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Panel 1: Social Security Benefits and Demographic Trends

Moderator

Karen Glenn (U.S. Social Security Administration)

Do People Work Longer When They Live Longer?

Eugene Steuerle, **Damir Cosic**, and Aaron Williams (Urban Institute)

The Demographics Behind Aging in Place: Implications for Supplemental Security Income Eligibility and Receipt

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Misperceptions of the Social Security Earnings Test and the Actuarial Adjustment: Implications for Labor Force Participation and Earnings

Alexander Gelber (University of California, San Diego and NBER), **Damon Jones** (University of Chicago and NBER), Ithai Luthrie (U.S. Department of the Treasury), and Daniel Sacks (Indiana University)

Do People Work Longer When They Live Longer?

Eugene Steuerle, Damir Cosic, and Aaron Williams (Urban Institute)·

Introduction

Labor force participation among the older population has been growing over the last three decades in parallel with an increasing trend in life expectancy, but for more than a hundred years before that, they were moving in opposite directions. This makes it difficult to understand the relationship between these two variables based on time-series data. This study uses a novel approach in examining the relationship between life expectancy and labor force participation at older ages. Rather than analyzing changes over time, we rely on the spatial variation at a point in time. Because all observations were made under the same national macroeconomic conditions and with the same access to the federal safety net, this approach allows us to remove some of the key factors that confound the temporal analysis.

There are two main mechanisms through which increases in life expectancy can raise labor force participation at older ages. The first one assumes that individuals choose their retirement age by optimizing their lifetime utility, and that their individual expectation of longevity corresponds to the actuarial life expectancy. The lifetime optimization includes saving for retirement, forming expectations of longevity and future income, and weighing the disutility of working at older ages against the need to adequately fund retirement. It is easy to show that an increase in an individual's longevity expectations should induce them to postpone their retirement age. Otherwise, the individual would have to fund a longer retirement with the same amount of retirement savings, assuming that older workers have little room for increasing their retirement savings by changing their saving rate.

The second way that life expectancy affects labor force participation is through health and capacity for work. Life expectancy is closely related to the overall health of the population. A lower prevalence of chronic diseases such as obesity, heart disease, and diabetes reduces mortality and increases life expectancy. Health is also one of the key factors in an individual's decision to work. A medical condition may limit or prevent some types of work, and poor health generally increases disutility of work.

· The research reported herein was pursuant to a grant from the U.S. Social Security Administration (SSA), funded as part of the Retirement and Disability Research Consortium. The findings and conclusions expressed are solely those of the authors and do not represent the views of SSA, any agency of the federal government, the Urban Institute, or the Center for Retirement Research at Boston College.

The question we address has significance beyond academic research. The Social Security Board of Trustees (the Trustees henceforth), who project a number of economic variables over a 75-year horizon in their annual report, use forecasted increases in life expectancy to adjust their labor force participation projections. As will be seen (Figure 1), their method produces comparable increase in labor force participation with increases in life expectancy at younger ages but somewhat steeper at older ages. Our cross-section results show that the effect of life expectancy may be more modest.

Data and Methods

We combined demographic and economic data from the Census Bureau and life expectancy data from the National Center for Health Statistics at the census tract level to examine the relationship between life expectancy and labor force participation. We used life expectancy data by age group (55-64 and 65-74), gender, and census tract from the USALEEP data, which contain abridged period life expectancy tables for 11 age groups and 65,662 census tracts (88.7 percent of all census tracts) during the 2010-2015 period. Census tracts from Maine and Wisconsin were excluded, as geocoding of death records in these states did not start until 2011. About 1,000 additional census tracts were excluded because of their small population size.

Most other variables used in this study come from the 2011-2015 five-year *American Community Survey* (ACS) at the census tract level. We calculated the labor force participation rate for each age-gender group and census tract as the ratio of the number of people who are in the labor force to the total number of people. We constructed prime-age employment rates for ages 25-54 from population counts and employment rates for four smaller age groups published in the ACS subject tables. We estimated the median prime-age employment rate and designated census tracts with the employment rate below the median as low employment areas. We constructed the variable for the share of people ages 25 or older in a census tract with no more than a high school diploma as the sum of the proportions with "less than 9th grade," "9th to 12th grade," "no degree," and "high school graduate." The shares of the population living in poverty, those with a disability, and those who identify as non-Latinx White[1] are reported directly in the

[1] This paper uses the term Latinx to describe people of Latin American descent because it is the most inclusive term with respect to ethnicity and gender.

published ACS profile tables. Median household income by census tract is also directly reported in the ACS tables, which we used for classification of tracts into quartiles of median income.

We mapped census tracts to commuting zones, as defined by the U.S. Department of Agriculture's Economic Research Service, for estimating fixed-effects regression models and robustness checks. Commuting zones are combinations of counties and county equivalents that are intended to capture regional markets rather than solely municipal or state boundaries.

