Final Report

Income Security and Financial Wellbeing of Older Workers Transitioning into Retirement

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I. Introduction

Income security during retirement is a growing concern for American workers. The shifting from defined benefit pension plans to defined contribution plans places greater responsibilities on individuals to sufficiently plan and save for retirement. Wealth accumulated while working is playing an increasingly larger part in retirement income security. A greater number of post-retirement years as a result of longer life expectancies also leave individuals vulnerable to economic shocks that may put their retirement savings at risk. These trends emphasize the importance of financial management skills and financial knowledge, as retirees will face difficult choices on reducing household expenditures if income from Social Security, pensions, and savings distribution do not allow retirees to maintain their pre-retirement standard of living. Many without sufficient pre-retirement savings may suffer income shortfalls and resort to high-interest debt borrowing, which is linked with serious long-term financial consequences such as bankruptcy (Gross and Souleles, 2002).

Public workers typically have more financial security than their private sector counterparts since they are more likely to have a defined-benefit pension plan that pays a steady stream of income throughout the retirement. Nonetheless, our previous work has documented that a nontrivial percentage of public workers have experienced financial distress in retirement in terms of holding credit card debt and not having sufficient emergency funds (Clark and Liu, 2020).

This report examines the income security of a sample of North Carolina public sector employees as they enter retirement between 2014 and 2018, who receive pension benefits from a defined-benefit plan. The key issues addressed in this paper are:

(1) To what extent do public retirees experience income declines as they transition to retirement?

(2) How much do their pension benefits replace their pre-retirement income?

(3) What factors contribute to income changes for newly retired public retirees?

(4) Are income declines associated with financial distress?

To measure retirement income security, we compare household and individual income pre- and post-retirement in both datasets. The income replacement ratio—retirement income expressed as a percentage of preretirement income—has become a familiar metric among financial planners and economists for assessing the adequacy of retirement income (Booth, 2004; Moore and Mitchell, 2000; Yuh, 2011). The income-replacement rates have been used as an indicator of both wealth accumulation pre-retirement and income loss post-retirement.

The proportion of preretirement income needed to maintain one's standard of living in retirement varies according to individual circumstances. Lower-income workers typically need a higher replacement ratio than average-income workers because they spend a higher proportion of their income on everyday necessities. Higher-income workers, too, may need higher replacement ratios to maintain their preretirement standard of living, especially if their retirement plans include substantial spending on recreation and leisure activities.

In this report, we draw our analysis base on three samples of survey data merged with administrative records for North Carolina public employees. The focus of this report is on individuals who transitioned into retirement between two of our survey waves. The other two samples include older workers who kept working and those who stayed retired during all of our surveys. We compare statistics of these two samples with those who recently retired to better follow their income trajectory as they age and understand changes in their financial wellbeing. Our results are also benchmarked against to both public- and private-sector retirees in the Health and Retirement Study (HRS) dataset. The HRS is a rich and detailed nationally representative survey on older individuals over the age of 50. This study tracks employment, wealth, health,

and wellbeing in older households both over time. While the North Carolina public employees have higher household income and are more likely to have a college degree, we find many similarities between the two samples in terms of income changes, financial literacy, and financial distress.

This report begins with a discussion of the literature on income replacement and income security as older workers transition into retirement. In addition, literature on the financial distress and financial literacy of elderly households is reviewed. Section III describes our data sources and dataset construction. Section IV presents descriptive statistics on income replacement of recent retirees while Section V examines the characteristics of subgroups experiencing large income changes. Finally, Section VI shows regression analysis of the factors associated with income changes and studies the link between income changes and financial distress. Appendix A and Appendix B offers description of our samples of North Carolina public workers and HRS respondents in greater detail. Appendix C includes tables on sample characteristics and regression analysis of additional outcomes. Appendix D records the survey questions we use to create key variables for our North Carolina dataset.

II. Literature review

Income replacement

There have been many studies on income security transitioning into retirement using both administrative data and household surveys over the past 30 years. Income replacement ratios, an approach to assess retirement income adequacy, evaluate the ratio of household income needed to sustain post-retirement consumption as a proportion of annual pre-retirement income.[1] While

[1] The replacement ratio approach largely ignores the utility theory, which results in fewer desirable theoretical properties compared to life cycle models. However, the replacement ratio is more robust against differences in

some have estimated total income replacement ratios, a number of studies have estimated the proportion of pre-retirement income replaced by Social Security benefits (Fox 1979, 1982; Grad 1990; Mitchell and Phillips 2006; Biggs and Springstead 2008). Replacement ratios are also calculated based on both Social Security benefits and pension income (Fox 1982; Grad 1990). Total income replacement ratios are computed based on the total income of a worker pre- and post-retirement, including any benefit payments from Social Security, employer pension system, as well as payout from individual retirement savings accounts. Researchers have found much variation of total income replacement ratios by age, cohort, and marital status. Butrica et al. (2012) estimated levels and sources of income at age 67 using the Social Security Agency's Modeling Income in the Near Term (MINT) model, which matches Social Security earnings records to results of the Census Bureau's Survey of Income and Program Participation. They showed that median price-indexed household earnings replacement ratios at age 67 is around 110 percent, which similar to Biggs and Springstead (2008)'s estimate of 106 percent using the same data. Smith (2003) used data from both the Current Population Survey and the Panel Study of Income Dynamics to estimate total income replacement ratios over the period 1977–1999. He estimated that the average pretax income replacement ratio at age 70 increased from 67 percent in 1977 to 74 percent in 1999. Munnell and Soto (2005) used data from the Health and Retirement Study (HRS) to estimate total replacement ratios and found that average replacement ratios of 79 percent for married couples and 89 percent for non-married individuals. Yuh (2011) analyzes data from the Federal Reserve's Survey of Consumer Finances and uses total retirement wealth of pre-retired households to project a median replacement ratio of about 67 percent of households' permanent income. Binswanger and Schunk (2012) use a specifically designed

modelling assumptions and is more widely used among retirement planning practitioners (Booth, 2004; Moore and Mitchell, 2000).

internet survey to elicit adequate levels of retirement spending. Their calculated minimum income replacement rates to finance spending is 95% for the lowest income quintile and 45% for the highest.

Income replacement ratio calculated using benefit and earnings are closely related to policy considerations that design and update benefit systems. Biggs and Springstead (2008) used the MINT model and found the median Social Security replacement rate to be 47 percent. They showed the inverse correlation between lifetime earnings and replacement rate for both married and non-married individuals and households. Individuals with lower lifetime earnings receive significantly higher replacement rates under all measures than higher earning individuals. Similar to Butrica et al. (2012), they found that replacement rates are higher among older cohorts. Wu et al. (2013) used HRS data and show that median Social Security replacement rates vary by marital status, gender, and cohort, ranging between 40 and 53 percent. Poterba (2014) also found that Social Security as a source of retirement income is more important for those in the bottom half of the income distribution, which reflects both the low saving rate for many workers. They presented the Social Security benefit replacement rate to be 41 percent for someone with a national average wage. However, for an individual at the twenty-fifth percentile of the wage distribution, the replacement rate is more than 75 percent.

Financial distress

The majority of the financial distress literature primarily focuses on measuring the ability of households to remain current on incurred debts. Some studies examine financial distress using total household debts. Brown and Taylor (2008) examines "financial pressure" in Europe and the US through two measures, having negative net worth, and high debt-to-income ratios. Ampudia et al. (2016) proposed a comprehensive measure of financial distress that find

households as being in distress if they are unable to pay their debts, i.e., do not have enough income to cover their spending and do not have sufficient liquid assets. They use information from the Household Finance and Consumption Survey (HFCS), a European household-level dataset. Athreya et al. (2019) exploits account-level panel data from the Federal Reserve Bank of New York Consumer Credit Panel/Equifax to study financial distress. Their definition of financial distress is having an account for which payment is at least 120 days past due in a given year. Lusardi and Tufano (2015) examines self-evaluated over-indebtedness and found over a quarter of the sample overburdened with their debt loads.

Other research also studies non-housing short-term debts, as they potentially amplify the default risk for households. Christelis et al. (2009) uses data drawn from the first wave of the Survey of Health, Ageing and Retirement in Europe (SHARE) and examines financial fragility through both the objective measure of holding non-housing debt and the subjective measure of having difficulty making ends meet. Keys et al. (2020) measure financial distress using a nationally representative panel of TransUnion credit report data that tracks approximately 35 million individuals on a monthly basis over 2000-2016. They choose to focus on three metrics of financial distress – debt in collections, credit card non-payment, and personal bankruptcy.

There is also a strand of literature that focuses on subjective metrics that indicate financial distress not necessarily due to indebtedness.

Worthington (2006) takes an alternative approach that focuses on standards of living. Using data drawn from the Household Expenditure Survey in Australia, they define financial stress as being unable to have a holiday, to have meals with family and friends, and to engage in hobbies and other leisure activities, due to financial reasons. In order to study American workers' financial fragility in the wake of a financial crisis, Lusardi et al. (2011b) examine respondents' perceived

confidence to cope with an unexpected expense of $2,000 within the next month. This type of questions on "emergency funds" appears often in the financial planning literature, where planners often refer to emergency funds as recommendation to households. They find that more than 35% of older individuals report not being able to cope with the unexpected expense. Brunetti et al. (2016) takes a novel approach and combine objective and subjective measures. They define households as financially fragility if they earn sufficient income to at least cover all expected expenses, but that might be unable to cope with unexpected expenses. Their characterization focuses on non-optimal portfolio allocation with too small liquid assets using the Bank of Italy Survey on Household Income and Wealth (SHIW). They then use financial fragility to predict financial distress, which includes three indicators on having difficulty making ends meet, having informal debt, and having had arrears for 90 days or longer.

In this paper, we focus on two type of financial distress, namely, having kept credit card balance and not being able to come up with $2,000 should need arises over the next month. We exploit changes in the latter variable between two surveys to show how income changes is associated with variation in financial distress.

Financial literacy

There has been much empirical research on measuring financial literacy of older workers using the "Big 3" questions designed by Lusardi and Mitchell (2011a) that were first introduced in a special module of the 2004 HRS survey. Since then, these three financial literacy questions have been widely used in several other U.S. surveys as well as related surveys around the world (Lusardi and Mitchell, 2009; Lusardi, Mitchell, and Curto, 2010; Lusardi and Mitchell, 2011b;

Lusardi and Mitchell, 2014).[2] The questions were created to measure basic knowledge of interest compounding, inflation, and risk diversification. The 2004 HRS survey results showed that only half could correctly answer a simple question on how two percent interest compounds over five years and the proportion of older individuals that gave correct answers to all three questions was only about one third (Lusardi and Mitchell 2011a). Other studies have shown similarly widespread lack of these knowledge among older individuals in the U.S. (Lusardi and Mitchell, 2007; Lusardi and Mitchell, 2014; Lusardi and Tufano, 2015). Some sub-groups of the population, such as women and low-income individuals, have been found to be even less financially knowledgeable (Lusardi and Mitchell, 2007; Lusardi and Mitchell, 2008; Seligman, 2012). In addition, Lusardi and Tufano (2015) showed that elderly individuals age 65 and above have the lowest debt literacy among all age groups despite having the highest self-assessed financial literacy.

Financial literacy has been found to be correlated with economic decisions with financial consequences of older workers. High levels of financial literacy are found to be positively associated with retirement planning, which is linked to more wealth accumulation (Lusardi and Mitchell 2007, 2011a, 2011c). More financially literate individuals are also more likely to change saving goals for retirement, and to participate in the stock market (Clark et al. 2006; Stango and Zinman, 2009; van Rooij et al., 2011). Financial literacy also has consequences on income sources in retirement. Many older workers have limited knowledge of their pension and Social Security and these misconceptions can affect planned retirement timing and response to retirement incentives (Chan and Stevens, 2008; Clark et al., 2010; Clark et al., 2012)

[2] For example, the 2007–2008 National Longitudinal Survey of Youth (NLSY) for young respondents (ages 23–28); the RAND American Life Panel (ALP) covering all ages; and the 2009 and 2012 National Financial Capability Study.

As for household debt, several researchers have found links between low financial literacy and higher mortgage costs (Moore, 2003; Campbell, 2006). Stango and Zinman (2009) concluded that those unable to correctly calculate interest rates out of a stream of payments ended up borrowing more and accumulating less wealth. Those with low financial literacy are also shown to be more likely to engage in costly borrowing behavior with higher transaction costs or higher fees for credit cards (Gathergood, 2012; Lusardi and Tufano, 2015; Mottola, 2013). Allgood and Walstad (2013) found that both self-assessed and actual literacy are more likely to make in-time payments and less likely to carry credit card balance. In the long run, these high-cost borrowing accumulates and many financially illiterate households report being in excessive debts (Lusardi and Tufano, 2015).

III. Data description

The first part of the study examines the well-being of retired state and local government employees in North Carolina. We obtained administrative data files for all actively working employees covered by the North Carolina Teachers' and State Employees' Retirement System (TSERS) and the Local Governmental Employees' Retirement System (LGERS) as of March 2014. We extracted a stratified random sample who were sent two surveys developed by the authors and their colleagues in spring 2014, spring 2016, and spring 2018. We include public workers who were actively working as of our 2016 survey but have started claiming benefits by the 2018 survey.[3] The administrative records contain detailed information on each retiree including earnings, job information, years of service, creditable service, year of retirement,

[3] The surveys were fielded as part of a grant from the Sloan Foundation examining the transition from career employment to complete retirement. For more information about the data and copies of the survey instrument, see: https://sites.google.com/site/publicsectorretirement/.

annuity option chosen, and benefit amount. The surveys obtained additional personal information not contained in the administrative data about race/ethnicity, education level, household income and wealth, work status after claiming retirement benefits and marital status, along with questions about their spouses of married retirees. The survey elicits self-reported household income in categories.[4] In addition, the survey included questions on retiree debt holding and financial literacy.

