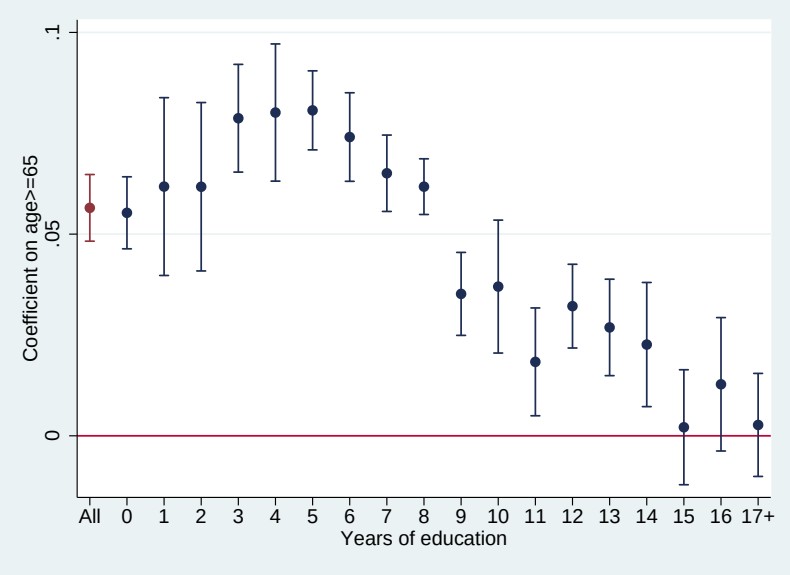
Period budget constraint relating income (Y) to leisure L, with and without OAA. The OAA program depicted is an income-floor program, which implicitly taxes labor earnings at a 100 percent rate from the first dollar (by phasing out benefits dollar-for-dollar with labor income).

Figure 3: Share of men with non-wage/salary income in 1939, by age at 1940 Census



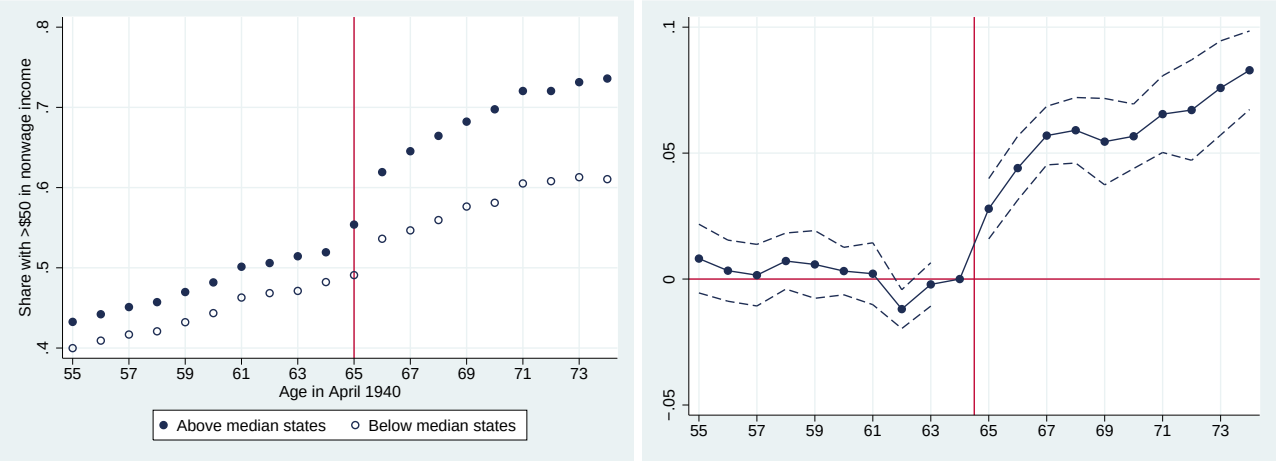
Notes: Figure shows share of men at each age reporting more than $50 in non-wage income in 1939. Sample: men aged 55-74 in states with an OAA eligibility age of 65 in 1939. $N = 6645898$.

