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ARTICLE

The potential impact of policies to reduce Social Security funding shortfalls on consumers' expected benefits and behavior

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Abstract

To ensure the long-term sustainability of the US Social Security System, several policy alternatives can theoretically be implemented. However, in practice, consumer responses can be challenging for policy-makers to anticipate. We conducted a randomized survey on the nationally-representative Understanding America Study (UAS) panel where respondents were presented with a series of 'policy scenarios' in which the government enacts alternative reforms aimed to reduce the expected shortfall in the trust fund that pays Social Security retirement benefits. These scenarios included an increase in the Social Security payroll tax, an increase in the wage ceiling, and a reduction of benefits. We find that changes in respondents' subjective expectations about their benefits and how this will affect their behaviors are directionally consistent with what would be expected when individuals are attentive to the available information and form rational expectations (e.g., monthly benefit expectations increase upon the announcement of an increase in the Social Security tax rate or in the wage ceiling, and they decrease less-than-proportionally with hypothetical benefit cuts). However, surprisingly, these changes are not sensitive to the magnitudes of policy change (e.g., the increase in expected benefits is about the same regardless of the size of Social Security payroll tax increases). Individuals with higher levels of education, cognitive ability, and financial literacy are more likely to adjust their expectations as predicted by theory.

Keywords: Internet panel; policy uncertainty; shortfalls; Social Security; subjective expectations
JEL Codes: H55; D90; C93

Since the signing of the Social Security Act in 1935, Americans have come to expect the Social Security system to provide them with financial security in old age. However, barring significant intervention, the Old Age and Survivors Insurance (OASI) trust fund that pays out Social Security retirement benefits will almost certainly experience a major shortfall in the foreseeable future (SSA, 2017). To ensure long-term sustainability, a number of policy options can in principle be undertaken, either alone or in combination, such as a reduction in retirement benefits, an increase in the Social Security payroll tax rate, or an increase in the 'wage ceiling' (the upper limit on Social Security taxable income).

However, changes in expected benefits and, consequently, changes in behavior related to savings, investments, and labor force participation in response to any given package of options may be complex and contingent on unobserved subjective factors, including respondent understanding of the system and their prior expectations. To the extent that people already anticipate reduced future retirement benefits, a substantial increase in Social Security payroll taxes may imply that such reductions may not be needed after all or that they may be smaller, which may then increase their average expected retirement benefit. However, those who do not form forward-looking rational expectations or who

are inattentive may respond differently. For instance, individuals who were not initially aware that benefits could be reduced at all may find that a raise in Social Security payroll taxes makes the possibility of further changes more salient, and lower their expectations of future benefits.

In this study, we estimate the impact of different hypothetical interventions on individuals' expectations of future benefits, using a new survey in the Understanding America Study (UAS), a nationally-representative online panel described in more detail in the introduction of this Special Issue. We present respondents with a series of 'policy scenarios' in which the government enacts alternative policy changes. The three scenarios are: a reduction of Social Security retirement benefits, an increase in the Social Security payroll tax rate, and an increase in the wage ceiling. We also present an additional scenario where the government raises the income tax rate, which is not connected to the OASI fund which pays retirement benefits, and hence should not have the same effects (we use it as a sort of falsification test). Under each of these scenarios, we measure respondents' expectations of their retirement benefits. Using the UAS, we are able to elicit these expectations more effectively and efficiently using interactive graphics that allow us to capture the distribution of expectations.

The main empirical exercise consists of comparing individual responses across the scenarios to derive an estimate of how alternative policies affect benefit expectations. If respondents understand the tradeoffs between the alternative policy options, and they form rational expectations:

- A benefit cut would reduce expected benefits less than proportionally, or may not reduce them at all, because a forward-looking and attentive decision-maker would have already assigned a positive probability to the benefit cut. On the other hand, an inattentive or naïve decision-maker who had not already accounted for the possibility of the cut could experience the benefit cut as a surprise and hence slash their expectations more strongly.
- A Social Security payroll tax increase would increase the revenue into the OASI trust fund, and hence lessen its shortfall. Thus, a decision-maker with rational expectations would understand this increase reduces the probability of steep benefit cuts. The individual's expected retirement benefits should therefore raise. On the other hand, for respondents who are unaware of this trade-off, a payroll tax increase could have no effect, or it may even work in the reverse direction by making the shortfall salient and making people aware of the shortfall.
- An increase in the wage ceiling would work in the same way as in the payroll tax (raising revenue and hence lessening the likelihood of severe benefit cuts). Hence, it should likewise raise the benefit expectation of an attentive and rational decision-maker.
- A raise in the income tax does not directly affect the trust fund, and hence should not largely affect retirement benefit expectations.