For each age-gender group, we estimated a regression model with the logarithm of the labor force participation rate as the dependent variable, life expectancy as the explanatory variable, and the socioeconomic and demographic variables described above as covariates. The unit of observation is a census tract. For identification, we rely on the variation of these variables within commuting zones and states. Under the assumption that states affect labor force participation by their legislative and regulatory framework, and commuting zones approximate geographic boundaries of local labor markets, we include state and commuting zone indicators to remove cross-state and cross-commuting-zone variation. This framework does not allow us to identify mechanisms through which life expectancy affects labor force participation.

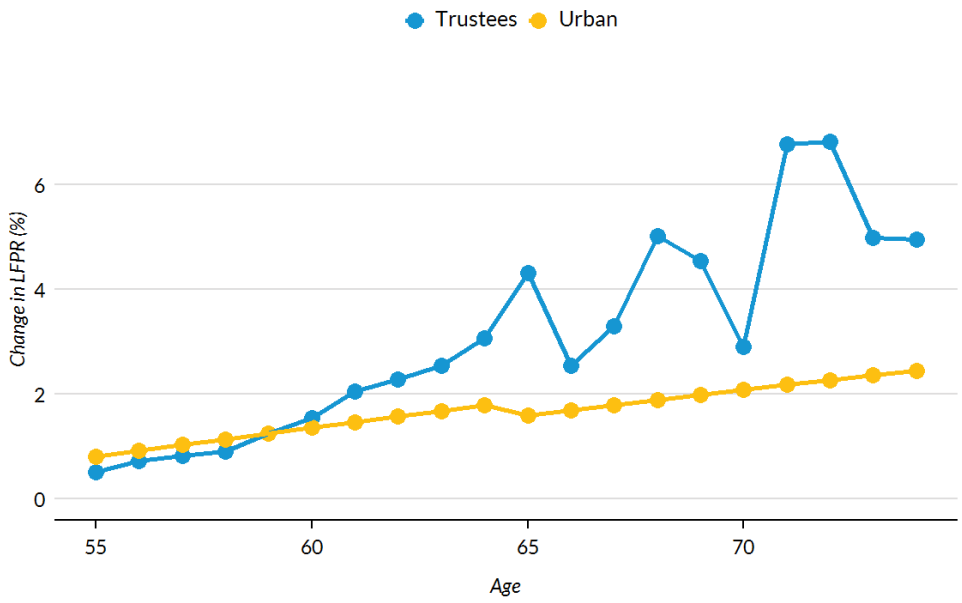
Results

Our estimates of the effect of changes in life expectancy on labor force participation are relatively small, especially when compared to the effects implied by the Trustee's life expectancy adjustment. For men in both age groups, an additional year of life expectancy causes a one-percent increase in the labor force participation rate. When we allowed a nonlinear relationship between the two variables, we found that the effect increases with age from 0.80 percent at age 55 to 1.75 percent at age 64, and from 1.57 percent at age 65 to 2.39 percent at age 74. These estimates are shown in Figure 1 together with the effects implied in the Trustees' life expectancy adjustment of labor force participation, which are substantially higher than our estimates at ages 62 and older. For women ages 55-64, an additional year of life expectancy raises their labor force participation rate by 0.3 percent on average and, like for men, the effect increases with age. The estimated effect for women ages 65-74 has the opposite sign, which indicates that an additional year of life expectancy reduces labor force participation by 0.3 percent. Even though the correlation between the two variables is positive, once the cross-state variation is removed it becomes negative. This unexpected result, for which we currently do not

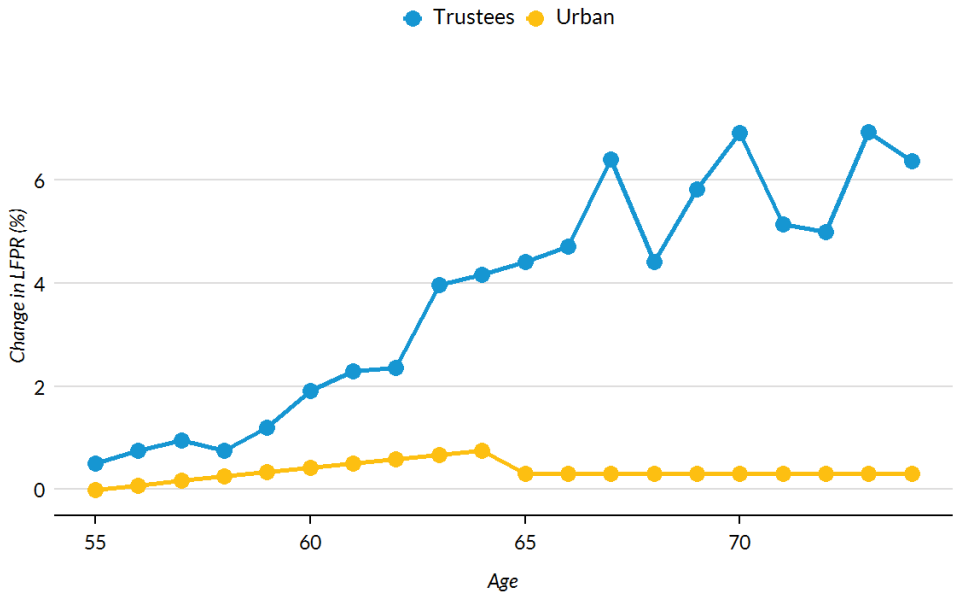
have a good explanation, has been fairly consistent for this group. Only when we allowed the effect of life expectancy to vary with the tract median household income, it had a positive sign in census tracts with median income in the top half of median-income distribution, and negative for those in the bottom half of the distribution.