We divide the NC dataset into three subgroups. The first subgroup is the NC newly retired sample, which contains individuals who were still working as of our survey in 2014 or 2016 but have already started claiming benefits by our survey in 2016 or 2018. The NC newly retired sample represents workers who have transitioned into retirement between our surveys and is the focus of this study. Two other subgroups, serving as benchmarks for the NC newly retired sample, are the NC working sample and NC retiree sample, who were either both working or already retired in both our surveys in 2016 and 2018.[5]

In Clark and Liu (2020), we studied a sample of retirees who started claiming benefits between 2009 and 2014. Individuals in this report are younger compared to those we studied in the past, with average age ranging between 58 and 62. It had only been over one year since initial benefit claiming for an average retiree. Other demographics are very similar to those shown in Clark and Liu (2020).[6]

For the NC dataset, the pension income replacement ratio is computed as dividing the annual pension benefit by the annual salary of 2013. The annual pension benefit of North Carolina

[4] Respondents were asked to report whether their annual household income fell into one of a series of brackets. Options were: less than $25,000, $25,000 to $49,999, $50,000 to $74,999, $75,000 to $99,999, $100,000 to $149,999, $150,000 to $249,999, $250,000 or more, and Don't Know. Individuals who responded 'Don't Know' when asked to report their annual income were excluded from the analysis.

[5] See Appendix A and Appendix Table 1 for more information on our surveys and sample construction.

[6] Appendix Table 2 present mean demographics for all samples in this report.

retirees has a direct relationship to their employment history with state and local governments. The benefit formula for is 1.82 or 1.85 percent of average final earnings times years of service, depending on whether the employee works for state or local governments. Thus, retirees with higher career earnings and more years of service will have higher annual pension benefits. Another component of the annual pension benefit is the choice to claim early with reduced benefit. Early retirement with reduced benefits is available to those who have reached age 50 and completed 20 years of creditable service and those who have reached age 60 and completed 5 years of service. The final determinant of pension benefit replacement ratio is the retiree's choice of annuity type. Upon termination and achieving the age and service requirements, retirees must request from the retirement system that their benefits begin and benefit amount varies based on their choice of annuity option.[7]

The second dataset draws on the Health and Retirement Study (HRS).[8] The Health and Retirement Study (HRS) is a longitudinal survey on older individuals that collects detailed individual-level information including demographics, employment, pension, and health of respondents and their spouses, as well as financial characteristics such as income and wealth at the household level. This study was originally designed to track age-eligible individuals and their spouses as they made the transition from active worker into retirement. Since the first wave in 1992, the HRS is an ongoing biennial survey. In addition to a repeated questionnaire, each wave contains a number of modules that provides even more detailed information on selected topics. We construct a sample for HRS data that is constrained to those who self-reported transitioning from to retirement at least once between 1994 and 2016, with valid pre- and post-retirement

[7] There are six annuity options, which include a single life annuity (called the maximum benefit), a 100 percent J&S, a 50 percent J&S, Social Security Leveling, and two additional J&S options with a pop-up provision if the retiree's beneficiary dies first.

[8] See Appendix B for more information on the HRS.

household income and responded to the 2010 wave. Since many individuals switch between work and retirement more than once, we focus on the income security of first-time retirees. Pre-retirement year is defined as the last wave when the individual reported employment status as working full-time or part-time before reported employment status as retired. Post-retirement year is recorded as year of the first wave after the post-retirement wave. For the HRS sample, the pension income replacement ratio is constructed through dividing the post-retirement year income from employer pension and annuity by the pre-retirement year household income.

IV. Income changes of recent retirees

Table 1 lists the computed transition proportions for each baseline pre-retirement household income group for all four datasets. Both the NC newly retired sample and working sample are better off in household pre-retirement income compared to NC retirees, perhaps not surprisingly due to the fact that both samples were still working as of our first wave of survey in 2014 or 2016. Both samples have fewer workers in the lower two income groups than the NC retirees sample. 55-65% workers in these two samples were earning a household income of more than $75,000, compared to 43% in the NC retirees sample and 44% in the HRS retirees sample. As the NC newly retired group progresses to the post-retirement survey, their income category composition becomes similar to that of the NC retiree group, with higher proportions of individuals in the lower three income categories and less than half remaining in the highest category. The HRS first-time retiree dataset contains the highest percentage of individuals earning low to moderate household income below $25,000 and between $25,000 and $50,000, which suggests our NC sample is relatively well-off when compared to a nationally representative dataset.

While the majority of all three NC samples maintain their household-income grouping two years in the future, there exists considerable variability. There are some similar trends shown in all panels. First, it is highly unlikely for the group with the lowest household income to transition to higher income categories, especially if the respondent has recently retired (Panel A, C, D, and E). Second, Panel A, D and E show that moderate-income households are struggling to maintain their income after the respondent transitions to retirement. Around 30% of households in the $25,000 to $50,000 group and 40% in the $50,000 to $75,000 group experience decreases in income categories, while individuals who continued to work or stay retired (Panel B and C) experience fewer changes in income. This indicates large income drops following retirement for both the NC newly retired and HRS samples. Finally, while the majority of the group with income higher than $75,000 stays in the same category, there is still 23-40% of retirees who slip two or three income categories post-retirement (Panel A, C, D, E). The high earners in the NC newly retired group has lower proportions of income decreases compared to the HRS sample. The HRS public-sector workers have higher income compared to private-sector workers, and are more likely to transition to a higher income category after retirement.

Table 2 shows the relationship between levels and changes of household income and pension income replacement rate for the retiree samples. In Table 2, we find that the median pension income replacement for both NC datasets is more than 40 percent.[9] Adding this to the Social Security benefit replacement rate of more than 40 percent shown in the literature, North Carolina retirees maintain a high total income replacement rate of more than 80 percent (Biggs and Springstead, 2008; Butrica et al., 2012; Wu et al., 2013). We find that pension income

[9] The benefit formula for is 1.82 or 1.85 percent of average final earnings times years of service, depending on whether the employee works for state or local governments. However, the decision on early retirement with reduced benefits as well as choice over annuity types can also affect the pension income replacement rate.

replacement rate is higher for households with higher pre-retirement income in both NC datasets, in contrary to the inverse relationship documented in the literature (Biggs and Springstead, 2008; Munnell and Soto, 2005; Smith, 2003). However, this is expected as the replacement rate largely represents total years of service and average salary, which is correlated with household income. For NC retirees, income category changes do not seem to be correlated with pension income replacement ratio. We observe income increases post-retirement positively correlated with pension replacement rates in the HRS sample. On the other hand, the median pension benefit replacement rate is highest among NC new retirees with no change in income categories, while the replacement rate among those with income increases and decreases are similar and lower at around 40%. This suggests that other sources of income, potentially income from work after retirement, also contribute to income category changes for NC new retirees. In all three panels, pension income replacement rate is higher among women, especially non-married women. Table 3 gives a closer look at the interaction of marital status and gender and corresponding income changes in each demographic subgroup. In all three panels for NC samples, non-married women are significantly more likely to be in the lower pre-retirement income categories than men and married women. Non-married women in the NC newly retired dataset (Panel A) are shown to be most well-off compared to other panels, yet less than a quarter earn household income higher than $75,000, compared to more than 70% among men and married women. Understandably, this is due to differences in the number of working household members. Since our surveys on North Carolina workers only elicits household income information in categories, we are unable to calculate household equivalence scale to directly compare non-married women with married households. Therefore, we need to conduct subgroup analyses to better understand the financial wellbeing of this subgroup. Women do not seem to experience more income

changes than men post-retirement, nor are they more likely to have a pension replacement rate that is above median. For the NC working sample, it is worth noting that more married women have decreased income compared to men, while non-married women are more likely to have the same or higher income category in the second wave of survey two years later. Similar to the NC datasets, non-married women in the HRS sample have lower income categories and are more likely to experience income decreases compared to married women and men, despite the fact that they are slightly more likely to have positive income from employer pension benefits.

V. Income changes and wealth, financial literacy, and financial distress

Table 4-9 present cross-tabulations for six subsamples - men, married women, and non-married women in NC newly retired dataset, NC working individuals and retirees samples, as well as the HRS sample. For each subsample, we highlight the relationship between income changes and components of individuals' finances, including wealth, financial distress, and financial literacy. Table 4 and 5 show the relationship between levels and changes of household post-retirement Supplemental Retirement Plans (SRP) balance and income changes. The NC working sample and the retiree sample show similar distributions of SRP wealth, with the former group having slightly higher proportions of SRP coverage. There is notable difference in SRP wealth by marital status and gender for the newly retired group. Men are better off compared to women in terms of SRP balance and non-married women are far less likely to have SRP or have high SRP balance. Lower SRP coverage suggests that non-married women may lack wealth in retirement needed to buffer them against financial shocks. In addition, Table 5 shows that the newly retired sample are more likely to experience decreases in SRP wealth categories between two waves of survey compared to both the working sample and the retirees sample. Among the three

subgroups of the newly retired sample, non-married women have the highest rate of SRP wealth decreases, suggesting both low levels and decreasing trend of wealth for this group of retirees. Since we only have information on IRA and Keogh accounts for the HRS sample, more than half of the sample report having no such accounts. However, more than 20% of the sample still have a balance of over $100k, suggesting relatively high levels of retirement wealth.

While income changes do not seem to be correlated with the likelihood of having SRP or post-retirement SRP balance for the NC working sample and the retiree sample, a more complicated relationship is presented for the newly retired sample in Panel A-C, Table 4. For non-married women in the newly retired sample, those who experience decrease in income are worse off in terms of SRP wealth. Despite the small amount of observations, men and married women in the newly retired sample with income increases have lower levels of SRP wealth. In all panels of Table 5, those with income decreases are more likely to experience decrease in SRP wealth categories, possibly due to withdrawals from SRP accounts to supplement income.[10] Having an above-median pension replacement rate is negatively correlated with SRP wealth for men and married women in the newly retired dataset, while a positive correlation is shown for non-married women in the newly retired dataset and retirees dataset. Non-married women in the newly retired sample with a below-median pension replacement rate are more likely to have decreases in SRP balance category, suggesting drawdown of retirement saving. For all other groups, having a below-pension replacement rate appears to be slightly negatively or not correlated with SRP balance decreases. The HRS sample draws stark contrast from the NC samples, with more than half of the sample with increases in IRA account balance, suggesting

[10] While the newly retired group may have accumulated wealth prior to retirement, it is less clear why 20% of the retirees group have increased SRP balance in two years. Explanations include contributions to SRP from work after retirement and respondents' recall errors on SRP balance.

that these individuals are still accumulating wealth. Another explanation is that the changes in SRP balance in the HRS are not strong enough to trigger category changes as recorded in the NC surveys. The key takeaway from Table 4 and 5 is that non-married women who are newly retired have the lowest levels of retirement savings while being most in need of supplemental saving from wealth drawdown. While non-married women having an above-median pension replacement rate is significantly less likely to experience SRP balance decreases, the relationship is reversed in other panels.

Table 6 presents additional sources of post-retirement income from work and Social Security, offering possible explanations to why some households have higher post-retirement income or SRP wealth. A large number of retiree households have supplemented their household income with post-retirement labor income, income from spouse, and Social Security benefit payments. Compared to the NC retiree dataset, the newly retired individuals are less likely to have worked for pay or have started claiming Social Security benefits. On the other hand, married new retirees are more likely to have a spouse that is still working, possibly due to this cohort's younger age on average. Perhaps unsurprisingly, we find increase in income categories positive correlated with both Social Security claiming and work after retirement. The only exception is non-married female new retirees, for whom we find higher proportions of Social Security claiming among those with decreases in income. However, non-married women are the subgroup with the lowest rate of work after retirement among the NC samples, which indicates that they are most in need of additional income in retirement. The HRS sample show similar proportions of individuals that have started claiming Social Security benefits.[11] However, they are less likely to have a spouse with employment.

[11] Since we define first-time retirees based on their self-reported employment status of "retired", no one in the HRS sample is considered having worked for pay after retirement.