Overall, our results present mixed evidence about whether people may behave like predictable rational decision-makers when presented with policy changes. On one hand, on average, responses are directionally consistent with rational expectations. For instance, monthly benefit expectations increase upon the announcement of an increase in the Social Security tax rate or an increase in the wage ceiling, and decrease after an announcement that the monthly benefits will be cut. This suggests that people do broadly understand the contribution of these policies to addressing the shortfall and that existing policy uncertainty does affect the formation of their expectations. On the other hand, however, such expectations are not sensitive to the severity of the policy changes. Participants who are exposed to scenarios with a higher tax or wage ceiling increases do not expect higher benefits than those exposed to lower tax and wage ceiling increases.

Using the UAS allows us to link our data to past surveys, including previous measures of household income and wealth levels, educational attainment, cognitive ability, and financial literacy. We use this linked data to test how the results differ for respondents with different characteristics. We find that individuals with higher levels of education, financial literacy, and cognitive ability form expectations in a way that is more closely aligned to the 'rational expectations' hypothesis.

1. The survey

Between September of 2017 and March of 2018, we conducted an online survey in the UAS of about 3,000 respondents under 65 who had not previously claimed Social Security benefits and had also participated in an earlier survey (Kapteyn and Prados 2018, henceforth KPY) that measured retirement benefit expectations.

The survey is structured as follows (a complete version is available online on uasdata.usc.edu/uas101). Section A gives a brief introduction to the survey. In Section B, respondents are provided with information about the expected shortfalls in the OASI trust fund. The information presented to respondents comes in one of three ways. The first one only describes the likely future shortfalls in the fund. The second adds information explaining the types of policy levers that can be deployed (increasing the Social Security payroll tax rate, the wage ceiling, or the benefit reductions), while the final version provides an interactive tool that illustrates the extent to which alternative policy levers can address shortfalls of the system. The type of information provided was randomized. While this is not the main focus of this paper, we also examine the impact of this randomization in secondary analyses.

Finally, Section C elicits expectations of subjective benefits as in KPY, who adapt the visual 'balls and bins' elicitation tool developed by Delavande and Rohwedder (2008) to the setting of Social Security retirement benefits.[1] First, respondents are asked to give the minimum and the maximum value of the monthly benefit that they are likely to receive from Social Security (in current dollars). The survey software then divides this range into five equal-sized bins. They are then asked to distribute 20 balls across these bins such that the number of balls in each bin is proportional to the likelihood of receiving that amount, effectively creating a visual representation of their subjective probability distribution as shown in panel A in Figure 1. Respondents are also asked to estimate the probability that they would receive exactly zero benefits, using a scale as shown in Panel B.

Respondents are first asked to complete this exercise after being provided with information about the likely shortfalls, but with no explicit policy in place. After that, respondents are presented with various policy scenarios and asked to repeat the exercise each time, reflecting their updated beliefs about their benefits under each scenario.

The following scenarios are shown (in randomized order) to the respondents:

(a) *A benefit reduction*. Half the sample is told that the benefits decrease by 10% and the remaining half that it does so by 25%.
(b) *A Social Security payroll tax increase*. Half of the sample are told that the Social Security payroll tax rate (the tax rate paid by employees) would increase by one percentage point (from 6.2% to 7.2%), and the remaining half that it would increase by two percentage points (from 6.2% to 8.2%).
(c) *An increase in the wage ceiling*. Half of the respondents are presented with a case in which the wage ceiling for Social Security taxes is raised from $118,000 to $250,000 and the other half to $500,000.
(d) *An income tax increase ('placebo')*. Respondents are presented with a case where income taxes (not Social Security taxes) are increased by one or two percentage points. This scenario serves as a sort of falsification test, as it allows us to understand whether respondents can distinguish between increases in revenue earmarked for managing Social Security shortfalls (Social Security payroll taxes), and revenue that is not (income taxes).