Figure 4: Breaks at age 65 in share of men with non-wage/salary income in 1939, by education



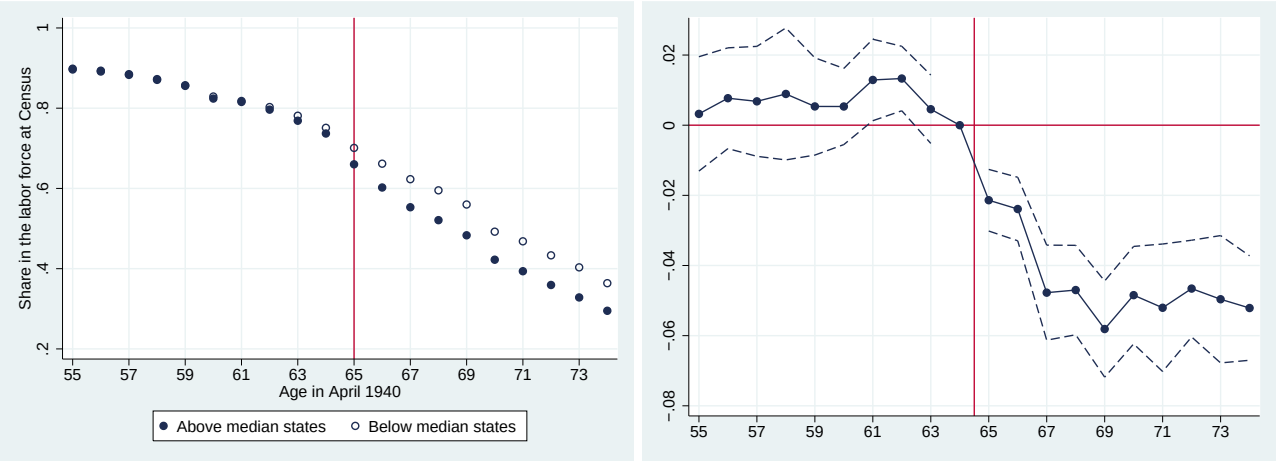
Notes: Figure shows point estimates and 95% confidence intervals from estimation of equation (3) separately by reported years of education. Sample: men aged 56-64 or 66-73 at 1940 Census, in states with an eligibility age of 65 in 1939. Standard errors clustered by years of age. $N = 5220753$.

Figure 5: Receipt of non-wage/salary income in 1939, by age and state payments per person 65+



Notes: Left figure shows share of men receiving more than $50 in non-wage income in 1939 in states with above- and below-median payments per person 65+ in 1939, for states with an eligibility age of 65 in 1939. Right 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. $N = 2161093$.

Figure 6: Labor force participation in 1940, by age and state payments per person 65+