Figure 1. *Effect of a One-Year Increase in Life Expectancy*

Men



Women



Notes: Trustees' values were calculated based on the life-expectancy add factor, which was provided to us by the Social Security Administration.

Conclusion

Our findings indicate that when comparisons are made across commuting zones at a point in time and with existing policies in place, people do work longer when they live longer, but this conclusion comes with caveats. The relationship between labor supply and life expectancy is complex and multifaceted. This study offers but one perspective and brings out the classic issue of what can be learned from the different perspectives of cross-section versus time series analysis. Life expectancy can affect labor force participation in multiple ways, these two variables move at different paces over time, and they are correlated with many of the same confounding variables.

Our choice of data and methods brings some aspects of this question into sharper focus but inevitably blurs others; it removes some time-varying confounding variables but may introduce others that vary across space. In particular, it is not clear that our approach captures the optimization of lifetime utility, which is one of the main mechanisms through which life expectancy affects labor force participation at older ages, nor will it capture the extent to which succeeding cohorts react as a group (rather than only as individuals) to their new health and longevity status. Because there is no evidence that people are aware of the geographic variation in life expectancy, it is possible that our estimates capture only its correlation with health and its effect on capacity to work, thus underestimating the total effect on labor force participation, and should be considered a lower bound for the total effect. The lack of evidence is due to the lack of research in this area, which points to a direction for future investigations. Another issue that requires further attention is the negative sign of the effect of life expectancy on labor force participation for women ages 65-74. Although this result may be a true reflection of a phenomenon that is waiting for a theoretical explanation, it is more likely that our functional specifications failed to capture the true nature of the relationship between life expectancy and labor force participation for this age-gender group, or that some of the assumptions we made are invalid. Despite these caveats, our results may expand the understanding of this important question and help inform the Trustees' projections of future labor force participation.

The Demographics Behind Aging in Place:
Implications for Supplemental Security Income Eligibility and Receipt

Mary K. Hamman (University of Wisconsin-La Crosse)·

Introduction

Despite population aging, fewer older adults are living in nursing homes (West et al., 2014). This paper investigates two key demographic trends that may have contributed to the decline in nursing home residents: 1) increasing longevity among men; and 2) increasing racial and ethnic diversity. In doing so, I explore implications of changes in residency patterns for the Supplemental Security Income program (SSI).

Prior research indicates that the probability of moving into a nursing home varies by age, health, and disability status, but also by sex, race and ethnicity, marital status, and availability of informal support (Gaugler et al. 2007). Since 1980, men's life expectancy has increased and the U.S. population as a whole has become more diverse. These trends are associated with higher probabilities of living with a partner or in a multigenerational family, which reduce the risk of moving into a nursing home (Freedman 1996; Lofquist 2012; Stepler 2016).

SSI provides financial assistance to blind or disabled people and people ages 65 and older who have very low income and financial resources. In 2018, federal SSI payments to recipients ages 65 and over totaled $11.3 billion, and federally administered state supplements added over $726 million (*Annual Report of the SSI Program 2019, Table IV.C1.*; *Annual Report of the SSI Program 2019, Table IV.C4.*). These payments supported more than 2.2 million financially vulnerable older adults nationally (U.S. Social Security Administration 2019a).

As the share of people ages 65 and older living in nursing homes has fallen, so has the share of SSI recipients living in institutional settings. Only 1.3 percent of SSI aged recipients lived in institutional care settings covered by Medicaid in 2018, compared to nearly 5 percent in 1980 (U.S. Social Security Administration 2019b). The maximum monthly federal SSI payment for a Medicaid recipient living in a nursing home in 2018 was $30 but the maximum when living in the community was $750 (U.S. Social Security Administration 2019a). The reason for this

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difference is that older adults who live in the community must pay for room and board separately from any Medicaid-covered care they receive, while Medicaid pays room and board costs for beneficiaries living in nursing homes. This means changes in living arrangements among low-income older adults impact expenditures for both Medicaid and SSI.