The survey then goes on to elicit self-reported behavioral responses to each of the policy scenarios. People are asked whether their savings, labor force participation, and retirement age would decrease, remain unchanged, or increase under each of the policy scenarios above.

[1]Luttmer and Samwick (2018) also used a similar tool to estimate the welfare impact of policy uncertainty Luttmer and Samwick do not ask for expected absolute benefit amounts, but rather ask about expectations of benefits relative to 'the benefits they are supposed to get under current law'.

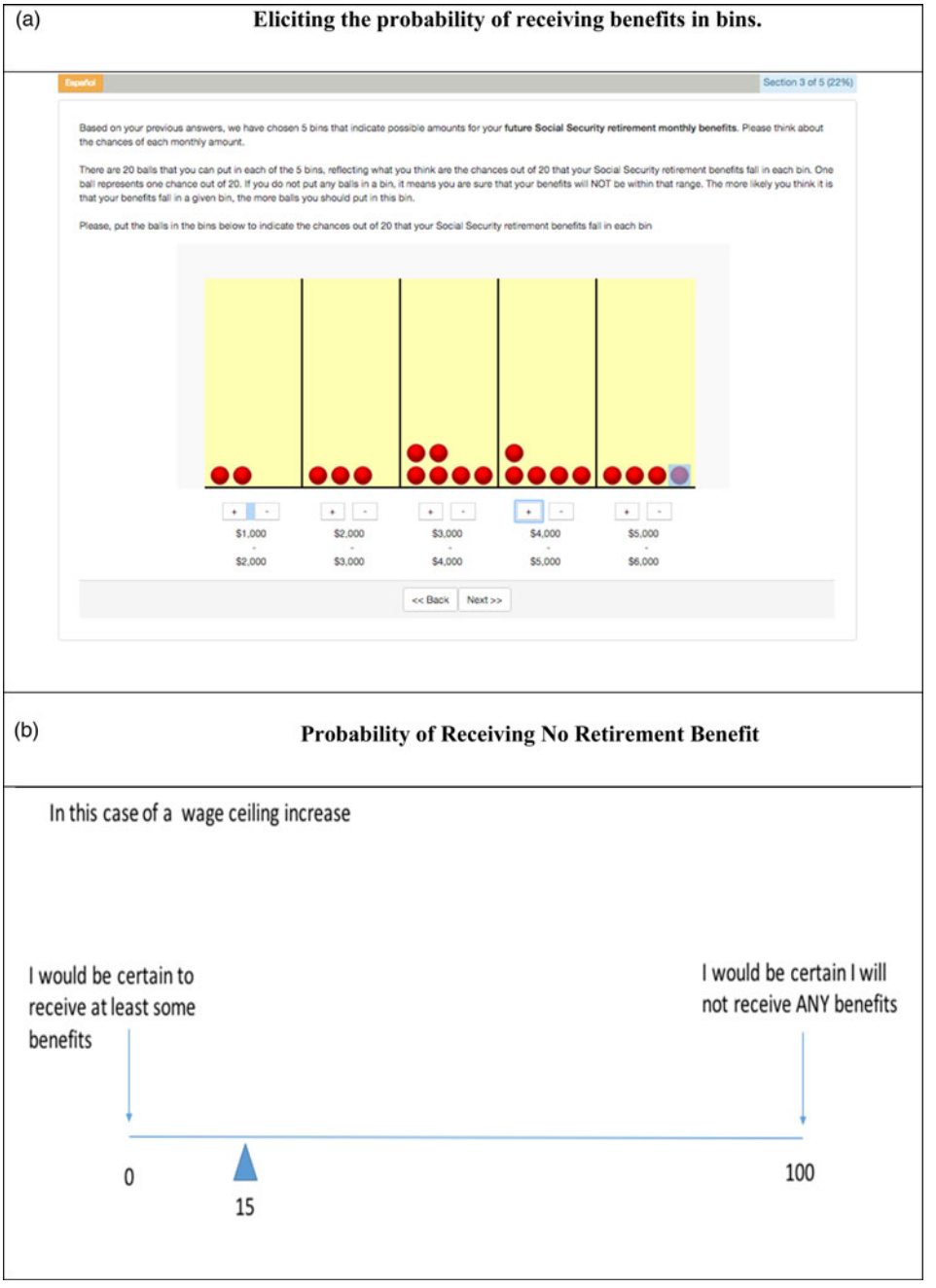

Figure 1. Eliciting expected benefit distribution at baseline and for each of the policy scenario.