Table 7 and 8 show the relationship between financial literacy and income changes. Our surveys asked three questions to measure public retirees' financial literacy.[12] The objective of the questions was to determine if the retiree understood the power of compound interest, the impact of inflation of purchasing power, and the value of diversification in wealth management. These three simple questions have been used in numerous other studies to measure financial knowledge and to assess the importance of financial literacy in managing assets and debts. While financial literacy does not seem to be correlated with income changes or pension replacement rates, it is worth noting that the newly retired sample has relatively high levels of financial literacy compared to the working and retiree samples. Married women in the newly retired group, however, has the lowest average number of correct answers to financial literacy questions. Non-married women in the newly retired sample has the highest proportion experiencing decrease in financial literacy, suggesting many are unable to give a correct answer to questions they did well in two years earlier. In all samples, individuals with decreases in income are significantly more likely to have decreased financial literacy compared to those without changes in income categories. The HRS sample show similar rates of correct answers to financial literacy questions compared to the NC dataset. It is worth noting that the subgroup with below-median pension replacement rate are significantly more likely to give correct answers to all three questions. Next, we turn to the consequences of income changes during the transition to retirement. We constructed two measures of financial distress. The first measure is defined as not being able to come up with $2,000 within the next month. This variable is available in S2016 and S2018,

[12] These three questions were designed by Lusardi and Mitchell and first implemented in the 2004 Health and Retirement Study (see Lusardi and Mitchell 2011a). The same questions were subsequently added to several other surveys and have been used in numerous studies (Lusardi et al. 2014; Lusardi and Mitchell, 2011b; Lusardi and Mitchell, 2017). While the questions seem rather simple, articles generally indicate a rather low level of correct answers across a wide range of sample populations.

allowing us to investigate changes in financial distress over time. The second measure is defined as having kept a balance on credit cards as the household was unable to pay the full balance. The second measure of having credit card debt is only available in S2018, making the financial distress index applicable to S2018 respondents. We choose the second measure of financial distress because it is comparable to the financial distress measure for the HRS sample, which is defined as having carried over unpaid balance on credit card last month. Table 9a shows the correlation between income category changes and financial distress. The newly retired sample is less likely to be financially distressed in either wave of survey compared to the other two samples. Yet, there is a downward trend in the second survey, with fewer individuals improving and more individuals becoming more distressed. Those with income category increases in the newly retired sample are also more likely to experience financial distress compared to active workers and retirees. Having an above-median pension replacement is positive correlated with financial distress with the exception of married women. Table 9b show financial distress for the HRS sample of public-sector new retirees. Public-sector non-married women is the subgroup with the highest proportion experiencing financial distress, while they are not as distressed as their counterparts in the NC newly retired sample. Public-sector men and married women are more financially distressed in the HRS sample compared to those in the NC newly retired sample, while non-married women have similar distress levels. Private-sector subgroups are in general less distressed compared to public-sector workers. In addition, there is a very little gap in financial distress levels by marital status and gender among private-sector workers in the HRS sample, contrasting that among NC and HRS public employees. Public-sector women with a post-retirement income increase are more likely to be distressed in both surveys and less likely to see their financial wellbeing improve between the two waves of surveys. In the private sector,

however, those with an income increase are not worse off than their peers. A potential explanation is that some public-sector workers receives higher income post-retirement due to seeking additional income sources such as working after claiming benefits when they are already financially distressed. On the other hand, private-sector workers' increase in post-retirement income is suggestive of their financial security.

VI. Regression analysis of income changes and financial distress

Tables 10a, 10b, and 10c are regression tables of two types of income changes – income (category) decrease and having an above-median pension replacement rate. For the NC sample, we find that compared to men, married women are more likely to have income category decreases and an above-median pension replacement rate. Non-married women in the HRS sample have higher rates of income decreases. Consistent with our expectations, those having recently transitioned to retirement are more likely to experience decrease in income categories, even after controlling for all covariates. Recent retirement does not seem to be linked with pension replacement rates. Having higher salary while working is also positive correlated with these two income change variables. Given the same retirement replacement rate, higher salary contributes to higher levels of change in income, which is more likely to be large enough to result in income category changes. The positive correlation between salary and pension replacement rate is possibly due to higher years of service contributing to both variables. Having a bachelor's degree is negatively associated with income decreases for both the NC and the HRS sample. There is little difference in the chance of experiencing income decreases by the sector of employment for the HRS respondents.

Tables 11a, 11b, and 11c show the relationship between income changes and credit card debt. For the NC sample, increase in income category is positively correlated with financial distress, but the effect goes away after controlling for addition covariates including wealth and spousal characteristics. Pension replacement rate does not seem to contribute to financial distress. This is likely due to its correlation with other demographic variables. For the HRS sample, having decreased income is statistically significantly associated with higher chance of having credit card debt. The result is robust even after controlling for IRA balance, financial literacy, and spousal characteristics. In all three regressions, non-married women are more financially distressed than men. Those with young age and low income are also more likely to experience financial distress in terms of having credit card debt. Having a high SRP balance is associated with lower chance of experiencing financial distress by almost 50% in all three regressions. Having a spouse with pension coverage or Social Security claiming brings an additional steady source of income, which negatively contributes to financial distress. Those with high self-rated financial knowledge has lower chance of carry credit card balance for the NC models. Objectively measured financial literacy, on the other hand, has a much smaller effect on distress in all three tables.[13]

VII. Conclusion

We use administrative data and survey responses on North Carolina public workers to examine changes in income near and after retirement. All workers in our dataset are enrolled in a defined-benefit pension plan and have started claiming benefits by the time of our survey for retirees. Compared to the nationally representative sample from the HRS, the NC datasets consist of workers and retirees with high pre-retirement household income as well as high pension income

[13] Appendix Table 5a and 5b show regression results of financial distress (emergency funds). Objective financial literacy is found negatively associated with this definition of financial distress.

replacement ratios. Despite this, almost half of the newly retired sample has experienced decreases in post-retirement household income large enough to lead to income category decreases. We also find that many rely on additional sources of post-retirement income such as labor income directly or through a spouse. Moreover, the financial distress levels measured by having credit card debt is similar, if not higher, compared to the HRS sample. We find that public-sector workers in the HRS sample have similar characteristics to the NC samples in terms of demographics and financial literacy. Regression results show that for the NC sample and the HRS sample, high household income and high retirement savings account balance are strongly and robustly associated with less credit card debt. The HRS sample also show that those with income decreases transitioning into retirement are more likely to experience financial distress. Public- and private-sector workers in the HRS sample have a few differences in the relationship between income changes and financial distress. Private-sector workers in the HRS sample have lower household income and similar levels of credit card holding compared to public-sector workers. One interesting observation is that the subgroup experience post-retirement income increases is the most distressed among public-sector workers while they are the least distressed among private-sector workers. The relationship between income and financial wellbeing is possibly complicated by the prevalence of employer-provided define-benefit pension and work after benefit claiming behavior among public-sector workers. This result suggests that researchers and policy makers may look at additional financial wellbeing measures in addition to retirement income replacement for public workers.

Another distinct characteristic of the public-sector worker samples is the large gap by gender and marital status. Non-married women who recently retired fare the worst in almost all facets of their finance wellbeing, including household income, income changes, SRP wealth, early Social

Security claiming, and access to emergency funds. The gap in financial distress between non-married women and other subgroups are even larger in the NC sample compared to the public-sector HRS sample. Despite having a median of 43% in pension income replacement rate, many non-married women rely on additional income sources by working after retirement and have already started claiming Social Security retirement benefits. Their financial wellbeing may continue to deteriorate as they enter later phases of retirement and deplete their retirement savings. Policy makers may consider targeting non-married women for financial education programs with the aim of promoting retirement planning and wealth accumulation during working years.

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Table 1. Income category transition matrix

Pre-retirement household income	Proportion in each sample	Post-retirement household income			
		Income < $25K	$25K - $50K	$50K - $75K	> $75K
Panel A: NC newly retired					
Income < $25K	0.8%	50.0%	50.0%	0.0%	0.0%
$25K - $50K	12.5%	27.1%	57.6%	15.3%	0.0%
$50K - $75K	22.2%	3.8%	45.7%	41.9%	8.6%
> $75K	64.5%	0.7%	9.2%	20.0%	70.2%
N	473	24	112	114	223
Proportion		5.1%	23.7%	24.1%	47.1%
Panel B: NC working					
Income < $25K	1.3%	54.2%	25.0%	8.3%	12.5%
$25K - $50K	17.3%	1.5%	70.0%	23.2%	5.3%
$50K - $75K	25.8%	0.0%	5.6%	68.0%	26.4%
> $75K	55.6%	0.2%	1.1%	5.9%	92.9%
N	1,865	20	270	465	1,110
Proportion		1.1%	14.5%	24.9%	59.5%
Panel C: NC retiree					
Income < $25K	3.2%	66.7%	33.3%	0.0%	0.0%
$25K - $50K	25.9%	6.2%	61.5%	30.2%	2.1%
$50K - $75K	24.6%	0.0%	20.9%	51.6%	27.5%
> $75K	46.2%	0.0%	5.8%	17.0%	77.2%
N	370	14	92	105	159
Proportion		3.8%	24.9%	28.4%	43.0%
Panel D: HRS first-time retiree, public sector workers					
Income < $25K	15.0%	79.6%	14.6%	1.9%	3.9%
$25K - $50K	21.2%	37.1%	43.4%	10.5%	9.0%
$50K - $75K	19.5%	12.4%	23.9%	35.1%	28.6%
> $75K	44.3%	6.4%	9.5%	15.2%	68.9%
N	2,061	615	466	328	652
Proportion		29.8%	22.6%	15.9%	31.6%
Panel E: HRS first-time retiree, private sector workers					
Income < $25K	30.3%	81.2%	14.3%	2.6%	1.9%
$25K - $50K	23.6%	37.3%	43.1%	11.8%	7.8%
$50K - $75K	15.8%	18.0%	29.0%	30.8%	22.3%
> $75K	30.3%	7.9%	12.9%	18.9%	60.3%
N	4,457	2,068	1,031	552	806
Proportion		46.4%	23.1%	12.4%	18.1%

Note: The NC samples only contain information on income categories. The HRS sample includes retirees who transitioned into retirement between two consecutive waves. HRS sample results are weighted.

Table 2. Income changes and pension income replacement rates

Respondent characteristics	Proportion in each sample	Has non-zero pension benefit (HRS only)	Pension income replacement rate		
			25th percentile	50th percentile	75th percentile
Panel A: NC newly retired					
First-wave household income < $50K	13.3%		0.22	0.34	0.50
$50K - $75K	22.2%		0.31	0.41	0.57
> $75K	64.5%		0.30	0.45	0.56
Income category increases	7.6%		0.30	0.41	0.61
Income category decreases	49.3%		0.28	0.40	0.54
Income category stays the same	43.1%		0.30	0.46	0.55
Men	34.7%		0.28	0.40	0.54
Married women	45.7%		0.31	0.44	0.55
Non-married women	19.7%		0.27	0.43	0.59
N	473		0.29	0.43	0.55
Panel B: NC retiree					
First-wave household income < $50K	29.2%		0.21	0.36	0.47
$50K - $75K	24.6%		0.25	0.42	0.55
> $75K	46.2%		0.29	0.41	0.52
Income category increases	24.1%		0.25	0.41	0.49
Income category decreases	24.6%		0.27	0.40	0.52
Income category stays the same	51.4%		0.24	0.40	0.52
Men	35.7%		0.24	0.39	0.50
Married women	43.0%		0.27	0.41	0.52
Non-married women	21.4%		0.26	0.41	0.49
N	370		0.26	0.40	0.51
Panel C: HRS first-time retiree, public sector workers					
First-wave household income < $50K	36.2%	32.6%	0.12	0.26	0.63
$50K - $75K	19.5%	44.0%	0.14	0.27	0.48
> $75K	44.3%	41.7%	0.11	0.26	0.48
Income increases	36.9%	40.9%	0.15	0.34	0.69
Income decreases	63.1%	37.6%	0.10	0.24	0.44
Men	48.0%	39.7%	0.13	0.26	0.54
Married women	21.8%	28.9%	0.10	0.24	0.45
Non-married women	30.3%	44.5%	0.12	0.28	0.51
N	2,061	38.8%	0.12	0.26	0.50

Note: For the NC samples, pension income is calculated based on monthly net benefit paid out retirees that are recorded in administrative records. For the HRS sample, pension income is self-reported income from employer pension or annuity. HRS sample results are weighted.

Table 3. Income changes and the interaction between marital status and gender

Respondent characteristics	Proportion in full sample	Subsamples by marital status and gender		
		Men	Married women	Non-married women
Panel A: NC newly retired				
First-wave household income < $25K	0.8%	0.6%	0.5%	2.2%
$25K - $50K	12.5%	7.3%	6.9%	34.4%***
$50K - $75K	22.2%	19.5%	17.1%	38.7%***
> $75K	64.5%	72.6%	75.5%	24.7%***
Income category increases	7.6%	5.5%	7.9%	10.8%
Income category decreases	49.3%	47.6%	51.4%	47.3%
Income category stays the same	43.1%	47.0%	40.7%	41.9%
Pension replacement below median	47.7%	52.1%	43.8%	48.8%
Pension replacement above median	52.3%	47.9%	56.2%	51.2%
N	473	164	216	93
Proportion		34.7%	45.7%	19.7%
Panel B: NC working				
First-wave household income < $25K	1.3%	0.5%	0.7%	3.4%***
$25K - $50K	17.3%	9.4%	9.5%	42.7%***
$50K - $75K	25.8%	22.6%	22.0%	37.3%***
> $75K	55.6%	67.5%	67.8%	16.6%***
Income category increases	22.5%	23.1%	24.4%	18.0%**
Income category decreases	10.4%	8.0%	14.7%***	5.2%*
Income category stays the same	67.1%	68.8%	60.9%***	76.8%***
N	1,865	584	841	440
Proportion		31.3%	45.1%	23.6%
Panel C: NC retiree				
First-wave household income < $25K	3.2%	1.5%	1.3%	10.1%***
$25K - $50K	25.9%	18.9%	16.4%	57.0%***
$50K - $75K	24.6%	26.5%	22.6%	25.3%
> $75K	46.2%	53.0%	59.7%	7.6%***
Income category increases	24.1%	26.5%	23.9%	20.3%
Income category decreases	24.6%	23.5%	28.3%	19.0%
Income category stays the same	51.4%	50.0%	47.8%	60.8%
Pension replacement below median	53.0%	56.8%	50.3%	51.9%
Pension replacement above median	47.0%	43.2%	49.7%	48.1%
N	370	132	159	79
Proportion		35.7%	43.0%	21.4%
Panel D: HRS first-time retiree, public sector workers				
First-wave household income < $25K	15.0%	9.5%	6.7%**	29.7%***
$25K - $50K	21.2%	15.0%	18.2%	33.4%***
$50K - $75K	19.5%	21.6%	17.7%*	17.5%
> $75K	44.3%	54.0%	57.3%	19.5%***
Income increases	36.9%	38.0%	37.5%	34.6%
Income decreases	63.1%	62.0%	62.5%	65.4%
Pension benefit is zero	61.2%	60.3%	71.1%***	55.5%
Pension replacement below median	13.4%	34.7%	34.2%	34.0%
Pension replacement above median	25.4%	65.3%	65.8%	66.0%
N	2,061	903	441	717
Proportion		43.8%	21.4%	34.8%

Note: Stars indicate proportions of individuals with income categories/changes in each group is significantly difference from proportions of those in the male workers group. HRS sample results are weighted.