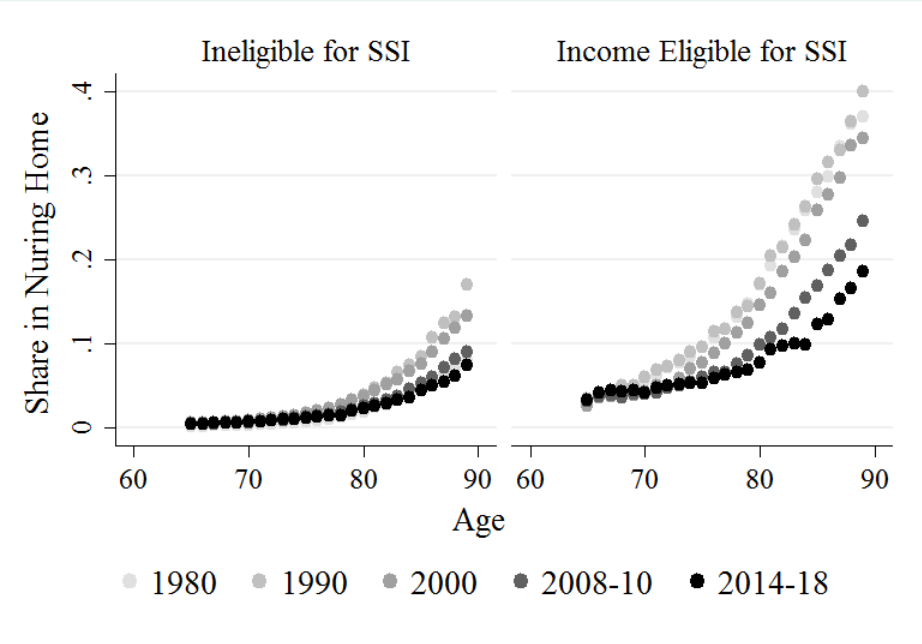
Data

Using U.S Census Bureau and *American Community Survey* data from 1980-2018, I study the decline in nursing home residents overall, and low-income residents in particular (Ruggles et al. 2020). I examine which other living arrangements rise as nursing home residency falls and investigate whether changes in the demographics of the older adult population can explain the decline in nursing home residents. These data include older adults who live in the community and who live in nursing homes; the data also offer sufficient sample size to study financially vulnerable adults separate from higher-income adults and to account for the role of differences in state policy environments, like Medicaid Home and Community Based Care (HCBS) programs. The surveys include information about housing characteristics which are used to estimate the percentages of older adults who live in assisted living communities and in independent households.

Results

Figure 1 shows the proportions of older adults by age who lived in nursing homes (or similar settings) in 1980, 1990, 2008-2010 and 2014-2018, by income. Although the number of people living in nursing homes in both income groups dropped from 1980-2018, the decline is greatest among people with incomes low enough to qualify for federal SSI payments.