2. Results

For each individual, expected Social Security Retirement benefits E(SSB) can be measured in three ways. The first way is by taking a simple weighted average. For each of the five intervals, we multiply the mid-point of the interval times the percentage of the 20 balls in that bin. The second way is to multiply the first measure times one minus the self-reported probability of getting exactly zero benefits. The third way is to fit a log-normal distribution to the data. The results we report throughout this

Table 1. Summary characteristics of the expected Social Security benefits

Subpopulation	Expected Social Security benefits	Average probability of zero benefits
All $N = 2,943$	$1,361	0.27
T0: No information on policy levers. $N = 1,011$	$1,249	0.26
T1: Descriptive information on policy levers. $N = 988$	$1,547	0.27
T2: Interactive information on policy levers. $N = 944$	$1,289	0.29
Female. $N = 1,739$	$1,318	0.29
Male. $N = 1,203$	$1,424	0.23
Family income below median	$1,167	0.31
Family income above median	$1,498	0.24

paper use the second method. We prefer this method for its simplicity and completeness. However, we have conducted the analysis using the other two methods, and the main results do not differ in any qualitative or quantitative meaningful way (results are available upon request).

On average, in the absence of any policy intervention, respondents expect to receive $1,361 per month (see Table 1). However, there is substantial variation, with a standard deviation of about twice that amount. Interestingly, many expect to receive no retirement benefits at all. The average probability of receiving zero benefits equaled 0.27.

Table 1 shows the descriptive statistics of the expectations for some subgroups. We note that the distribution of benefits also somewhat differs across demographic groups. For instance, the average E(SSB) is higher for men ($1,424 per month) than for women ($1,318), and is also higher for those living in families with income above and below the median ($1,498 versus $1,167). These results give some reassurance that the subjective expected benefits co-vary with what one would objectively expect (since we know that men and individuals from families with higher income will accrue higher benefits).

3. The impact of information about policy on expected Social Security retirement benefits

Before getting to the effect of the policy scenarios themselves, we test whether providing information changes the subjective expected distribution of Social Security Retirement benefits E(SSB). Notably, providing more information explaining the various potential policy levers did not change average expectations by much. Among respondents who received only information about shortfalls but no explanation about the policies themselves (NO INFO), Expected Social Security Benefits, E(SSB) equaled $1,249, not materially or statistically different from respondents who received a simple descriptive explanation (DESCRIPTIVE INFO, $1,547) or those who received the more interactive tool (INTERACTIVE INFO, $1,318). One could also hypothesize that more information to respondents might make them less likely to believe that predicted shortfalls imply a complete elimination of benefits (since, in reality, the trust fund is still predicted to be able to pay around two-thirds of the benefits for the long term). However, there is also little evidence of this, as seen in the last two columns of rows 2 and 3 in Table 1. The probability of receiving zero benefits under the NO INFO group equaled 0.26, while it equaled 0.27 in the DESCRIPTVE INFO group and 0.29 in the INTERACTIVE INFO group.

4. The impacts of policy changes on expected Social Security retirement benefits

We investigate how the expected benefits change in response to policy changes. The empirical test for these hypotheses is simple: we estimate the mean expected retirement benefits under the policy change of interest, E(SSB|ΔPol), and test for statistically significant differences from the baseline level, E(SSB)

4.1 Reduction in benefits

We test whether respondents lower their benefit expectations after a reduction in benefits (E(SSB|B)). While it may seem intuitive to think people will state a lower level of E(SSB) when they are told to

assume that benefits are cut, it is not necessarily the case if people are forward-looking, form expectations rationally, and have already internalized potential benefit cuts. In this case, the announcement may not have as strong an impact, or may have no impact at all.