Table 4. Income changes and household post-retirement SRP balance

Income changes	Proportion in each sample	Post-retirement household SRP balance (IRA and Keogh only for HRS retirees)				
		No SRP	< $25K	$25K to $100K	> $100K	Don't know / Missing
Panel A: Men (NC newly retired)						
Income category increases	5.5%	0.0%	22.2%	22.2%	44.4%	11.1%
Income category decreases	47.6%	5.1%	16.7%	11.5%	65.4%	1.3%
Income category stays the same	47.0%	1.3%	14.3%	20.8%	61.0%	2.6%
Pension replacement below median	52.1%	2.7%	17.6%	21.6%	56.8%	1.4%
Pension replacement above median	47.9%	2.9%	11.8%	13.2%	69.1%	2.9%
N	164	3.0%	15.9%	16.5%	62.2%	2.4%
Panel B: Married women (NC newly retired)						
Income category increases	7.9%	23.5%	17.6%	5.9%	52.9%	0.0%
Income category decreases	51.4%	4.5%	13.5%	26.1%	51.4%	4.5%
Income category stays the same	40.7%	5.7%	17.2%	25.3%	46.0%	6.8%
Pension replacement below median	43.8%	9.9%	13.6%	24.7%	44.4%	7.4%
Pension replacement above median	56.2%	5.8%	16.5%	26.2%	47.6%	4.8%
N	216	6.5%	15.3%	24.2%	49.3%	5.1%
Panel C: Non-married women (NC newly retired)						
Income category increases	10.8%	10.0%	20.0%	30.0%	30.0%	10.0%
Income category decreases	47.3%	20.5%	27.3%	29.5%	22.7%	0.0%
Income category stays the same	41.9%	10.3%	20.5%	30.8%	33.3%	5.1%
Pension replacement below median	48.8%	15.4%	12.8%	30.8%	33.3%	7.7%
Pension replacement above median	51.2%	19.5%	31.7%	26.8%	22.0%	0.0%
N	93	15.1%	23.7%	30.1%	28.0%	3.2%
Panel D: NC working						
Income category increases	22.5%	5.5%	12.7%	24.2%	50.0%	7.9%
Income category decreases	10.4%	4.1%	15.5%	23.8%	52.3%	4.6%
Income category stays the same	67.1%	5.0%	13.2%	27.6%	46.6%	7.7%
N	1,865	5.1%	13.3%	26.5%	48.0%	7.5%
Panel E: NC retiree						
Income category increases	24.1%	8.0%	12.5%	22.7%	51.1%	6.7%
Income category decreases	24.6%	8.8%	17.6%	19.8%	46.2%	7.7%
Income category stays the same	51.4%	10.6%	14.3%	19.6%	49.2%	6.8%
Pension replacement below median	53.0%	8.8%	11.9%	15.5%	56.7%	8.2%
Pension replacement above median	47.0%	10.3%	17.8%	25.9%	40.2%	5.7%
N	370	9.5%	14.7%	20.4%	48.9%	7.0%
Panel F: HRS first-time retiree, public sector workers						
Income increases	36.9%	48.4%	9.9%	15.9%	25.8%	-
Income decreases	63.1%	44.4%	13.4%	15.4%	26.8%	-
Pension benefit is zero	61.2%	46.6%	12.8%	14.7%	25.8%	-
Pension replacement below median	13.4%	46.0%	11.0%	14.9%	28.2%	-
Pension replacement above median	25.4%	44.1%	10.9%	18.2%	26.8%	-
N	2,061	45.9%	12.1%	15.6%	26.4%	-

Note: The NC samples' SRP balance includes balance of any retirement savings plans (e.g., 401(k), 457, 403(b), or IRA). HRS sample only has information on IRA, Keogh accounts. SRP balance is reported in categories only for the NC samples. HRS sample results are weighted.

Table 5. Income changes and household SRP balance changes

Income changes	Proportion in each sample	Post-retirement household SRP balance changes (IRA and Keogh only for HRS retirees)		
		SRP balance (category) increases	SRP balance (category) decreases	SRP balance (category) stays the same
Panel A: Men (NC newly retired)				
Income category increases	2.9%	0.0%	0.0%	100.0%
Income category decreases	50.0%	18.0%	20.0%	62.0%
Income category stays the same	47.1%	28.3%	17.4%	54.3%
Pension replacement below median	48.2%	20.5%	17.9%	61.5%
Pension replacement above median	51.8%	22.0%	19.5%	58.5%
N	102	22.2%	18.2%	59.6%
Panel B: Married women (NC newly retired)				
Income category increases	6.3%	12.5%	12.5%	75.0%
Income category decreases	53.1%	21.2%	30.3%	48.5%
Income category stays the same	40.6%	22.0%	26.0%	52.0%
Pension replacement below median	39.1%	16.2%	24.3%	59.5%
Pension replacement above median	60.9%	19.7%	31.1%	49.2%
N	143	21.0%	27.4%	51.6%
Panel C: Non-married women (NC newly retired)				
Income category increases	4.9%	0.0%	0.0%	100.0%
Income category decreases	54.1%	12.1%	33.3%	54.5%
Income category stays the same	41.0%	29.2%	20.8%	50.0%
Pension replacement below median	42.9%	15.8%	42.1%	42.1%
Pension replacement above median	57.1%	7.1%	25.0%	67.9%
N	61	18.6%	27.1%	54.2%
Panel D: NC working				
Income category increases	22.5%	38.9%	10.6%	50.5%
Income category decreases	10.4%	27.1%	24.8%	48.1%
Income category stays the same	67.1%	28.1%	13.6%	58.3%
N	1,865	30.4%	14.0%	55.6%
Panel E: NC retiree				
Income category increases	24.1%	25.3%	16.5%	58.2%
Income category decreases	24.6%	20.5%	24.1%	55.4%
Income category stays the same	51.4%	18.9%	13.0%	68.0%
Pension replacement below median	53.0%	23.4%	14.9%	61.7%
Pension replacement above median	47.0%	17.9%	18.6%	63.5%
N	370	20.8%	16.6%	62.5%
Panel F: HRS first-time retiree, public sector workers				
Income increases	36.9%	61.1%	38.9%	0.0%
Income decreases	63.1%	64.4%	35.4%	0.2%
Pension benefit is zero	61.2%	60.9%	38.9%	0.2%
Pension replacement below median	13.4%	70.6%	29.4%	0.0%
Pension replacement above median	25.4%	64.7%	35.3%	0.0%
N	2,061	63.2%	36.6%	0.1%

Note: This table does not contain NC workers who transitioned into retirement between S2014 and S2016, as S2014 does not contain information on SRP balance categories. HRS sample results are weighted.

Table 6. Income changes and additional sources of income after retirement

Income changes	Proportion in each sample	Post-retirement work and Social Security claiming		Post-retirement spouse's work and Social Security claiming, conditional on being married	
		Have worked for pay after retirement from NC	Has started claiming Social Security benefits	Has spouse that is currently employed	Spouse has started claiming Social Security benefits
Panel A: Men (NC newly retired)					
Income category increases	5.5%	55.6%	55.6%	57.1%	28.6%
Income category decreases	47.6%	38.5%	35.9%	39.1%	28.1%
Income category stays the same	47.0%	50.6%	44.2%	56.5%	26.1%
Pension replacement below median	52.1%	43.2%	60.8%	52.5%	37.7%
Pension replacement above median	47.9%	52.9%	22.1%	50.9%	17.5%
N	164	45.1%	40.9%	48.6%	27.1%
Panel B: Married women (NC newly retired)					
Income category increases	7.9%	52.9%	52.9%	47.1%	76.5%
Income category decreases	51.4%	44.1%	42.3%	44.3%	44.3%
Income category stays the same	40.7%	40.9%	37.5%	61.4%	37.3%
Pension replacement below median	43.8%	39.5%	60.5%	36.4%	48.1%
Pension replacement above median	56.2%	49.0%	27.9%	59.0%	45.0%
N	216	43.5%	41.2%	51.5%	44.2%
Panel C: Non-married women (NC newly retired)					
Income category increases	10.8%	70.0%	40.0%		
Income category decreases	47.3%	31.8%	59.1%		
Income category stays the same	41.9%	43.6%	41.0%		
Pension replacement below median	48.8%	41.0%	74.4%		
Pension replacement above median	51.2%	41.5%	29.3%		
N	93	40.9%	49.5%		
Panel D: NC retiree					
Income category increases	24.1%	60.7%	62.9%	47.7%	52.3%
Income category decreases	24.6%	57.1%	52.7%	40.8%	46.5%
Income category stays the same	51.4%	45.3%	61.1%	39.4%	53.5%
Pension replacement below median	53.0%	46.4%	73.0%	33.1%	64.1%
Pension replacement above median	47.0%	58.0%	44.3%	52.1%	36.4%
N	370	51.9%	59.5%	41.8%	51.3%
Panel E: HRS first-time retiree, public sector workers					
Income increases	36.9%	-	45.1%	40.9%	33.7%
Income decreases	63.1%	-	51.3%	36.7%	36.0%
Pension benefit is zero	61.2%	-	47.5%	40.3%	36.8%
Pension replacement below median	13.4%	-	58.0%	34.9%	37.9%
Pension replacement above median	25.4%	-	48.0%	34.6%	29.1%
N	2,061	-	49.0%	38.3%	35.2%

Note: Spouse's working status and social security claiming is reported by respondent in NC samples. Retirement status in the HRS sample is based on employment status changing to retired or partly retired, thus not recording work after benefit claiming behaviors. HRS sample results are weighted.

Table 7. Income change and financial literacy

Income changes	Proportion in each sample	Number of correct answers to S2016 financial literacy questions					
		0	1	2	3	Don't know	Mean
Panel A: Men (NC newly retired)							
Income category increases	2.9%	0.0%	0.0%	0.0%	100.0%	0.0%	3.0
Income category decreases	50.0%	0.0%	2.0%	15.7%	78.4%	3.9%	2.7
Income category stays the same	47.1%	0.0%	6.2%	33.3%	60.4%	0.0%	2.5
Pension replacement below median	48.2%	0.0%	7.5%	10.0%	80.0%	2.5%	2.7
Pension replacement above median	51.8%	0.0%	0.0%	39.5%	60.5%	0.0%	2.6
N	102	0.0%	3.9%	23.5%	70.6%	2.0%	2.6
Panel B: Married women (NC newly retired)							
Income category increases	6.4%	0.0%	33.3%	33.3%	33.3%	0.0%	2.0
Income category decreases	52.9%	2.7%	16.2%	35.1%	39.2%	6.8%	2.0
Income category stays the same	40.7%	0.0%	21.1%	35.1%	42.1%	1.8%	2.2
Pension replacement below median	39.3%	2.3%	18.2%	31.8%	45.5%	2.3%	2.2
Pension replacement above median	60.7%	0.0%	20.6%	36.8%	35.3%	7.4%	2.0
N	140	1.4%	19.3%	35.0%	40.0%	4.3%	2.1
Panel C: Non-married women (NC newly retired)							
Income category increases	3.3%	0.0%	0.0%	50.0%	50.0%	0.0%	2.5
Income category decreases	55.0%	0.0%	9.1%	36.4%	54.5%	0.0%	2.5
Income category stays the same	41.7%	4.0%	12.0%	32.0%	52.0%	0.0%	2.3
Pension replacement below median	41.7%	0.0%	0.0%	30.0%	70.0%	0.0%	2.7
Pension replacement above median	58.3%	0.0%	14.3%	42.9%	42.9%	0.0%	2.3
N	60	1.7%	10.0%	35.0%	53.3%	0.0%	2.4
Panel D: NC working							
Income category increases	22.1%	1.8%	15.2%	35.8%	45.4%	1.8%	2.2
Income category decreases	9.7%	3.4%	10.9%	29.9%	54.4%	1.4%	2.3
Income category stays the same	68.1%	3.7%	16.1%	33.0%	44.8%	2.4%	2.2
N	1,513	3.2%	15.4%	33.3%	45.9%	2.2%	2.2
Panel E: NC retiree							
Income category increases	23.7%	2.4%	22.4%	30.6%	44.7%	0.0%	2.2
Income category decreases	24.8%	3.4%	15.7%	30.3%	50.6%	0.0%	2.3
Income category stays the same	51.5%	2.2%	14.1%	35.1%	48.6%	0.0%	2.3
Pension replacement below median	53.5%	2.6%	17.2%	31.8%	48.4%	0.0%	2.3
Pension replacement above median	46.5%	2.4%	15.6%	34.1%	47.9%	0.0%	2.3
N	359	2.5%	16.4%	32.9%	48.2%	0.0%	2.3
Panel F: HRS first-time retiree, public sector workers							
Income increases	32.4%	3.2%	13.8%	33.0%	49.9%	-	2.3
Income decreases	67.6%	2.7%	14.4%	24.5%	58.4%	-	2.4
Pension benefit is zero	62.3%	2.6%	16.1%	28.7%	52.6%	-	2.3
Pension replacement below median	12.9%	1.9%	6.9%	23.3%	67.9%	-	2.6
Pension replacement above median	24.7%	4.0%	13.4%	25.8%	56.8%	-	2.3
N	439	2.9%	14.2%	27.3%	55.6%	-	2.4

Note: This table does not contain those who transitioned into retirement between S2014 and S2016, as S2014 contains only two questions on financial literacy. The sample contains workers with non-missing responses to financial literacy questions in both S2016 and S2018. The HRS sample only contain those with valid response for the financial literacy experimental modules. See Appendix B for detailed information on financial literacy questions in the HRS. HRS sample results are weighted.