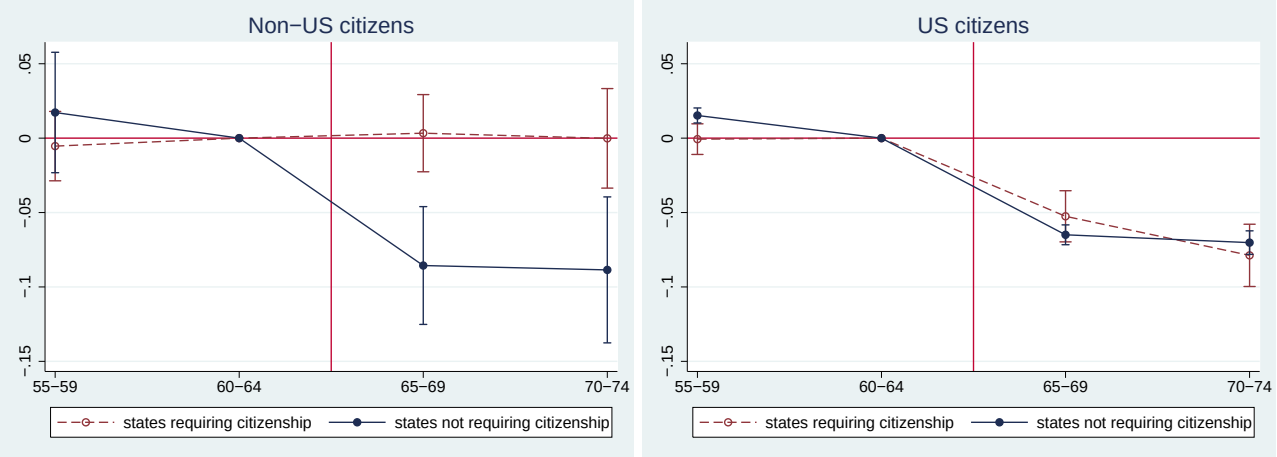


Notes: Left figure shows share of men in the labor force at the time of the 1940 Census, in states with above- and below-median payments per person 65+ in 1939. Right figure shows point estimates and 95% confidence intervals on age-payment interactions from estimation of equation (2). Standard errors clustered at the state level. $N = 2318328$.

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

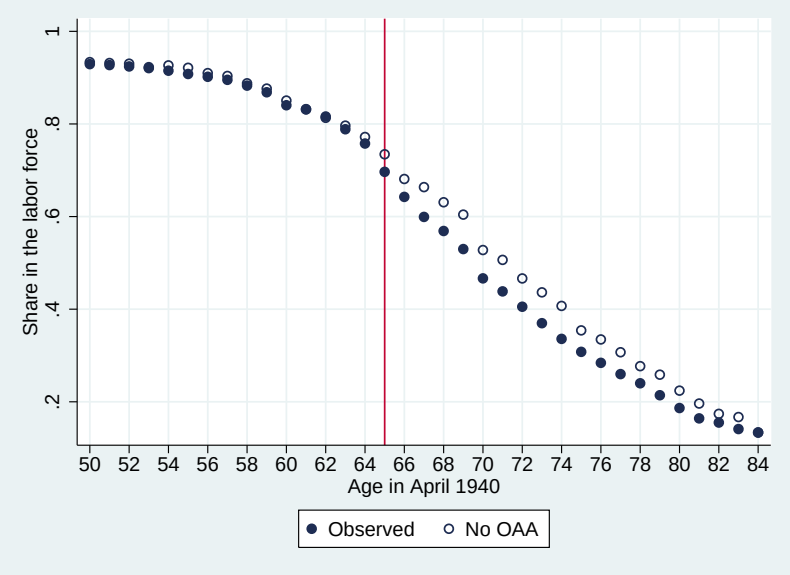
Notes: Figure shows point estimates from estimation of equation (3) for receipt of non-wage income in 1939 against estimates for labor force participation in 1940, separately by state. Sample: men aged 56-64 or 66-73 at 1940 Census, in states with an eligibility age of 65 in 1939; breaks in receipt of non-wage income estimated on sample of men with non-missing 1939 income information ($N = 5220753$) and breaks in labor force participation estimated on sample of men with non-missing 1940 labor force participation information ($N = 5602968$).