Table 2 shows these results. The second row of Panel A shows that a cut in benefits of 10% results in an average reduction of $126 per month in expected benefits, consistent with the direction of the policy change, and this difference is significant at the 1% level. It is useful to compare the average percentage reduction in expected benefits (E(SSB|B) –E(SSB) /E(SSB)) with the nominal reduction in benefits (−10% or −20%, respectively). As shown in row (3), the reduction among those randomized to a 25% cut was $165, substantially under 25% of the mean benefits of about $1,361 in the baseline. This is consistent with the idea that people had already accounted for some form of cut. The reduction among those randomized to a 10% cut was $126, which is just under 10% of the baseline level.

The last row of the panel shows the differences in the changes in E(SSB) across the two levels of the benefit reduction. The changes upon a 10pp reduction and a 25pp reduction were of similar magnitudes and the difference is statistically insignificant (p-value = 0.35).

The third and fourth columns of Table 2 show the change in the probability of receiving exactly zero benefits upon the reduction in benefits. On average, the probability of receiving exactly zero benefits was 0.01 greater than at baseline (p-value = 0.01). The second and third rows show the increases in probability upon the less and more severe benefit cuts (0.13 and 0.07, respectively).

4.2 Increase in Social Security payroll tax rates

Given the tradeoff between cutting expenses and reducing benefits, it should be expected that increases in payroll tax rates should lower the extent to which benefits need to be cut. Hence, we should rationally expect that E(SSB) increases after tax rate hikes.

Table 2. Expected Social Security benefits under the policy change scenarios

	E(SSB)		Prob of 0-benefit	
Policy scenario	Change from baseline*	p-value of difference	Change from baseline*	p-value of difference
Panel A. Reduction in benefits				
(1) (all)	−$146	0	0.010	0.01
(2) 10pp reduction	−$126	0.01	0.013	0.01
(3) 25 pp reduction	−$165	0.01	0.007	0.24
(3)–(2)**	p-value = 0.35			
Panel B. Increase in payroll tax rate				
(1) All	$34	0.04	−0.016	0.00
(2) 1pp increase	$36	0.00	−0.009	0.07
(3) 2 pp increase	$32	0.18	−0.023	0.00
(3)–(2)**	p-value = 0.6			
Panel C. Increase the wage ceiling				
(1) (all)	$24	0.10	−0.015	0.00
(2) To $250.000	$41	0.00	−0.013	0.02
(3) To $500,000	$7	0.41	−0.016	0.00
(3)–(2)**	p-value = 0.6			
Panel D. Increase the income tax rate (placebo)				
(1) (all)	−$62	0.06	0.013	0.00
(2) 1 pp	−$80	0.21	0.020	0.00
(3) 2 pp	−$45	0.00	0.005	0.36
(3)–(2)**	p-value = 0.45			

Notes: Column 1 shows the differences of the values of E(SSB) under the policy change minus its value at baseline and before *t* and probability of zero benefits, as well as differences from their values at baseline. Column 2 shows the p-values of the test that the difference equals zero. Columns 3 and 4 show the corresponding values for the probability of zero benefits. *The value at baseline of E(SSB) and the probability of zero benefits is estimated separately for each of the groups. **Shows the p-value of a test of equality between the changes in E (SSB) between those randomized to the higher and lower policy changes.

Our results reflect this to some extent. E(SSB||T) were on average $34, or about 3%, higher than the baseline level (p-value = 0.04). The change in the probability that a person would receive zero benefits was negative as expected. The subjective probability of receiving zero benefits was 0.016 points lower than at baseline (p-value <0.01). This again suggests that (at least some) respondents understood that more income into the trust fund would result in a lower likelihood that it would go broke and become unable to pay any benefits at all.

However, the responses were not sensitive to the magnitude of the increase in the tax rate. The increase in E(SSB) among those who were asked about a 2pp increase was of $32, almost identical to the $36 increase among those who were asked about a 1pp hike, and the difference was statistically insignificant (p-value = 0.6).

4.3 Increase in the wage ceiling

A priori, we expect E(SSB) to react to an increase in the wage ceiling in much the same way as it would to an increase in Social Security payroll tax rates. The added income flows should allow for smaller reductions in benefits, and make such reductions less likely. Panel D shows that respondents do to some extent respond in this way, with the average benefit increasing by $24 per month (p-value = 0.10). Likewise, the average probability of receiving zero benefits goes down by 1.5 percentage points (p-value <0.01).

As in the previous cases, the reaction to the raise in the wage ceiling is not sensitive to the magnitude of the increase. The average E(SSB) after a ceiling increase to $500,000 is not statistically different from when the wage ceiling is raised to $250,000 (p-value = 0.6).