Figure 1. *Rates of Nursing Home Residence by Income*

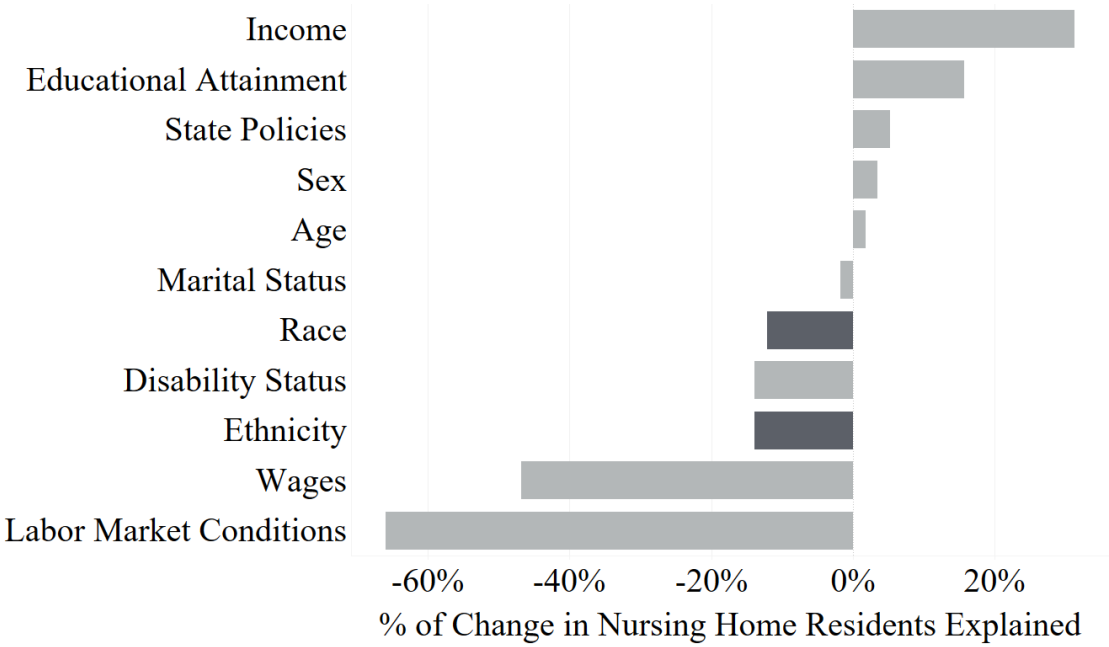


Notes: SSI eligibility is based on self-reported income only. Nursing home shares may include adults in other institutional settings.
Source: Author compilation of Decennial Census and *American Community Survey* PUMS.

Over the same time period, the number of older adults living in the homes of younger family members rose in the low-income but not the higher-income group. Both low- and higher-income groups were more likely to live in assisted living by 2018, though assisted living rates rose more slowly in the low-income group.

Gains in male longevity and diversity were also largest for the lowest income group. From 1980-2018, the share of low-income adults over age 65 who identified as white only and non-Hispanic fell from 79 percent to 52 percent compared to a decline from 93 percent to 81 percent in the higher-income group. In the low-income group, the share of men increased from 29 to 33 percent while the share of men in the higher-income group remained relatively constant.

Figure 2. *Estimated Role of Demographic and Other Factors in Explaining Nursing Home Residency Trends, 1980-2018*



Notes: Wages include state average inflation-adjusted wages for nursing home industry employees and home health aides. Labor market conditions include male and female labor force participation and full-time employment rates.
Source: Author analysis of Decennial Census and *American Community Survey* PUMS.

Figure 2 reports the role of these demographic changes in explaining the falling rates of nursing home residence shown in Figure 1. These estimates answer the question: How large would the share of older adults living in nursing homes have been if people behaved the same way in both 1980 and 2018 but there were simply more men and persons of color in 2018? The estimates indicate that the changes in racial and ethnic diversity in the low-income group explain about 25 percent of the total decline in nursing home residents from 1980-2018. Though the estimates indicate that rising numbers of men should increase nursing home residency, not reduce it, higher proportions of married older adults do reduce nursing home residency, but the role of marital status is small relative to other variables. State labor market conditions and wages appear to be particularly important drivers.

Conclusion

From 1980-2018, the percentage of low-income older adults living in nursing homes fell by nearly 50 percent – a substantially larger decline than among higher-income older adults.

Changes in the racial and ethnic diversity of this population explain about 25 percent of the decline. By 2018, low-income older adults had much higher rates of co-residence with younger relatives but similar rates of assisted living, though the rise in assisted living arrangements appears to have happened a decade later for low- than for higher-income adults.

These findings provide several useful insights for federal and state SSI programs. First, the older adult population is projected to continue to grow, in size and diversity, in the coming decade. The findings in this study suggest these trends may further reduce the use of nursing home care, and could in turn increase the number of older adults who use SSI to cover basic living expenses. This study also found increased rates of co-residence with unrelated persons and increasing incidence of unmarried partner cohabitation. More complex family structures may increase the costs and challenges of equitably administering SSI payments that treat couples and individuals differently and are reduced when the SSI recipient is residing in another person's household.

References

Freedman, V. A. 1996. "Family Structure and the Risk of Nursing Home Admission." *The Journals of Gerontology: Series B* 51B(2): S61-S69.

Gaugler, J. E., S. Duval, K. A. Anderson, and R. L. Kane. 2007. "Predicting Nursing Home Admission in the U.S: A Meta-analysis." *BMC Geriatrics* 7(1): 13.

Lofquist, D. A. 2012. *Multigenerational Households: 2009-2011*. Washington, DC: U.S. Department of Commerce, Economics and Statistics Administration.

Stepler, R. 2016. "Smaller Share of Women Ages 65 and Older are Living Alone: More Are Living with Spouse or Children." Washington, DC: Pew Research Center.

West, L. A., S. Cole, D. Goodkind, and W. He. 2014. *65+ in the United States: 2010,* 23-212. Washington, DC: U.S. Census Bureau.