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



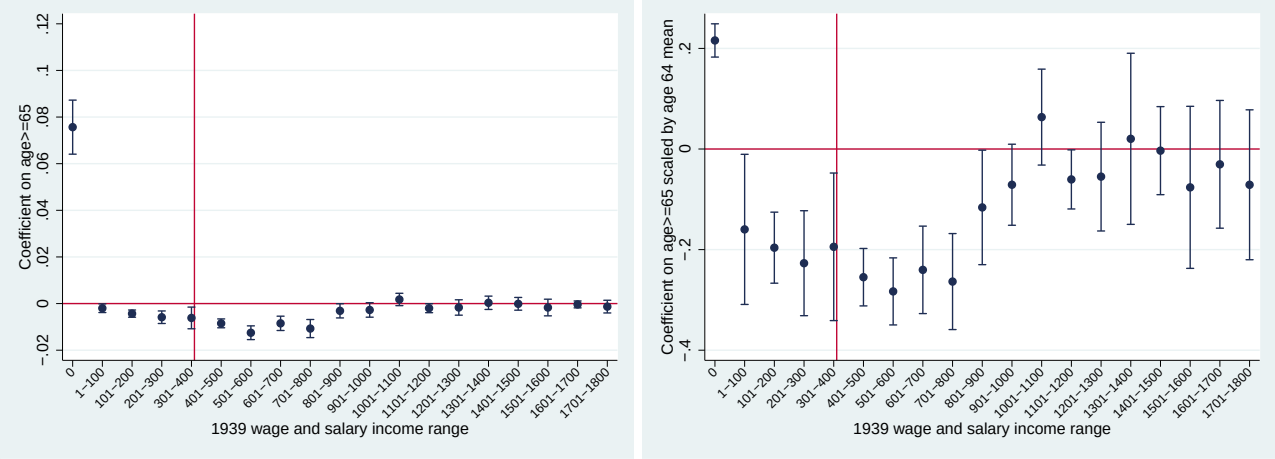
Notes: Figure shows point estimates and 95% confidence intervals from estimation of equation (1) on non-US citizens (left) and US citizens (right), grouping ages into 5-year bins. 'States requiring citizenship' are those limiting eligibility to US citizens in both 1939 and 1940. 'States not requiring 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 $N = 290409$, for non-citizens in states not requiring citizenship $N = 48435$. For citizens, samples sizes are $N = 3855245$ and $N = 1765514$ respectively.

Figure 9: Actual and counterfactual no-OAA profile of labor force participation



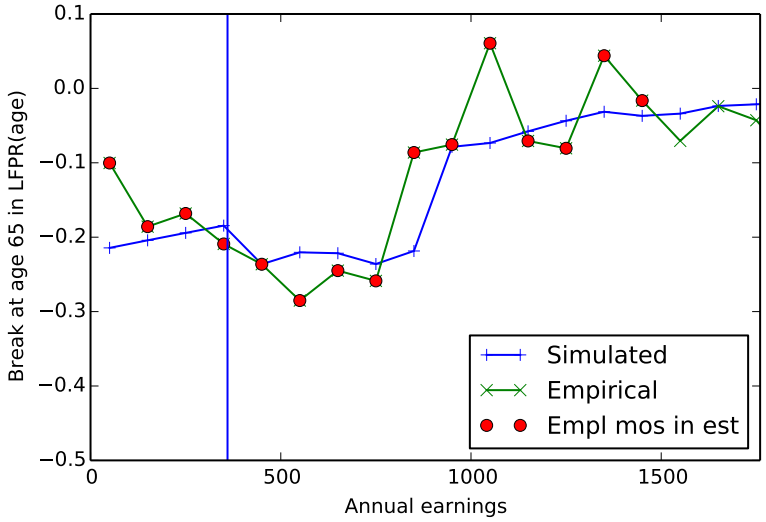
Notes: Figure shows observed rates of labor force participation by age and estimated counterfactual rates of labor force participation in the absence of OAA, based on estimates of equation (4).

Figure 10: Breaks at age 65 in share of men with specified amount of wage/salary income in 1939



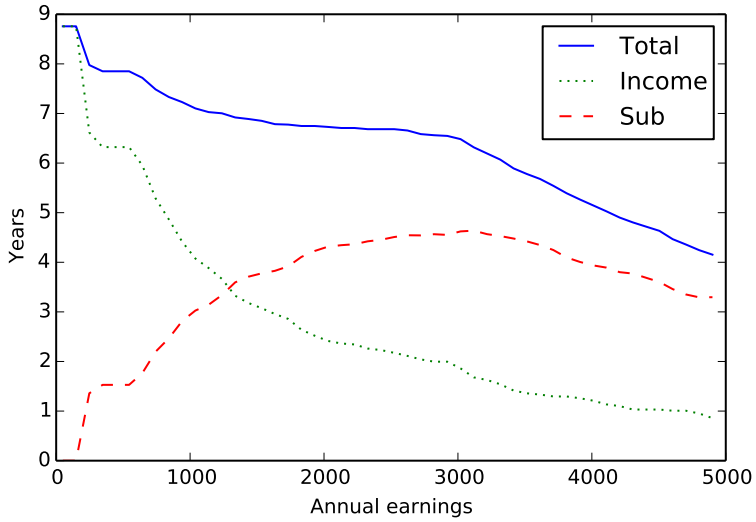
Notes: Figures show point estimates and 95% confidence intervals from separate estimations of equation (3), with dependent variable indicating wage/salary earnings of each specified amount in 1939. Sample: men aged 56-64 or 66-73 at 1940 Census in Massachusetts. Vertical line denotes 'income floor' of $360 per year. Standard errors clustered by years of age. Left panel shows unscaled estimates; right panel shows estimates scaled by the share of men aged 64 reporting the specified amount of wage and salary earnings in 1939.