Table 8. Income changes and financial literacy changes

Income changes	Proportion in each sample	Change in financial literacy between		
		Number of correct answers increases	Number of correct answers decreases	Number of correct answers stays the same
Panel A: Men (NC newly retired)				
Income category increases	2.9%	0.0%	33.3%	66.7%
Income category decreases	50.0%	7.8%	19.6%	72.5%
Income category stays the same	47.1%	16.7%	12.5%	70.8%
Pension replacement below median	48.2%	7.5%	20.0%	72.5%
Pension replacement above median	51.8%	18.6%	14.0%	67.4%
N	102	11.8%	16.7%	71.6%
Panel B: Married women (NC newly retired)				
Income category increases	6.4%	11.1%	55.6%	33.3%
Income category decreases	52.9%	28.4%	24.3%	47.3%
Income category stays the same	40.7%	24.6%	14.0%	61.4%
Pension replacement below median	39.3%	20.5%	27.3%	52.3%
Pension replacement above median	60.7%	32.4%	22.1%	45.6%
N	140	25.7%	22.1%	52.1%
Panel C: Non-married women (NC newly retired)				
Income category increases	3.3%	0.0%	0.0%	100.0%
Income category decreases	55.0%	6.1%	33.3%	60.6%
Income category stays the same	41.7%	24.0%	20.0%	56.0%
Pension replacement below median	41.7%	5.0%	25.0%	70.0%
Pension replacement above median	58.3%	21.4%	32.1%	46.4%
N	60	13.3%	26.7%	60.0%
Panel D: NC working				
Income category increases	22.1%	22.7%	23.3%	54.0%
Income category decreases	9.7%	19.7%	33.3%	46.9%
Income category stays the same	68.1%	22.4%	22.2%	55.4%
N	1,513	22.2%	23.5%	54.3%
Panel E: NC retiree				
Income category increases	23.7%	17.6%	21.2%	61.2%
Income category decreases	24.8%	14.6%	36.0%	49.4%
Income category stays the same	51.5%	16.8%	23.2%	60.0%
Pension replacement below median	53.5%	18.2%	23.4%	58.3%
Pension replacement above median	46.5%	14.4%	28.7%	56.9%
N	359	16.4%	25.9%	57.7%

Note: This table does not contain those who transitioned into retirement between S2014 and S2016, as S2014 contains only two questions on financial literacy. The sample contains workers with non-missing responses to financial literacy questions in both S2016 and S2018.

Table 9a. Income changes and financial distress

		Financial distress: cannot come up with $2,000 within the next month				Financial distress: kept credit card balance when spending exceeded income in the past year
Income changes	Proportion in each sample	Financial distress improves	Financial distress worsens	Not distressed in both surveys	Distressed in both surveys	Distressed in second wave survey
Panel A: Men (NC newly retired)						
Income category increases	2.9%	0.0%	0.0%	100.0%	0.0%	0.0%
Income category decreases	50.0%	0.0%	5.9%	90.2%	3.9%	12.0%
Income category stays the same	47.1%	6.2%	10.4%	83.3%	0.0%	22.9%
Pension replacement below median	48.2%	2.5%	5.0%	92.5%	0.0%	15.0%
Pension replacement above median	51.8%	2.3%	9.3%	86.0%	2.3%	19.0%
N	102	2.9%	7.8%	87.3%	2.0%	16.8%
Panel B: Married women (NC newly retired)						
Income category increases	6.3%	11.1%	0.0%	77.8%	11.1%	33.3%
Income category decreases	53.1%	2.6%	5.3%	90.8%	1.3%	24.7%
Income category stays the same	40.6%	1.7%	8.6%	84.5%	5.2%	22.4%
Pension replacement below median	39.1%	0.0%	4.4%	91.1%	4.4%	28.9%
Pension replacement above median	60.9%	4.3%	4.3%	87.1%	4.3%	19.4%
N	143	2.8%	6.3%	87.4%	3.5%	24.3%
Panel C: Non-married women (NC newly retired)						
Income category increases	4.9%	0.0%	0.0%	33.3%	33.3%	50.0%
Income category decreases	54.1%	3.0%	12.1%	78.8%	6.1%	30.3%
Income category stays the same	41.0%	8.0%	0.0%	84.0%	8.0%	32.0%
Pension replacement below median	42.9%	4.8%	9.5%	81.0%	0.0%	20.0%
Pension replacement above median	57.1%	3.6%	7.1%	75.0%	14.3%	42.9%
N	61	4.9%	6.6%	78.7%	8.2%	31.7%
Panel D: NC working						
Income category increases	22.2%	9.8%	2.4%	82.0%	5.6%	33.5%
Income category decreases	9.7%	3.4%	2.7%	86.5%	7.4%	32.7%
Income category stays the same	68.1%	6.8%	3.2%	82.7%	6.9%	30.2%
N	1,524	7.2%	3.0%	82.9%	6.7%	31.2%
Panel E: NC retiree						
Income category increases	24.1%	4.5%	5.6%	84.3%	4.5%	29.9%
Income category decreases	24.6%	5.5%	7.7%	81.3%	5.5%	27.0%
Income category stays the same	51.4%	3.7%	6.3%	84.2%	5.3%	25.9%
Pension replacement below median	53.0%	2.6%	4.6%	87.2%	5.1%	26.4%
Pension replacement above median	47.0%	6.3%	8.6%	79.3%	5.2%	27.9%
N	370	4.3%	6.5%	83.5%	5.1%	27.1%

Note: Financial distress refers to not being able to come up with $2,000 within the next month and having kept credit card balance when spending exceeded income. This table does not contain those who transitioned into retirement or were working between S2014 and S2016, as S2014 does not contain information on financial wellbeing. Financial distress measured by access to emergency funds is available in both S2016 and S2018. Financial distress measured by keeping credit card balance is only available in S2018.

Table 9b. Income changes and financial distress (HRS sample)

Income changes	Proportion in each sample	Financial distress: carried over unpaid credit card debt from last month to this month				
		Distressed in second wave	Changes in financial distress levels after retirement			
			Financial distress lessens	Financial distress worsens	Not distressed in both surveys	Distressed in both surveys
Panel A: Men (public sector workers)						
Income increases	39.4%	22.7%	4.6%	8.4%	72.7%	14.3%
Income decreases	60.6%	23.3%	10.0%	5.4%	66.7%	17.9%
Pension benefit is zero	58.3%	22.0%	8.8%	3.6%	69.1%	18.4%
Pension replacement below median	15.2%	27.6%	5.2%	12.5%	67.2%	15.1%
Pension replacement above median	26.5%	22.8%	7.4%	9.6%	69.9%	13.1%
N	340.0	23.1%	7.9%	6.6%	69.0%	16.5%
Panel B: Married women (public sector workers)						
Income increases	45.9%	35.4%	15.3%	11.3%	49.3%	24.1%
Income decreases	54.1%	26.1%	22.5%	7.4%	51.4%	18.7%
Pension benefit is zero	65.7%	28.2%	18.9%	9.2%	52.9%	19.0%
Pension replacement below median	10.0%	48.5%	0.0%	9.5%	51.5%	39.0%
Pension replacement above median	24.3%	28.9%	27.9%	9.1%	43.1%	19.8%
N	159	30.4%	19.2%	9.2%	50.4%	21.2%
Panel C: Non-married women (public sector workers)						
Income increases	33.0%	30.3%	5.4%	7.5%	64.3%	22.8%
Income decreases	67.0%	28.3%	20.4%	6.6%	51.3%	21.6%
Pension benefit is zero	54.7%	25.1%	17.7%	5.3%	57.2%	19.7%
Pension replacement below median	14.3%	14.8%	18.1%	4.3%	67.1%	10.5%
Pension replacement above median	31.0%	42.3%	10.3%	10.9%	47.5%	31.4%
N	315	28.9%	15.4%	6.9%	55.6%	22.0%
Panel D: Men (private sector workers)						
Income increases	39.1%	20.9%	7.3%	6.9%	71.8%	14.1%
Income decreases	60.9%	24.9%	7.4%	11.2%	67.7%	13.6%
Pension benefit is zero	75.8%	22.5%	8.0%	10.1%	69.6%	12.3%
Pension replacement below median	13.2%	16.7%	8.5%	7.2%	74.8%	9.5%
Pension replacement above median	11.0%	37.3%	2.0%	8.2%	60.8%	29.1%
N	711	23.3%	7.4%	9.5%	69.3%	13.8%
Panel E: Married women (private sector workers)						
Income increases	46.2%	17.2%	13.4%	4.7%	69.4%	12.5%
Income decreases	53.8%	32.9%	13.1%	11.1%	54.0%	21.8%
Pension benefit is zero	81.5%	23.1%	12.2%	6.5%	64.7%	16.6%
Pension replacement below median	9.8%	38.8%	21.6%	16.3%	39.6%	22.4%
Pension replacement above median	8.7%	34.6%	13.4%	14.7%	52.0%	19.8%
N	368	25.6%	13.2%	8.2%	61.1%	17.5%
Panel F: Non-married women (private sector workers)						
Income increases	36.8%	19.4%	9.9%	3.4%	70.7%	16.0%
Income decreases	63.2%	24.9%	13.0%	10.2%	62.1%	14.7%
Pension benefit is zero	79.4%	20.7%	12.6%	6.6%	66.7%	14.1%
Pension replacement below median	9.1%	46.7%	18.2%	20.5%	35.1%	26.2%
Pension replacement above median	11.6%	19.0%	2.3%	5.5%	78.7%	13.5%
N	687	22.9%	11.9%	7.7%	65.3%	15.2%

Note: Financial distress refers to having carried over credit card balance from last month to this month. This table does not contain those who retired before the 2010 wave, as the credit card debt question is only included in waves in and after 2008. All sample results are weighted.

Table 10a. Regression of income changes – income category decreases (NC sample)

Respondent / household characteristics in S2014/S2016	Income category decreases (1)	(2)	(3)	(4)
Married female	0.072*	0.063	0.080*	0.073*
	(0.040)	(0.041)	(0.042)	(0.042)
Non-married female	-0.010	-0.008	0.012	0.044
	(0.048)	(0.049)	(0.050)	(0.057)
African American	0.013	0.028	0.031	0.029
	(0.057)	(0.058)	(0.060)	(0.060)
Hispanic	0.037	0.002	-0.015	-0.019
	(0.166)	(0.162)	(0.160)	(0.161)
Bachelor's degree or above	-0.077*	-0.115**	-0.133***	-0.136***
	(0.043)	(0.046)	(0.047)	(0.047)
Age at survey	0.005	0.006	0.005	0.006
	(0.004)	(0.004)	(0.004)	(0.004)
Has good health	-0.103**	-0.099**	-0.062	-0.058
	(0.047)	(0.050)	(0.051)	(0.051)
Transitioned to retirement between S2016 and S2018	0.255***	0.210***	0.209***	0.208***
	(0.037)	(0.078)	(0.078)	(0.079)
Salary in 2nd quartile	0.144**	0.172***	0.182***	0.177***
	(0.064)	(0.065)	(0.066)	(0.066)
Salary in 3rd quartile	0.232***	0.244***	0.241***	0.235***
	(0.062)	(0.064)	(0.064)	(0.064)
Salary in 4th quartile	0.233***	0.280***	0.275***	0.273***
	(0.061)	(0.062)	(0.063)	(0.063)
Financial literacy questions all correct			0.034	0.033
			(0.038)	(0.038)
Financial literacy answers missing			0.141	0.154
			(0.130)	(0.131)
Self-rated financial knowledge is high			0.107***	0.107***
			(0.038)	(0.038)
Has supplemental retirement saving accounts			0.038	0.032
			(0.053)	(0.053)
Spouse currently employed				0.051
				(0.041)
Spouse covered by pension plan				0.026
				(0.041)
Control for agency type and retirement year	No	Yes	Yes	Yes
Sample size	843	843	843	843
Mean dependent variable	0.384	0.384	0.384	0.384

Note: The sample contains retired workers with non-missing records for net benefit paid out per month. Average marginal effects from probit models are reported. Salary is the 2013 annual salary based on administrative records. Financial literacy information in S2016 is used in models.