U.S. Social Security Administration, Office of the Chief Actuary. 2019a. *Annual Report of the SSI Program*. SSI Annual Reports. Washington, DC. Available at: https://www.ssa.gov/OACT/ssir/SSI19/index.html

U.S. Social Security Administration. 2019b. *Annual Statistical Supplement to the Social Security Bulletin.* SSA Publication No. 13-11700. Washington, DC. Available at: https://www.ssa.gov/policy/docs/statcomps/supplement/2019/7e.pdf

Misperceptions of the Social Security Earnings Test and the Actuarial Adjustment: Implications for Labor Force Participation and Earnings

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The Social Security Earnings Test reduces the program's Old Age and Survivors Insurance ("Social Security") benefits in a given year as a proportion of a claimant's earnings above an exempt amount in that year. For example, for Social Security claimants under age 66 in 2019, current benefits are reduced by one dollar for every two dollars earned above $17,640. This creates a "kink" in the earnings schedule, i.e. a discontinuous change in the marginal incentives to work. Previous literature has found that Social Security claimants "bunch" at this convex kink (Burtless and Moffitt 1985; Friedberg 1998; Friedberg 2000; Song and Manchester 2007; Engelhardt and Kumar 2014; A. M. Gelber, Jones, and Sacks 2020a). Bunching refers to a pattern when a mass of workers earns at or near a specific earnings amount. Previous research has also shown that employment falls due to the Earnings Test (Friedberg and Webb 2009; Gelber et al. 2018; Gelber et al. 2020b).

In this paper, we explore the explanation for the patterns of bunching observed at the Earnings Test exempt amount, and also near kink points. In many contexts, individuals disproportionately bunch under kinks rather than above them, a phenomenon we call "left bunching." We perform the first systematic exploration of this phenomenon, and explore two classes of possible explanations. First, we note that if a kink is imposed in the presence of a downward-sloping density of outcomes, standard theory implies that individuals should left-bunch. The imposition of the kink causes the density to shift downward, which leads to fewer bunchers above than below the kink. In principle, this could explain the left bunching that has been observed in such circumstances. We call this the "standard" candidate explanation for left bunching. Second, individuals could left-bunch because of some "behavioral" deviation from

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standard theory, including misperceiving the tax schedule or other explanations. We use the setting of the Earnings Test to tease apart these theories.

In addition to providing a laboratory for studying left bunching, the Earnings Test is important to policymakers in its own right. In the latest year of the available micro-data in 2003, the Earnings Test led to an estimated total of $4.3 billion in current benefit reductions for around 538,000 beneficiaries, thus substantially affecting benefits and their timing. The importance of the Earnings Test is now increasing as the affected age range – those at or below the Normal Retirement Age – expands gradually from 65 for cohorts born before 1938, to age 67 for those born in 1960 and later.

Reductions in current benefits due to the Earnings Test sometimes lead to increases in later benefits through an actuarial adjustment. In particular, there is a little-understood "notch" in the budget set just over the exempt amount: when individuals earn just above this level, their benefits once they reach Normal Retirement Age are adjusted upward by five-ninths of one percent. Thus, the incentives – understood properly – should lead Social Security beneficiaries to locate just above the exempt amount, i.e. they should "right-bunch." Moreover, benefits after reaching the Normal Retirement Age are adjusted upward by five-ninths of one percent for every month of Social Security benefits that experiences any reduction due to the Earnings Test, which significantly dulls the incentives to bunch or reduce earnings (Social Security Administration Section 728.2, 2018; Gruber and Orszag 2003). This has led to a longstanding puzzle in the Earnings Test literature: why do earnings respond strongly to the Earnings Test, despite the actuarial adjustment of benefits (Burtless and Moffitt 1985; Gelber et al. 2018)?

Using administrative tax data from the Internal Revenue Service (IRS) on a one-hundred percent sample of the U.S. residents with a Social Security Number (SSN), born between 1943 and 1951, we show that around 7 times as many individuals left-bunch as right-bunch. We show several pieces of evidence inconsistent with the standard explanation for this left bunching. First, this left bunching does not only occur amid the downward-sloping densities postulated in the standard explanation; it occurs even at ages when the distribution of earnings is close to flat around the exempt amount, as shown in Figure 1. Second, an illustrative simulation of a rational model of bunching indeed yields far less left bunching than we observe. Third, in a panel of data, we can proxy for individuals' desired earnings in the absence of the Earnings Test by examining their earnings in years just prior to reaching retirement age and facing the Earnings

Test. We show that individuals overwhelmingly left-bunch, particularly those whose earnings just prior to reaching retirement age were substantially above the exempt amount. This contrasts with behavior in the standard model, wherein these individuals would tend to right-bunch, especially those initially locating far above the exempt.

Having dispatched the standard explanation for these patterns, we explore other explanations. One possibility is that some individuals exhibit "spotlighting," in which individuals perceive the local marginal tax rate to apply everywhere in the budget set (Liebman and Zeckhauser 2004).[1] This implies they would perceive a notch at the exempt amount, wherein they would lose a discrete amount of income by locating just over the exempt amount. In other words, even though the Earnings Test in fact applies only to marginal earnings above the exempt amount, in this explanation, they would perceive that the Earnings Test also applies to earnings below the exempt amount, creating a notch, i.e. a discrete loss of income at the exempt amount.