Figure 11: Empirical vs. simulated effects of OAA



Notes:
Breaks at age 65 in the labor force participation-age profiles of groups with different rates of (potential) annual earnings in Massachusetts: simulated vs. empirical. The vertical line corresponds to the maximum OAA benefit in Massachusetts, $360 per year.

Figure 12: Simulated effects of OAA on retirement among people eligible for OAA



Notes: Simulated total, income, and substitution effects of OAA on retirement as functions of (potential) annual earnings. A total effect of three years means that OAA reduced the average retirement age among people with that level of annual earnings by three years. The simulations are based on the entire cohort of people aged 50 in 1940 in the US.

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	7.199	3.786	7081310	7.058	3.766	2099356
Completed primary school	.551	.497	7081310	.531	.499	2099356
Non-white	.078	.268	7081310	.09	.286	2099356
US citizen	.946	.226	7081310	.954	.21	2099356
Currently married	.753	.431	7081310	.754	.431	2099356
In the labor force	.723	.447	6667929	.735	.441	1989025
Employed	.66	.474	6667929	.676	.468	1989025
Employed, non-emergency work	.624	.484	6667929	.64	.48	1989025
Worked in 1939	.735	.441	6217191	.744	.436	1855840
Any wage/salary income in 1939	.486	.5	6217191	.485	.5	1855840
Wage/salary income in 1939	581	954	6217191	580	962	1855840
$\geq$\$50 in non-wage/salary income	.515	.5	6217191	.518	.5	1855840

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 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	-0.006	0.007	0.007
× age 55-59	(0.003)	(0.005)	(0.004)	(0.004)	(0.005)	(0.004)
Log per-65+ payment	0.063	0.057	0.058	0.063	0.049	0.049
× age 65-69	(0.004)	(0.007)	(0.007)	(0.006)	(0.004)	(0.004)
Log per-65+ payment	0.092	0.089	0.091	0.091	0.069	0.070
× age 70-74	(0.009)	(0.009)	(0.009)	(0.009)	(0.005)	(0.005)
Observations	6185380	6185380	6185380	2161093	2161093	2161093
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.

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	0.000
× age 55-59	(0.005)	(0.005)	(0.005)	(0.004)	(0.004)	(0.004)
Log per-65+ payment	-0.061	-0.061	-0.064	-0.058	-0.046	-0.046
× age 65-69	(0.004)	(0.007)	(0.007)	(0.006)	(0.005)	(0.005)
Log per-65+ payment	-0.069	-0.071	-0.076	-0.072	-0.057	-0.058
× age 70-74	(0.008)	(0.008)	(0.008)	(0.008)	(0.006)	(0.006)
Observations	6632959	6632959	6632959	2318328	2318328	2318328
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.

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	0.015	0.017	0.000	0.001	-0.001
× age 55-59	(0.004)	(0.004)	(0.004)	(0.004)	(0.003)	(0.003)
Log per-65+ payment	-0.058	-0.043	-0.029	-0.046	-0.034	-0.024
× age 65-69	(0.006)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Log per-65+ payment	-0.072	-0.049	-0.036	-0.058	-0.046	-0.034
× age 70-74	(0.008)	(0.007)	(0.006)	(0.006)	(0.005)	(0.004)
Observations	2318328	2318328	2318328	2318328	2318328	2318328
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.