Table 10b. Regression of income changes - pension benefit replacement rate (NC sample)

Respondent / household characteristics in S2014/S2016	Pension benefit replacement rate is above median (1)	(2)	(3)	(4)
Married female	0.133***	0.136***	0.119**	0.121**
	(0.045)	(0.046)	(0.048)	(0.048)
Non-married female	0.093*	0.083	0.070	0.070
	(0.054)	(0.055)	(0.055)	(0.062)
African American	0.073	0.080	0.072	0.071
	(0.064)	(0.065)	(0.066)	(0.066)
Hispanic	-0.189	-0.197	-0.215	-0.214
	(0.156)	(0.157)	(0.154)	(0.154)
Bachelor's degree or above	-0.045	-0.055	-0.036	-0.039
	(0.049)	(0.052)	(0.053)	(0.053)
Age at survey	-0.048***	-0.050***	-0.050***	-0.049***
	(0.005)	(0.005)	(0.005)	(0.005)
Has good health	-0.021	-0.055	-0.072	-0.069
	(0.051)	(0.053)	(0.055)	(0.055)
Transitioned to retirement between S2016 and S2018	0.100**	0.050	0.052	0.049
	(0.043)	(0.089)	(0.089)	(0.089)
Salary in 2nd quartile	0.169**	0.192***	0.190***	0.187**
	(0.069)	(0.070)	(0.070)	(0.070)
Salary in 3rd quartile	0.330***	0.354***	0.358***	0.359***
	(0.063)	(0.063)	(0.063)	(0.063)
Salary in 4th quartile	0.378***	0.406***	0.413***	0.415***
	(0.062)	(0.062)	(0.062)	(0.062)
Financial literacy questions all correct			-0.042	-0.042
			(0.043)	(0.043)
Financial literacy answers missing			0.174	0.176
			(0.141)	(0.141)
Self-rated financial knowledge is high			-0.061	-0.062
			(0.043)	(0.043)
Has supplemental retirement saving accounts			-0.005	-0.005
			(0.060)	(0.060)
Spouse currently employed				0.025
				(0.046)
Spouse covered by pension plan				-0.034
				(0.046)
Control for agency type and retirement year	No	Yes	Yes	Yes
Sample size	777	777	777	777
Mean dependent variable	0.498	0.498	0.498	0.498

Note: The sample contains retired workers with non-missing records for net benefit paid out per month. Average marginal effects from probit models are reported. Salary is the 2013 annual salary based on administrative records. Financial literacy information in S2016 is used in models.

Table 10c. Regression of income changes – income decreases (HRS sample)

Respondent / household characteristics in pre-retirement wave	Income decreases			
	(1)	(2)	(3)	(4)
Married female	0.012	0.013	0.015	0.010
	(0.023)	(0.023)	(0.023)	(0.024)
Non-married female	0.061***	0.061***	0.060***	0.067***
	(0.020)	(0.020)	(0.020)	(0.021)
African American	-0.025	-0.024	-0.029	-0.028
	(0.021)	(0.021)	(0.021)	(0.021)
Hispanic	-0.003	-0.001	-0.005	-0.004
	(0.024)	(0.024)	(0.025)	(0.025)
Bachelor's degree or above	-0.031*	-0.027	-0.024	-0.024
	(0.017)	(0.017)	(0.018)	(0.018)
Age at survey	0.004***	0.003	0.002	0.003
	(0.001)	(0.002)	(0.002)	(0.002)
Has good health	-0.017	-0.020	-0.018	-0.018
	(0.019)	(0.020)	(0.020)	(0.020)
Public sector worker	0.004	0.004	0.004	0.003
	(0.016)	(0.016)	(0.016)	(0.016)
Has positive salary in 1st quartile	0.032	0.030	0.030	0.030
	(0.021)	(0.022)	(0.023)	(0.023)
Has positive salary in 2nd quartile	0.148***	0.146***	0.148***	0.148***
	(0.020)	(0.022)	(0.022)	(0.022)
Has positive salary in 3rd quartile	0.200***	0.197***	0.198***	0.198***
	(0.022)	(0.024)	(0.024)	(0.024)
Has positive salary in 4th quartile	0.215***	0.211***	0.214***	0.213***
	(0.026)	(0.028)	(0.029)	(0.028)
Has IRA, Keogh accounts			0.022	0.024
			(0.017)	(0.016)
Financial literacy questions all correct			0.027	0.027
			(0.036)	(0.036)
Financial literacy is missing			-0.016	-0.017
			(0.026)	(0.026)
Spouse currently employed				0.007
				(0.022)
Spouse covered by pension plan				0.019
				(0.019)
Control for survey cohorts	No	Yes	Yes	Yes
Sample size	6,410	6,410	6,410	6,410
Mean dependent variable	0.615	0.615	0.615	0.615

Note: Average marginal effects from probit models are reported. Results are weighted.

Table 11a. Regression of financial distress (credit card debt) on income category changes (NC sample)

Respondent / household characteristics	Kept credit card balance when spending exceeded income			
	(1)	(2)	(3)	(4)
Income category increases	0.072**	0.057	0.054	0.055
	(0.037)	(0.037)	(0.037)	(0.038)
Income category decreases	0.010	0.004	-0.000	-0.003
	(0.029)	(0.029)	(0.029)	(0.029)
Married female	0.056	0.051	0.041	0.042
	(0.046)	(0.046)	(0.046)	(0.047)
Non-married female	0.048**	0.043*	0.036	0.038
	(0.023)	(0.023)	(0.024)	(0.024)
African American	0.062**	0.033	0.039	0.035
	(0.032)	(0.031)	(0.032)	(0.032)
Hispanic	0.022	0.018	0.021	0.018
	(0.076)	(0.076)	(0.076)	(0.075)
Bachelor's degree or above	-0.022	-0.004	0.001	0.003
	(0.022)	(0.022)	(0.023)	(0.023)
Age at survey	-0.007***	-0.006**	-0.006**	-0.007**
	(0.003)	(0.003)	(0.003)	(0.003)
Has good health	-0.028	-0.002	0.001	0.004
	(0.041)	(0.040)	(0.040)	(0.040)
Transitioned to retirement	-0.080*	-0.084*	-0.078*	-0.105**
between S2016 and S2018	(0.042)	(0.042)	(0.042)	(0.045)
Retiree in S2016 and S2018	-0.090	-0.081	-0.080	-0.109
	(0.097)	(0.098)	(0.098)	(0.096)
Years since retirement	0.019	0.017	0.018	0.018
	(0.031)	(0.031)	(0.031)	(0.031)
Household income $50-75k	-0.028	-0.014	-0.014	-0.015
	(0.029)	(0.030)	(0.030)	(0.030)
Household income >$75k	-0.114***	-0.059*	-0.054*	-0.063**
	(0.029)	(0.030)	(0.030)	(0.032)
Has supplemental retirement saving		0.005	0.013	0.009
accounts		(0.029)	(0.029)	(0.029)
SRP balance >$100k		-0.156***	-0.150***	-0.149***
		(0.022)	(0.022)	(0.022)
Financial literacy questions all			-0.004	-0.004
correct			(0.022)	(0.022)
Self-rated financial knowledge is			-0.089***	-0.086***
high			(0.023)	(0.024)
Spouse currently employed				0.051
				(0.044)
Spouse covered by pension plan				0.021
				(0.025)
Spouse started claiming SS benefits				-0.039
				(0.028)
Working after retirement				-0.011
				(0.040)
Has started claiming SS benefits				0.059
				(0.039)
Control for agency type and retirement year	Yes	Yes	Yes	2,147
Sample size	2,147	2,147	2,147	0.294
Mean dependent variable	0.294	0.294	0.294	0.294

Note: The sample contains both actively working and retired workers in the NC dataset. Average marginal effects from probit models are reported. Financial literacy information in S2016 is used in models. This table only contains NC employees with a valid response to S2018, as financial distress measured by keeping credit card balance is only available in S2018.

Table 11b. Regression of financial distress (credit card debt) on replacement rate (NC sample)

Respondent / household characteristics	Kept credit card balance when spending exceeded income			
	(1)	(2)	(3)	(4)
Pension replacement rate above median	0.011	-0.003	-0.004	-0.003
	(0.040)	(0.040)	(0.040)	(0.041)
Married female	0.062	0.068	0.057	0.074
	(0.053)	(0.053)	(0.054)	(0.056)
Non-married female	0.100**	0.084*	0.073	0.071
	(0.048)	(0.048)	(0.049)	(0.049)
African American	-0.037	-0.050	-0.050	-0.053
	(0.057)	(0.054)	(0.055)	(0.054)
Hispanic	0.226	0.235	0.242	0.233
	(0.176)	(0.179)	(0.180)	(0.183)
Bachelor's degree or above	-0.066	-0.043	-0.037	-0.043
	(0.043)	(0.043)	(0.043)	(0.044)
Age at survey	-0.004	-0.003	-0.002	0.000
	(0.005)	(0.005)	(0.005)	(0.006)
Has good health	0.043	0.066	0.065	0.066
	(0.064)	(0.060)	(0.060)	(0.060)
Transitioned to retirement between S2016 and S2018	-0.028	-0.022	-0.018	-0.022
	(0.079)	(0.079)	(0.079)	(0.080)
Years since retirement	0.019	0.019	0.019	0.014
	(0.032)	(0.032)	(0.032)	(0.032)
Household income $50-75k	0.028	0.042	0.046	0.053
	(0.048)	(0.049)	(0.049)	(0.051)
Household income >$75k	-0.056	-0.004	0.005	-0.013
	(0.046)	(0.048)	(0.049)	(0.054)
Has supplemental retirement saving accounts		-0.099*	-0.086	-0.085
		(0.058)	(0.058)	(0.058)
SRP balance >$100k		-0.146***	-0.143***	-0.137***
		(0.039)	(0.039)	(0.040)
Financial literacy questions all correct			-0.017	-0.016
			(0.038)	(0.038)
Self-rated financial knowledge is high			-0.084**	-0.077*
			(0.038)	(0.039)
Spouse currently employed				0.021
				(0.045)
Spouse covered by pension plan				0.042
				(0.044)
Spouse started claiming SS benefits				-0.107**
				(0.041)
Working after retirement				-0.006
				(0.040)
Has started claiming SS benefits				0.014
				(0.051)
Control for agency type and retirement year	Yes	Yes	Yes	Yes
Sample size	600	600	600	600
Mean dependent variable	0.254	0.254	0.254	0.254

Note: The sample contains retired workers with non-missing records for net benefit paid out per month. Average marginal effects from probit models are reported. Financial literacy information in S2016 is used in models. This table only contains NC employees with a valid response to S2018, as financial distress measured by keeping credit card balance is only available in S2018.

Table 11c. Regression of financial distress (credit card debt) on income changes (HRS sample)

Respondent / household characteristics	Carried over unpaid credit card debt from last month to this month			
	(1)	(2)	(3)	(4)
Income decreases	0.056***	0.055***	0.049**	0.049**
	(0.019)	(0.020)	(0.020)	(0.020)
Married female	0.012	0.011	-0.001	-0.000
	(0.027)	(0.027)	(0.028)	(0.028)
Non-married female	0.026	0.025	0.042*	0.041*
	(0.019)	(0.019)	(0.023)	(0.023)
African American	-0.030	-0.031	-0.032	-0.032
	(0.032)	(0.032)	(0.031)	(0.032)
Hispanic	-0.035	-0.035	-0.036	-0.037
	(0.030)	(0.030)	(0.030)	(0.030)
Bachelor's degree or above	-0.022	-0.023	-0.015	-0.015
	(0.027)	(0.027)	(0.027)	(0.027)
Age at survey	-0.007**	-0.007**	-0.006**	-0.007**
	(0.003)	(0.003)	(0.003)	(0.003)
Has good health	-0.022	-0.021	-0.021	-0.021
	(0.026)	(0.026)	(0.026)	(0.026)
Public sector worker	0.017	0.018	0.018	0.018
	(0.021)	(0.021)	(0.021)	(0.021)
Income <$25k	0.082***	0.081***	0.071**	0.072**
	(0.030)	(0.030)	(0.030)	(0.030)
Income $50-75k	0.135***	0.135***	0.114***	0.114***
	(0.035)	(0.035)	(0.035)	(0.036)
Income >$75k	0.128***	0.127***	0.093**	0.094***
	(0.033)	(0.033)	(0.036)	(0.035)
Has IRA, Keogh accounts	0.072***	0.072***	0.074***	0.074***
	(0.021)	(0.021)	(0.022)	(0.022)
IRA,Keogh balance >$100k	-0.116***	-0.115***	-0.118***	-0.117***
	(0.033)	(0.032)	(0.033)	(0.032)
Financial literacy questions all correct		-0.017	-0.016	-0.016
		(0.040)	(0.041)	(0.041)
Financial literacy is missing		-0.028	-0.028	-0.028
		(0.030)	(0.030)	(0.030)
Spouse currently employed			0.027	0.026
			(0.030)	(0.030)
Spouse covered by pension plan			0.079***	0.079***
			(0.025)	(0.025)
Spouse started claiming SS benefits			-0.003	-0.005
			(0.030)	(0.030)
Has started claiming SS benefits				0.015
				(0.027)
Control for survey cohorts	Yes	Yes	Yes	Yes
Sample size	3,007	3,007	3,007	3,007
Mean dependent variable	0.248	0.248	0.248	0.248

Note: Average marginal effects from probit models are reported. Results are weighted. This table does not contain those who retired before the 2010 wave, as the credit card debt question is only included in waves in and after 2008.