4.4 Increase in income (non-Ss) tax rates

As a falsification test, we asked respondents to estimate benefits under a scenario where income tax rates increase. Since income taxes are not earmarked for the OASI trust fund, the effect on benefit expectations should be null or at least smaller than that of Social Security payroll tax rates. In Panel D, we see that this is indeed the case. The change in average benefits is less statistically precise (significant at the 10% level only) than in the case of the increase in Social Security payroll taxes, and, furthermore, the change is in the different direction (i.e., benefits decrease rather than increase). The changes in the probability of zero benefit also go in the opposite direction than with the Social Security payroll taxes.

5. Heterogeneity

To understand whether policy impacts depend on the extent to which people have been exposed to information about the policy trade-offs, we examine the effects of the policy separately for each of the three information randomization groups. This analysis may also serve to predict whether the impacts of the policies would change after people are exposed to more information, and hence the value of additional education or awareness campaigns.

As a randomization check, Table A.1. in the online Appendix shows the three randomization groups have largely similar characteristics, with the exception of three statistically significant differences out of 45 pairwise comparisons. Fifty percent of respondents in the T2-Interactive Information group had a college education compared to 54 in the DESCRIPTIVE INFO group (p-value 0.05), and household income was higher in the NO INFO group than in either of the other two groups.

Table 3 shows the average change in E(SSB) for each of the policies by randomization group. The first column shows the average difference in E(SSB) after the benefit reduction is announced (compared to the baseline level). Among those assigned to the NO INFO group, the average E(SSB) was $99 lower than at baseline. The corresponding difference among those assigned to DESCRIPTIVE INFO was −$206 and −$133 for the INTERACTIVE INFO group, but these differences were not

Table 3. Heterogeneous effects of the policy change scenarios by treatment status

	Retirement benefit cut		Increase in payroll tax)		Increase in income tax (not SS)		Increase in wage ceiling	
	E(SSB)	Prob of 0-benefit	E(SSB)	Prob of 0-benefit	E(SSB)	Prob of 0-benefit	E(SSB)	Prob of 0-benefit
T0: No Info on policy levers	−98.6	1.25	38.64	−1.23	−57.6	1.16	26.9	−0.96
T1: Descriptive Info on policy levers	−205.8	1.20	57.17	−1.39	−80.55	1.29	25.99	−1.32
t-test (T1–T0)	0.23	0.96	0.41	0.88	0.8	0.9	0.98	0.7
T2: Interactive Info on policy levers	−132.6	0.54	3.63	−2.19	−48	1.33	17.4	−2.23
t-test (T2–T0)	0.65	0.46	0.51	0.34	0.7	0.87	0.83	0.19

Note: Table shows the differences between E(SSB) under the policy scenario and at baseline, averaged for respondents on the given randomization group. Rows labeled '*t*-test' show the p-value of a test of equality between the corresponding value for the corresponding treatment arm and the control group.

statistically significantly different from those in the NO INFO group. The same is true for the differences in terms of the probability of no benefit after the policy change: they increase by similar amounts: 1.25, 1.20, and 0.54 for each of the randomization groups. The remaining columns of Table 3 show that there are no significant impacts on either E(SSB) or the probability of receiving no benefits in any other policy scenarios.

6. Impacts by individual characteristics

In Table 4, instead of comparing effects across randomization groups, we compare the effects across groups defined by respondent characteristics. In the first panel, we divide the sample according to the baseline level of expected benefits. We find that individuals with higher baseline levels of benefits have an average greater reduction upon cuts in retirement benefits ($249 versus $43, p-value = 0.01). This is perhaps not surprising given that this group has more 'room to cut'. Interestingly, however, there was no difference across the two groups in terms of the change in benefits upon Social Security payroll tax and wage ceiling increases (p-value 0.95 and 0.93, respectively – shown in the third and seventh columns).