Table 6: Model and estimation details

Preferences

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

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

$\eta = -1$ (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 50 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 single 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 use the distribution of earnings in 1940 among people aged 48–52 with positive earnings who had a Social Security Number at that time. Having a Social Security Number indicates that the individual was working in covered employment or had done so in the past.

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. For simplicity, we assume that everyone received supplementary benefits based on one "dependent" (e.g., an aged spouse) and 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 Social Security would have been expected to have had it remained as it was as of the 1939 Amendments. 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."[37] The "No Program with Compensation" budget constraint is identical to the No Program budget constraint except that 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.[38] 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.[39] 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.

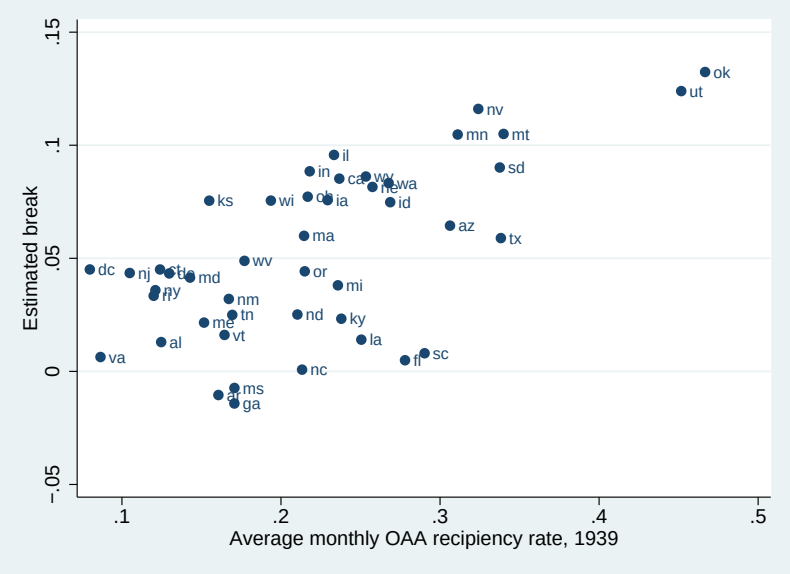
[37] We hold utility fixed at the level of utility the individual achieves with the program in order to ensure invertibility in the presence of borrowing constraints.

[38] An alternative would be to compensate the individual in initial assets instead of late-life income. Given 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 greater under the late-life income compensation we report than it is under the initial assets compensation.

[39] 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.

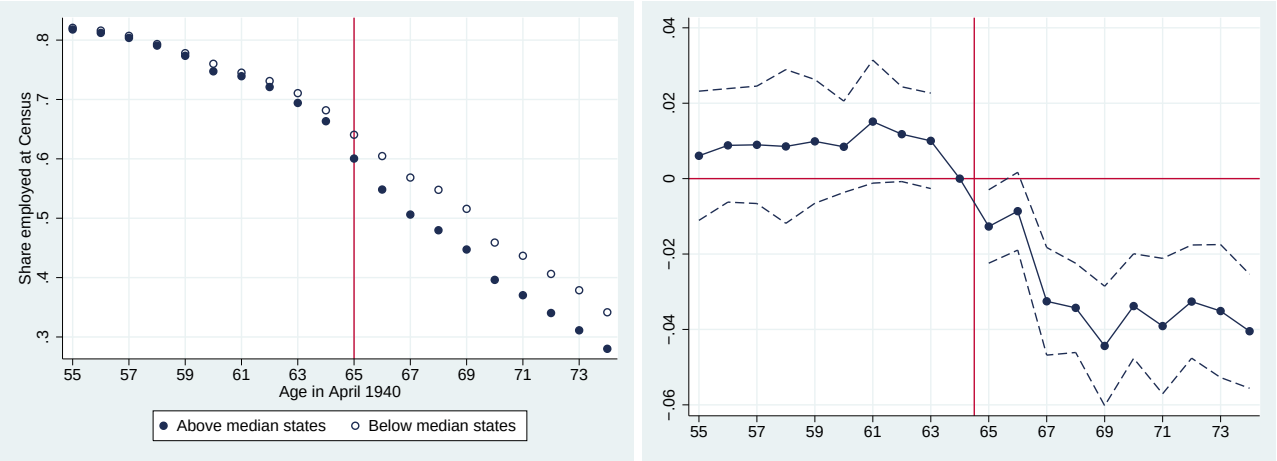
Results Appendix

Figure A1: Breaks at age 65 in non-wage/salary income in 1939, by state OAA recipiency rate