Appendix

Appendix A: NC sample construction and restrictions

This analysis of worklife transitions of public employees in North Carolina uses administrative records from the North Carolina Retirement Systems Division (RSD) and information from several surveys with responses merged with administrative records. The first and second survey are conducted among two cohorts of older workers who were employed full-time in 2014 and 2016, respectively. They are used to examine the retirement plans of older workers. The third and fourth survey follow these two cohorts into retirement in 2016 and 2018, respectively, and are used to report the employment choices made by these retirees. The two cohorts are combined for our analysis in the paper. This section describes the information from each cohort.

1. Survey of active workers in 2014 (S2014)

The survey population is comprised of workers that were aged 50 to 69, actively employed in March 2014, and have valid 2013 salary information indicating an active membership, according to administrative records as of March 2014. We sent a survey through email to those with an email address and by postal mail to the remaining workers. The final target population of 15,000 (9,012 and 5,988 surveys sent for the email and print sample, respectively). We received 2,622 responses (2,075 and 547 for email and print, respectively) for an overall response rate of about 18 percent.

2. Resurvey of workers (S2016-retiree)

The Retirement System provided us with administrative data on the full sample of 2014 active workers as of April 2016. We observe their benefit claiming status in the administrative records.

The administrative records also include information on job classification, benefit type, benefit amount, and year of service. In May 2016, we sent a survey through email to all 2,622 respondents in S2014. The survey has two versions, actives and benefit claimants, which were sent to individuals with respective working status in the North Carolina Retirement System. Both active workers and benefit claimants are included in this paper.

We received 1,208 responses with a response rate of 46.1%. Among them, 947 were still working as of 2016. Out of 947 workers who were working as of 2016, 76 responded to S2018 and self-identify as benefit claimants. We consider them part of the newly retired sample in this paper. The rest are included in the actives sample. We consider them part of the newly retired sample in this paper. 261 individuals started claiming benefits as of S2016, who belong to the newly retired sample.

3. Survey of active workers and benefit claimants in 2016 (S2016)

The survey population is comprised of workers that were actively employment in March 2014 according to administrative records as of March 2014 and were not deceased or claiming benefits other than TSERS/LGERS as of April 2016. We then exclude individuals who were in the target population of S2014. The final target population of 16,000 (11,170 active workers and 4,830 benefit claimants). We sent two versions of the survey, actives and benefit claimants, to individuals with respective working status in the North Carolina Retirement System according to the retirement system. Both active workers and benefit claimants are included in the paper. We received 4,200 responses for a response rate of about 26 percent. 3,311 were active workers as of April 2016, while 889 had started claiming benefits.

4. Resurvey of workers (S2018)

The Retirement System provided us with administrative data on the population of active workers and benefit claimants as of December 2017. The administrative records include information on job classification, benefit type, benefit amount, but not on benefit claiming date and year of service. We cannot observe the benefit claiming status as of May 2018. In May 2018, we sent a survey through email to all respondents with completed responses in S2016. The survey has two versions, actives and benefit claimants, and we asked respondents to self-identify as active workers or benefit claimants. Among the 5,408 workers in S2016 that we sent a survey to, 2,494 responded with a response rate of 46.1%. 1,445 of them were first surveyed in 2016 as active workers. Among them, 1,192 reported they were still working as of 2018, who belong to the active sample. The 253 individuals who self-classified themselves as benefit claimants are defined as part of the newly retired sample. 430 respondents of S2016 for benefit claimants stated that they had started claiming benefits as of 2018 and constitute the retiree sample. Appendix Table 1 shows how the three samples in our NC dataset are constructed. Check marks in the three columns under sample classification indicate how each subgroup is categorized.

Appendix B. Details of the Health and Retirement Study (HRS) dataset construction

The Health and Retirement Study (HRS) is a longitudinal survey on older individuals that collects detailed individual-level information including demographics, employment, pension, and health of respondents and their spouses, as well as financial characteristics such as income and wealth at the household level. The HRS is intended to provide data for research on the individual choices of people as they age and inform policy makers on the changing needs of the older population. Each HRS household observation must include at least one member satisfying the age eligibility requirements for each cohort.[14] Starting in 1998, all cohorts are interviewed every two years. As of 2016, the initial HRS sample have been subject to 13 waves of surveys. The HRS is nationally representative study and uses a multi-stage national area probability sample of U.S. households with oversampling of Blacks, Hispanics and residents of the state of Florida. In additional to questionnaire sections that are included in each wave such as income and retirement, the HRS also has wave-specific experimental modules with additional questions that are administered to random subsamples.

In this study, we rely on the RAND HRS longitudinal file 2016 to construct our HRS dataset. It provides cleaned and streamlined information that are consistent through most HRS waves. The

[14] The HRS consists of seven cohorts. With the exception of the AHEAD cohort, all other cohorts were tracked and interviewed every two years since the first interview. The initial HRS cohort include those born 1931 to 1941 who were first interviewed in 1992. The AHEAD cohort, born before 1924, was first interviewed in 1993 and subsequently in 1995, 1998, and every two years afterwards. The Children of Depression (CODA) cohort were born between 1924 and 1930 and first interviewed in 1998. The War Baby (WB) cohort, born 1942 to 1947 were first introduced to the HRS in 1998. The Early Baby Boomer (EBB) cohort, born 1948 to 1953, was first interviewed in 2004. The Mid Baby Boomer (MBB) cohort, born 1954 to 1959, was first interviewed in 2010. Finally, the Late Baby Boomer (LBB) cohort include those born 1960 to 1965 who were first interviewed in 2016. Our sample of first-time retirees between 2010 and 2016 include all seven cohorts, with 40% of observations from the original HRS cohort.

RAND file also imputes, when necessary, income, wealth, and medical expenditures variables based on the HRS Core Questionnaires.

Our primary unit of analysis is the household. Following the methodology in the RAND dataset, we create a household-level dataset by selecting all individuals in single-respondent households and just the Financial Respondent in couple households. Each household observation includes only one respondent and her spouse if married. Data construction thereafter focuses on the characteristics of the respondent in each household.

Our goal is to focus on individuals who transitioned into retirement during the years they were interviewed, with valid information pre- and post-retirement for us to analyze. Our definition of retirement is reporting "partly retired" or "retired" to the employment status questions.[15] The dataset with all waves combined has 29,567 household-level observations. About 70% have reported being retired at least once. Among them, around 9% report having returned to full-time/part-time work in waves after first reporting retirement. Another 16% have reported employment status other than full-time/part-time work and retirement in waves after first reporting retirement. Therefore, we focus our analysis on survey results when individuals report being retired for the first time.

To construct our sample, we first determine the year when an individual first reports being retired according to their responses to the question on employment status. Among those who have ever reported being retired, we eliminate from our sample those without valid pre-retirement survey responses, including those who report retiring by the 1992 survey, the very first wave of the HRS. This gives us a sample size of 9,047. We also exclude those with missing

[15] The question reads "Now I'm going to ask you some questions about your current employment situation. Are you working now, temporarily laid off, unemployed and looking for work, disabled and unable to work, retired, a homemaker, or what?"

information on pre- or post-retirement household income, bring the sample size down to 8,844. We also make the restriction that each observation in our sample has valid response in the 2010 wave. The final sample size is 6,518.

Public sector workers are defined as having been employed by the federal government or a unit of a state, county, or local government, or having worked in the public administration industry. The sample contains 2,061 public sector workers, which is around 32% of the sample.

Appendix Table 3 present descriptive statistics for our sample, as well as all retirees in wave 2008, 2010, 2012, 2014, and 2016 respectively. Individuals in our sample are disproportionately younger and have higher post-retirement household income compared retirees in waves between 2008 and 2016. This is due to the fact that retirees in these waves on average retire much earlier than the retirement timing cutoff of our sample, 2008. For example, the average first-time retirement year is 1998 for all retirees in the 2008 wave. Other demographics are similar, although our sample has a slightly higher proportion of non-Hispanic African Americans and Hispanics.

Our key variable, household income, is constructed partly based on imputations in the RAND dataset.[16] set to the sum of respondent and spouse earnings, pensions and annuities, SSI and Social Security Disability, Social Security retirement, unemployment and workers compensation, other government transfers, household capital income, and other income. Around 30% of observations in each wave have at least one income component imputed.[17]

[16] More information on how the income variables are imputed can be found in RAND HRS Detailed Imputations File 2016 Documentation, accessible at https://www.rand.org/content/dam/rand/www/external/labor/aging/dataprod/randhrsimp1992_2016v2.pdf.

[17] We believe that the RAND imputations were conducted with sufficient consideration and complex modeling, including logit regression models predicting wealth ownership and nearest neighbor imputation algorithms on income and wealth amounts. It is worth noting, however, that their cross-sectional models do not take into account the longitudinal dependencies on wealth variables.

The wealth and income variables we analyzed were converted to constant 2016 dollars using the Personal Consumption Expenditures (PCE) price index issued by the Bureau of Economic Analysis (U.S. Department of Commerce), which is now favored by the Federal Reserve over the traditional adjustments based on the Consumer Price Index (CPI) released by the Bureau of Labor Statistics.[18]

Information on the financial literacy of retirees is relatively limited in the HRS. The financial literacy questions are only available in experimental modules of the HRS in a few waves. Each respondent is randomly assigned to one and only one module. For example, the HRS 2010 wave has 10 experimental modules covering a variety of topics ranging from financial literacy to personality. 9.6% out of 22,034 respondents were randomly assigned to the financial literacy module. Apart from the 2010 wave, there are survey questions eliciting financial literacy in the "Retirement Planning" module of the 2004 wave, the "Financial sophistication and investment decision making" module of the 2008 wave, and the "Financial Mismanagement at Older Ages" module of the 2016 wave. The four waves all include the "Big Three" financial literacy questions developed by Lusardi and Mitchell (2011a) or questions with similar phrasing. After supplementing the 2010 wave financial literacy responses with the 2004, 2008, and 2016 wave, 22% of the HRS sample has non-missing information on financial literacy.

Starting from the 2008 wave, the HRS adds questions on credit card debt in the Asset, Debts section of the survey.[19] The outcome variable on financial distress for the HRS sample is whether the respondent's household has carried over credit card balance from last month.

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[18] More information on the difference between PCE and CPI is available at https://www.clevelandfed.org/newsroom-and-events/publications/economic-trends/2014-economic-trends/et-20140417-pce-and-cpi-inflation-whats-the-difference.aspx.

[19] There are three questions on credit card debt. The first question reads "Does any of that debt include credit card debt?", referring to debts that have not been asked about previously, such as credit card debt and medical debts. Responses to the second question are of interest in this study. The second question reads "Last month did you (and your spouse/partner) pay off all your credit card debt or was there an unpaid debt that you carried over to this

Appendix C. Appendix Tables

Appendix Table 1. Sample composition

Survey responses	Total observations	Sample Classification		
		Transitioned to retirement between surveys "newly retired"	Actively working in surveys "working"	Retired in surveys "retiree"
S2014 responses, all working	2,622	-	-	-
Responded to S2016	1,208	-	-	-
Still working by S2016	947		√	
		(except for 76 obs. who retired by S2018)		
Responded to S2018, still working	410		√	
Responded to S2018, retired	76	√		
Started claiming benefits by S2016	261	√		
Responded to S2018, still retired	133	√		
S2016 responses (new to surveys)	4,200	-	-	-
Working by S2016	3,311	-	-	-
Responded to S2018	1,445	-	-	-
Working by S2018	1,192		√	
Started claiming benefits by S2018	253	√		
Claiming benefits by S2016	889	-	-	-
Responded to S2018	430	-	-	-
Working by S2018	9	-	-	-
Started claiming benefits by S2018	421			√
N	3,074	590	2,063	421
Sample size with non-missing income	2,710	473	1,865	370

month?". The third questions elicits the amount of credit card balance carried over, which reads "How much credit card debt did you (and your spouse/partner) carry from last month to this one? We want the total amount owed".

Appendix Table 2. Descriptive statistics of the NC samples and the HRS sample

Pre-retirement wave respondent characteristics	NC newly retired	NC working	NC retiree	HRS public-sector workers	HRS private-sector workers
Men	34.7%	31.3%	35.7%	48.0%	47.1%
Married women	45.7%	45.1%	43.0%	21.7%	22.3%
Non-married women	19.7%	23.6%	21.4%	30.3%	30.5%
Race: Non-Hispanic black	10.1%	13.8%	11.6%	10.7%	10.1%
Race: Hispanic	1.9%	1.9%	0.3%	4.9%	8.1%
Race: White	86.3%	81.0%	85.9%	80.8%	78.6%
Race: Other	1.7%	3.3%	2.2%	3.6%	3.2%
Has bachelor's degree or above	75.3%	67.0%	67.9%	45.0%	19.5%
Age at survey	60.1	57.9	62.0	62.9	63.6
Household income < $25K	0.8%	1.3%	3.2%	25.0%	38.7%
$25K - $50K	12.5%	17.3%	25.9%	20.3%	23.0%
$50K - $75K	22.2%	25.8%	24.6%	16.1%	14.2%
> $75K	64.5%	55.6%	46.2%	38.6%	24.2%
N	473	1,865	370	2,061	4,457

Note: The HRS sample include respondents who reported being retired for the first time in the HRS surveys between 2010 and 2016, responded to the wave of survey prior to first-time retirement, had non-missing household income information for both pre-retirement and post-retirement waves, and was the Financial Respondent of the household if married. The HRS sample results are weighted.