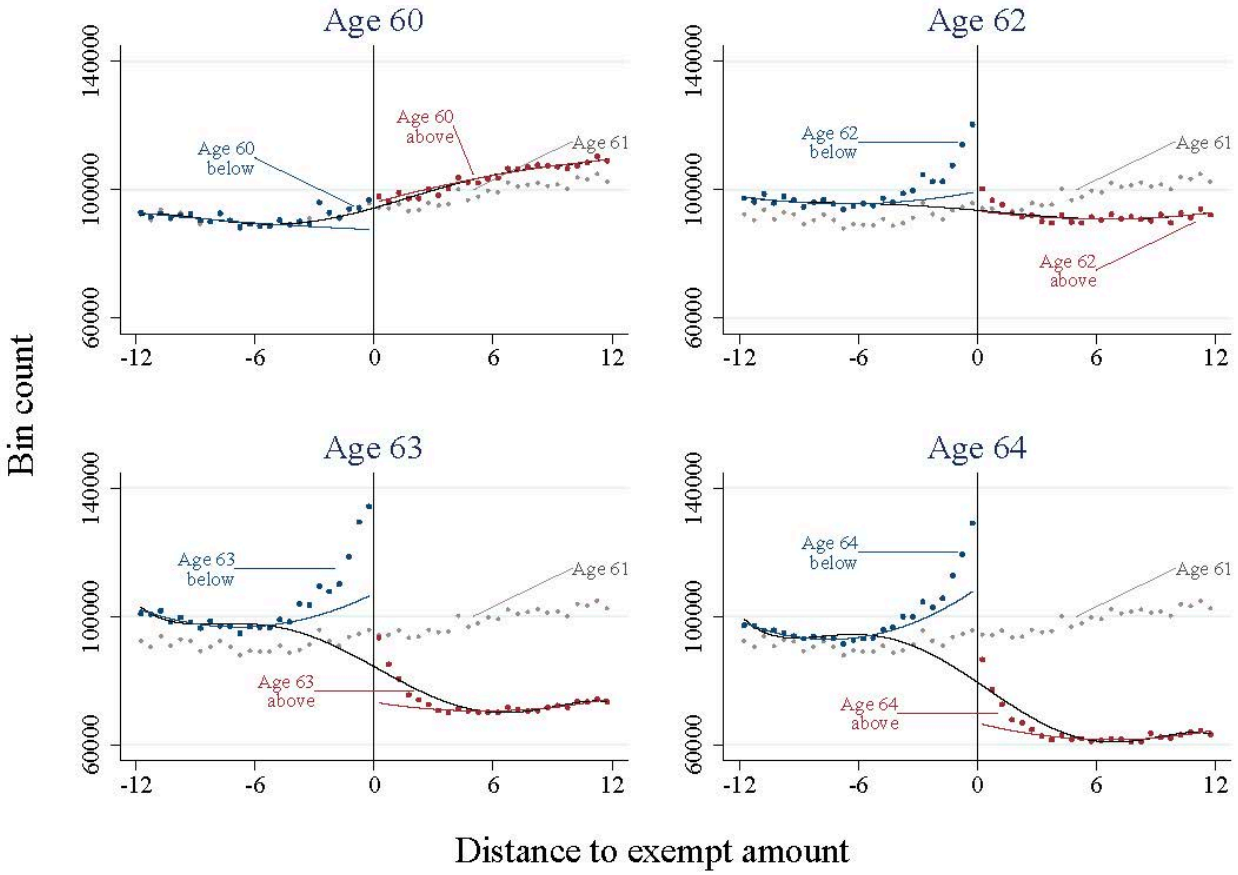
To substantiate this explanation, we document that there is a downward discontinuity in the employment probability as a function of lagged earnings, which we show should occur in the presence of a (perceived) notch in the budget set but not in the presence of a kink. This downward discontinuity in the employment probability is also inconsistent with other non-rational explanations that could be posited for left bunching, such as loss aversion to the Earnings Test combined with "diminishing sensitivity" (see Rees-Jones (2018) on loss aversion and bunching in a public finance context). Some individuals locate just above the exempt amount, implying that either some individuals are inert to the perceived notch (Kleven and Waseem 2013), or there is a mixture of types in which some spotlight and others react according to the standard model.

To our knowledge, this is the first evidence of spotlighting. Spotlighting contrasts with the "ironing" phenomenon documented in Ito (2014) and Taubinsky and Rees-Jones (2018). Under spotlighting, individuals perceive the local marginal tax rate as applying everywhere (i.e. as being the average tax rate), whereas under ironing individuals react to the average tax rate, instead of reacting to the marginal tax rate as a rational agent would. Ironing can help explain the lack of bunching at many kinks, while leaving unexplained why bunching occurs at other

[1] Liebman and Luttmer (2015) and Brown et al. (2013) document that many individuals do not understand the Earnings Test or other aspects of Social Security, but these studies do not specifically develop evidence on whether individuals exhibit spotlighting or other specific types of systematic misperceptions.

kinks; meanwhile, spotlighting can help explain the bunching at kinks that have been used to estimate elasticities, which often features left bunching. Moreover, the results help to explain why we observe such a dramatic response to the Earnings Test among claimants. If the policy is misperceived as a discrete loss in net income, i.e. a notch, the earnings and employment response to the Earnings Test may be viewed as commensurate to the *perceived* incentives faced by older workers, even if the *actual* incentives are much more moderate.