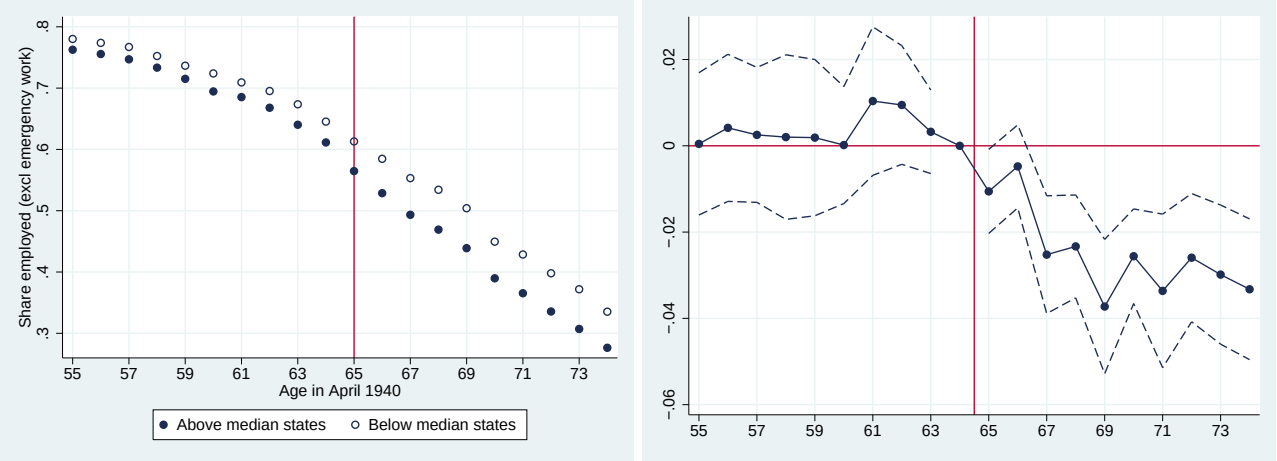
Notes: Figure shows point estimates from estimation of equation (3) separately by state plotted against state OAA recipiency rate in 1939. Sample: men aged 56-64 or 66-73 at 1940 Census, in states with an eligibility age of 65 in 1939. $N = 5220753$.

Figure A2: Employment in 1940, by age and state payments per person 65+



Notes: Left figure 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. Right figure shows point estimates and 95% confidence intervals on age-payment interactions from estimation of equation (2). Standard errors clustered at the state level. $N = 2318328$.

Figure A3: Private or non-emergency employment in 1940, by age and state payments per person 65+