Appendix Table 3. Descriptive statistics of the HRS sample, compared with the 2008-2016 wave retirees

Mean post-retirement characteristics	Our sample	2008 wave retirees	2010 wave retirees	2012 wave retirees	2014 wave retirees	2016 wave retirees
Female	52.6%	52.5%	52.8%	54.3%	54.7%	54.2%
Race: Non-Hispanic black	10.3%	9.8%	8.9%	11.4%	11.4%	11.1%
Race: Hispanic	7.0%	5.3%	5.4%	6.5%	6.9%	7.1%
Race: White	79.3%	82.6%	83.3%	79.5%	78.6%	78.9%
Race: Other	3.3%	2.2%	2.3%	2.7%	3.0%	2.8%
Has Bachelor's degree or above	28.1%	21.5%	23.4%	23.2%	24.4%	26.1%
Married	55.4%	44.6%	44.4%	42.5%	43.3%	44.3%
Public worker	33.6%	32.1%	32.5%	31.5%	31.8%	33.1%
Age at survey	63.4	73.2	74.3	72.8	73.1	73.5
Household income	83,730.3	66,740.5	52,345.7	49,388.1	54,703.2	59,927.7
Household income: <$25k	34.1%	43.3%	41.6%	42.4%	39.5%	37.5%
Household income: $25K - $50K	22.1%	29.2%	30.2%	27.7%	27.1%	28.0%
Household income: $50K - $75K	14.8%	12.4%	12.6%	14.0%	13.9%	13.4%
Household income: > $75K	29.0%	14.7%	15.2%	15.2%	19.0%	20.8%
Household income: Missing	-	0.4%	0.4%	0.7%	0.4%	0.4%
N	6,518	7,835	7,771	8,587	8,661	8,591
Proportion of retirees in survey wave	-	56.7%	42.5%	52.5%	56.0%	47.9%

Note: Our sample include respondents who reported being retired for the first time in the HRS surveys between 2010 and 2016, responded to the wave of survey prior to first-time retirement, had non-missing household income information for both pre-retirement and post-retirement waves, and was the Financial Respondent of the household if married. The 2010-2016 waves sample include all retirees who were the Financial Respondent of the household if married. All sample results are weighted.

Appendix Table 4. Regression of income changes - Income category decreases (all NC samples)

Characteristics in S2014/S2016	Income category decreases			
	Baseline	Baseline	Financial literacy	Spouse
	(1)	(2)	(3)	(4)
Married female	0.076***	0.074***	0.083***	0.077***
	(0.018)	(0.018)	(0.018)	(0.018)
Non-married female	-0.029	-0.029	-0.022	0.009
	(0.021)	(0.021)	(0.021)	(0.026)
African American	0.004	0.004	0.016	0.014
	(0.023)	(0.023)	(0.025)	(0.025)
Hispanic	0.017	0.025	0.023	0.023
	(0.061)	(0.062)	(0.062)	(0.063)
Bachelor's degree or above	-0.025	-0.025	-0.032*	-0.033*
	(0.018)	(0.019)	(0.019)	(0.019)
Age at survey	0.005***	0.006***	0.005***	0.006***
	(0.002)	(0.002)	(0.002)	(0.002)
Has good health	-0.017	-0.016	-0.015	-0.014
	(0.020)	(0.020)	(0.020)	(0.020)
Transitioned to retirement between S2016 and S2018	0.383***	0.379***	0.378***	0.381***
	(0.026)	(0.026)	(0.027)	(0.027)
Retiree in S2016 and S2018	0.139***	0.130***	0.133***	0.140***
	(0.028)	(0.028)	(0.028)	(0.029)
Salary in 2nd quartile	0.006	0.007	0.006	0.003
	(0.023)	(0.023)	(0.023)	(0.023)
Salary in 3rd quartile	0.047*	0.048*	0.047*	0.043*
	(0.026)	(0.026)	(0.026)	(0.026)
Salary in 4th quartile	0.051**	0.057**	0.051**	0.049*
	(0.026)	(0.027)	(0.026)	(0.026)
Financial literacy questions all correct			0.045***	0.044***
			(0.016)	(0.016)
Financial literacy answers missing			0.027	0.028
			(0.055)	(0.055)
Self-rated financial knowledge is high			0.000	0.001
			(0.017)	(0.017)
Has supplemental retirement saving accounts			0.008	0.003
			(0.022)	(0.022)
Spouse currently employed				0.043**
				(0.018)
Spouse covered by pension plan				0.021
				(0.018)
Control for agency type and retirement year	No	Yes	Yes	Yes
Sample size	2,705	2,705	2,705	2,705
Mean dependent variable	0.191	0.191	0.191	0.191

Note: The sample contains both active and retired workers. Average marginal effects from probit models are reported. Salary is the 2013 annual salary based on administrative records. Financial literacy information in S2016 is used in models.

Appendix Table 5a. Regression of financial distress (emergency funds) on income category changes (NC samples)

Respondent / Household characteristics	Cannot come up with $2,000 within the next month			
	(1)	(2)	(3)	(4)
Income category increases	0.040**	0.028	0.025	0.026
	(0.023)	(0.021)	(0.021)	(0.021)
Income category decreases	0.008	0.007	0.005	0.004
	(0.014)	(0.014)	(0.014)	(0.014)
Married female	0.051***	0.054***	0.045**	0.053***
	(0.022)	(0.022)	(0.021)	(0.023)
Non-married female	0.000	-0.003	-0.009	-0.009
	(0.013)	(0.012)	(0.013)	(0.013)
African American	0.126***	0.105***	0.094***	0.092***
	(0.023)	(0.021)	(0.021)	(0.021)
Hispanic	0.020	0.023	0.020	0.017
	(0.048)	(0.048)	(0.047)	(0.046)
Bachelor's degree or above	-0.035***	-0.024**	-0.019*	-0.021*
	(0.013)	(0.012)	(0.012)	(0.012)
Age at survey	-0.006***	-0.005***	-0.005***	-0.004***
	(0.001)	(0.001)	(0.001)	(0.002)
Has good health	-0.013	-0.007	-0.008	-0.007
	(0.015)	(0.014)	(0.014)	(0.014)
Transitioned to retirement between S2016 and S2018	0.032	0.034	0.034	0.040
	(0.028)	(0.028)	(0.028)	(0.032)
Retiree in S2016 and S2018	0.039	0.042	0.035	0.039
	(0.063)	(0.062)	(0.060)	(0.063)
Years since retirement	-0.011	-0.011	-0.009	-0.009
	(0.014)	(0.014)	(0.014)	(0.014)
Household income $50-75k	-0.063***	-0.055***	-0.055***	-0.052***
	(0.010)	(0.010)	(0.010)	(0.010)
Household income >$75k	-0.171***	-0.135***	-0.132***	-0.130***
	(0.017)	(0.017)	(0.017)	(0.018)
Has supplemental retirement saving accounts		-0.069***	-0.064***	-0.065***
		(0.018)	(0.018)	(0.018)
SRP balance >$100k		-0.056***	-0.051***	-0.050***
		(0.012)	(0.012)	(0.012)
Financial literacy questions all correct			-0.030***	-0.031***
			(0.011)	(0.011)
Self-rated financial knowledge is high			-0.007	-0.007
			(0.013)	(0.013)
Spouse currently employed			-0.005	0.000
			(0.012)	(0.016)
Spouse covered by pension plan				-0.001
				(0.013)
Spouse started claiming SS benefits				-0.025*
				(0.013)
Working after retirement				-0.002
				(0.018)
Has started claiming SS benefits				-0.006
				(0.018)
Control for agency type	Yes	Yes	Yes	Yes
Sample size	2,684	2,684	2,684	2,684
Mean dependent variable	0.110	0.110	0.110	0.110

Note: This sample contains both actively working and retired workers in the NC dataset. Average marginal effects from probit models are reported. Financial literacy information in S2016 is used in models.

Appendix Table 5b. Regression of financial distress (emergency funds) on replacement rate (NC samples)

Respondent / household characteristics	Cannot come up with $2,000 within the next month			
	(1)	(2)	(3)	(5)
Pension replacement rate above median	0.017	0.016	0.011	0.013
	(0.023)	(0.022)	(0.022)	(0.021)
Married female	0.065**	0.072**	0.070**	0.089***
	(0.033)	(0.033)	(0.033)	(0.035)
Non-married female	0.007	0.003	-0.008	-0.012
	(0.027)	(0.026)	(0.025)	(0.024)
African American	0.121***	0.103***	0.104***	0.087***
	(0.046)	(0.044)	(0.044)	(0.042)
Hispanic	0.068	0.070	0.068	0.064
	(0.117)	(0.119)	(0.117)	(0.115)
Bachelor's degree or above	-0.042*	-0.029	-0.022	-0.021
	(0.027)	(0.026)	(0.025)	(0.024)
Age at survey	-0.005**	-0.005*	-0.005**	-0.007*
	(0.003)	(0.003)	(0.003)	(0.003)
Has good health	-0.025	-0.010	-0.024	-0.020
	(0.030)	(0.028)	(0.030)	(0.029)
Transitioned to retirement between S2016 and S2018	-0.008	0.003	0.024	0.029
	(0.041)	(0.039)	(0.040)	(0.038)
Years since retirement	-0.009	-0.005	-0.003	-0.004
	(0.018)	(0.017)	(0.017)	(0.016)
Household income $50-75k	-0.053**	-0.047**	-0.044**	-0.030
	(0.020)	(0.020)	(0.019)	(0.020)
Household income >$75k	-0.139***	-0.113***	-0.108***	-0.094***
	(0.025)	(0.025)	(0.025)	(0.027)
Has supplemental retirement saving accounts		-0.130***	-0.119***	-0.116***
		(0.042)	(0.041)	(0.040)
SRP balance >$100k		-0.039*	-0.037*	-0.031
		(0.022)	(0.022)	(0.022)
Financial literacy questions all correct			-0.017	-0.019
			(0.021)	(0.020)
Financial literacy answers missing			-0.046**	-0.049**
			(0.022)	(0.022)
Self-rated financial knowledge is high			-0.012	-0.008
			(0.027)	(0.023)
Spouse currently employed				-0.008
				(0.023)
Spouse covered by pension plan				-0.057**
				(0.020)
Spouse started claiming SS benefits				-0.004
				(0.020)
Working after retirement				0.040
				(0.028)
Has started claiming SS benefits				
				(0.026)
Control for agency type and retirement year	Yes	Yes	Yes	Yes
Sample size	769	769	769	769
Mean dependent variable	0.120	0.120	0.120	0.120

Note: The sample contains retired workers with non-missing records for net benefit paid out per month. Average marginal effects from probit models are reported. Financial literacy information in S2016 is used in models.

Appendix D. Key survey variables of the NC dataset

1. Household income question

What is your household's total combined income for the past 12 months, approximately? Please include all wages, salary, commissions, bonuses, or tips from all jobs; net self-employment income from all businesses, proprietorships, and partnerships; interest, dividends, or net rental income; income from pension benefits or Social Security benefits; income from any court-ordered alimony payments; and any other monetary income received by you and all members of your family who are 15 years of age or older. Include the annual benefit amount you received from either/both TSERS/LGERS pension retirement systems.

a. Less than $25,000

b. $25,000 to $49,999

c. $50,000 to $74,999

d. $75,000 to $99,999

e. $100,000 to $149,999

f. $150,000 to $249,999

g. $250,000 or more

h. Don't know

2. SRP balance question

Which category best represents the total amount of all account balances of any retirement savings plans (e.g., 401(k), 457, 403(b), or IRA) that you currently hold? Do not include your TSERS/LGERS pension benefit here.

a. Less than $25,000

b. $25,000 to $99,999

c. $100,000 to $249,999

d. $250,000 to $499,999

e. $500,000 to $999,999

f. $1 million or more

g. No retirement savings plan

h. Don’t know

3. Financial distress questions

Financial distress (credit card debt) (S2018 only)

Over the past year, did you do any of the following when your spending exceeded your income? (Check all that apply.)

a. Spent out of savings/investments

b. Borrowed money from friends or family

c. Kept an account balance on a credit card

d. Got behind on payments or did not pay bills

e. Other (please specify)

f. My spending never exceeded my income

We define financial distress (credit card debt) as having chosen option d in S2018.

Financial distress (emergency funds)

How confident are you that you could come up with $2,000 if an unexpected need arose within the next month?

a. I am certain I could come up with $2,000.

b. I could probably come up with $2,000.

c. I probably could not come up with $2,000.

d. I am certain I could not come up with $2,000.

We define financial distress (emergency funds) as having chosen option c or d in each survey.

4. Financial literacy questions, "Big Three" questions developed by Lusardi and Mitchell (2011a)

Financial Knowledge: Compounding

If you have $100 in your savings account, and the annual interest rate is 2%, how much money will you have in your account after five years?

a. *More than $110* *(Correct answer)*
b. Exactly $110
c. More than $102, but less than $110
d. Exactly $102
e. Less than $102
f. Don't know

Financial Knowledge: Inflation

Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After 1 year, how much would you be able to buy with the money in this account?

a. More than today
b. Exactly the same

c. Less than today *(Correct answer)*

d. Do not know

Financial Knowledge: Stock returns

Is this statement True or False? Buying a single company's stock usually provides a safer return than a stock mutual fund.

a. True

b. False *(Correct answer)*

Don't know