Figure 1. *Left Bunching at the Exempt Amount During Ages 62-64*



Notes: Figure plots the number of observations in each bin of earnings (relative to the exempt amount), by age. Sample is anyone born 1944-1951 with a Social Security number and in the tax system in 1999-2018, and no age 61 self-employment income. The gray dots show the number of observations at age 61. The smooth black line is a degree 5 fit estimated using all data from the indicated age except in the range (-3000, 3000). The navy line is a degree 2 fit estimated using data from the range (-12000, -3000). The maroon line is a degree 2 fit estimated using data from the range (3000, 12000).

References

Brown, Jeffrey R., Arie Kapteyn, Teryn Mattox, and Olivia S. Mitchell. 2013. "Framing the Social Security Earnings Test." Working Paper 2013-06. Philadelphia, PA: Pension Research Council.

Burtless, Gary and Robert A. Moffitt. 1985. "The Joint Choice of Retirement Age and Postretirement Hours of Work." *Journal of Labor Economics* 3(2): 209-236.

Engelhardt, Gary V. and Anil Kumar. 2014. "Taxes and the Labor Supply of Older Americans: Recent Evidence from the Social Security Earnings Test." *National Tax Journal* 67(2): 443.

Friedberg, Leora. 1998. "The Social Security Earnings Test and Labor Supply of Older Men." *Tax Policy and the Economy* 12: 121-150.

———. 2000. "The Labor Supply Effects of the Social Security Earnings Test." *Review of Economics and Statistics* 82(1): 48-63.

Friedberg, Leora and Anthony Webb. 2009. "New Evidence on the Labor Supply Effects of the Social Security Earnings Test." *Tax Policy and the Economy* 23(1): 1-36.

Gelber, Alexander, Damon Jones, Daniel W. Sacks, and Jae Song. 2020a. "The Employment Effects of the Social Security Earnings Test." *Journal of Human Resources*.

Gelber, Alexander M., Damon Jones, and Daniel W. Sacks. 2020b. "Estimating Adjustment Frictions Using Nonlinear Budget Sets: Method and Evidence from the Earnings Test." *American Economic Journal: Applied Economics* 12(1): 1-31.

Gelber, Alexander M., Damon Jones, Daniel W. Sacks, and Jae Song. 2018. "Using Non-Linear Budget Sets to Estimate Extensive Margin Responses: Method and Evidence from the Social Security Earnings Test." Working Paper No. 23362. Cambridge, MA: National Bureau of Economic Research.

Gruber, Jonathan and Peter Orszag. 2003. "Does the Social Security Earnings Test Affect Labor Supply and Benefits Receipt?" *National Tax Journal* 56(4): 755-773.

Ito, Koichiro. 2014. "Do Consumers Respond to Marginal or Average Price? Evidence from Nonlinear Electricity Pricing." *American Economic Review* 104(2): 537-563.

Kleven, Henrik J. and Mazhar Waseem. 2013. "Using Notches to Uncover Optimization Frictions and Structural Elasticities: Theory and Evidence from Pakistan." *The Quarterly Journal of Economics* 128(2): 669-723.

Liebman, Jeffrey B. and Erzo FP Luttmer. 2015. "Would People Behave Differently If They Better Understood Social Security? Evidence from a Field Experiment." *American Economic Journal: Economic Policy* 7(1): 275-299.

Liebman, Jeffrey B. and Richard J. Zeckhauser. 2004. "Schmeduling." Cambridge, MA: Harvard University.

Rees-Jones, Alex. 2018. "Quantifying Loss-Averse Tax Manipulation." *Review of Economic Studies* 85(2): 1251-1278.

Song, Jae G. and Joyce Manchester. 2007. "New Evidence on Earnings and Benefit Claims Following Changes in the Retirement Earnings Test in 2000." *Journal of Public Economics* 91(3-4): 669-700.

Taubinsky, Dmitry and Alex Rees-Jones. 2018. "Attention Variation and Welfare: Theory and Evidence from a Tax Salience Experiment." *The Review of Economic Studies* 85(4): 2462-2496.

U.S. Social Security Administration. n.d. Social Security Handbook, Section 728.2. 2018. Washington, DC. Available at: https://www.ssa.gov/OP_Home/handbook/handbook.07/handbook-0728.html