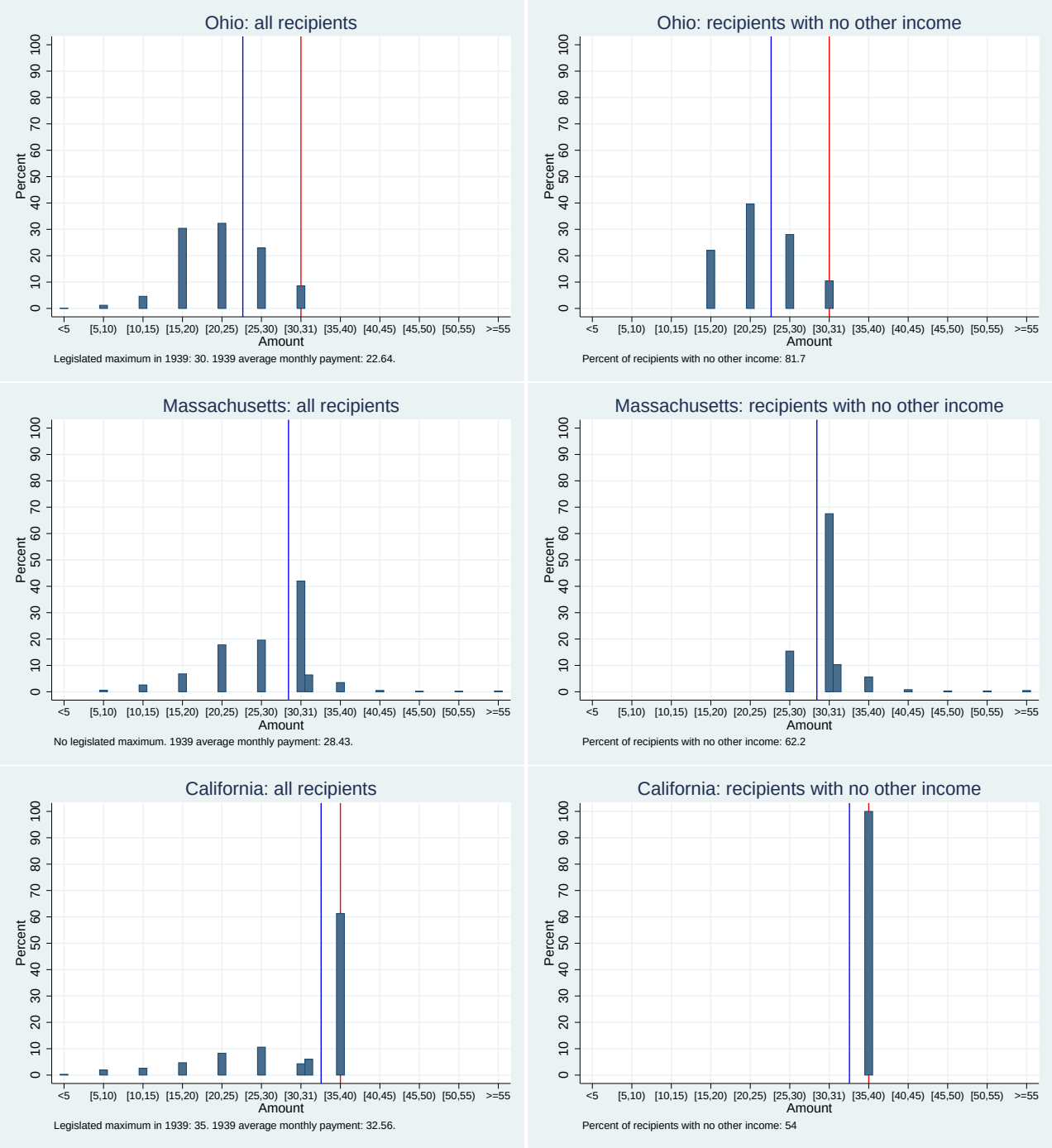
Notes: Left figure shows share of men employed in private or non-emergency government work at the time of the 1940 Census, in states with above and below-median payments per person 65+ in 1939. Right figure shows point estimates and 95% confidence intervals on age-payments interactions from estimation of equation (2). Standard errors clustered at the state level. $N = 2318328$.

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	-0.0024	-0.0025	0.0009	0.0007	0.0008
× age 55-59	(0.0009)	(0.0016)	(0.0016)	(0.0017)	(0.0010)	(0.0011)
Log per-65+ payment	-0.0008	0.0010	0.0011	-0.0018	0.0017	0.0017
× age 65-69	(0.0013)	(0.0022)	(0.0021)	(0.0019)	(0.0008)	(0.0007)
Log per-65+ payment	-0.0020	0.0027	0.0028	-0.0023	0.0019	0.0020
× age 70-74	(0.0020)	(0.0034)	(0.0033)	(0.0033)	(0.0016)	(0.0016)
Observations	6513575	6513575	6513575	2278011	2278011	2278011
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.

Figure A4: 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.