In the second panel, we divide the sample among those scoring below and above the median on a cognitive ability test at baseline.[2] We find that those with lower levels of cognitive ability have a stronger reaction to a reduction in benefits ($181 versus $91, p-value = 0.26) and a smaller reaction to increases in the payroll tax rate ($4.6 versus $80, p-value = 0.05) and to increases to the wage ceiling (−$20 versus $92, p-value<0.01). Similarly, the probability of receiving no retirement benefits at all increases more among the low cognitive ability group under a benefit cut (1.43 versus 0.34, p-value = 0.19) and decreases less under payroll tax and wage ceiling increases (−0.85 versus −2.77, p-value = 0.02; and −0.51 versus −3, p-value<0.01, respectively).

Similar patterns emerge when comparing groups defined by financial literacy scores or levels of education, as shown in the third and fourth panels of the table. Among those with low levels of financial literacy, the decrease in expected benefits upon a benefit cut is almost double the decrease among those with high levels ($191 versus $83, p-value = 0.18); but their increase in expected benefits upon a raise in payroll taxes and in the wage ceiling are almost null ($7 and negative $20). The increases are more substantial for those with high levels of financial literacy ($72 and $87) respectively (p-value of difference for an increase in payroll tax = 0.09 and for an increase in wage ceiling = 0.00). Likewise, among respondents with no college education, expected benefits were reduced by $223 when benefits are cut, whereas they were reduced by only $80 among those with a college education (p-value = 0.07). Benefit expectations increase by $77 and $75 upon payroll tax and wage ceiling increase, respectively,

[2]All UAS respondents are invited to respond to surveys, one of which is an IRT-based cognitive ability test which is provided under the Comprehensive File (www.uasdatata.usc.edu). The financial literacy score is obtained from a 14-question test that was fielded to all UAS panelists, and is also included in the UAS-Comprehensive File.

Table 4. Heterogeneous effects of the policy change scenarios by treatment status

	Retirement benefit cut		Increase in payroll tax)		Increase in income tax (not SS)		Increase in wage ceiling	
	E(SSB)	Prob of 0-benefit	E(SSB)	Prob of 0-benefit	E(SSB)	Prob of 0-benefit	E(SSB)	Prob of 0-benefit
G0: Low baseline level of benefits	−43.36	1.28	34.76	−1.83	0.25	0.61	21.97	−1.25
G1: High baseline level of benefits	−248.73	0.73	32.58	−1.35	0.06	1.91	25.17	−1.73
t-test (G1–G0)	0.01	0.49	0.95	0.56	0.06	0.12	0.93	0.55
G0: Below median in cognitive ability test	−181.08	1.43	4.58	−0.85	0.15	1.23	−20.18	−0.51
G1: Above median in cognitive ability test	−90.7	0.34	78.98	−2.77	0.16	1.36	91.54	−3
t-test (G1–G0)	0.26	0.19	0.05	0.02	0.97	0.88	0	0
G0: Low levels of financial literacy (bottom half)	−190.58	1.88	7.01	−0.99	0.15	1.73	−20.67	−0.52
G1: High levels of financial literacy (top half)	−83.47	−0.22	72.38	−2.51	0.17	0.59	86.92	−2.85
t-test (G1–G0)	0.18	0.01	0.09	0.07	0.84	0.18	0	0
G0: No college education	−222.6	1.71	−17.02	−0.25	0.2	1.82	−35.94	−0.45
G1: College graduate or more	−79.55	0.41	76.98	−2.74	0.12	0.77	74.71	−2.38
t-test (G1–G0)	0.07	0.1	0.01	0	0.4	0.21	0	0.02

Note: Table shows the differences between E(SSB) under the policy scenario and at baseline, averaged for respondents on the given randomization group. Rows labeled '*t*-test' show the p-value of a test of equality between the corresponding value for the corresponding treatment arm and the control group.

for those with a college education, whereas those without actually decrease their expectations of benefits (−$17 and −$36). None of the subgroups defined by cognitive ability tests, financial literacy, or education reacted significantly to the increase in the income tax (the 'placebo').

Overall, these results suggest that the beliefs of the population with high levels of education, cognitive ability, and financial literacy are more consistent with rational expectations and an understanding of the policy trade-offs. These individuals are likely to have already discounted the benefits they expect to receive at baseline and hence their response to expected benefits when a cut is announced is likely to be moderated. Likewise, since they understand the policy trade-offs, they understand that a benefit cut is less likely if the payroll tax or wage ceiling is increased, and hence they raise their benefit expectations under these scenarios. On the other hand, those with low levels of education, cognitive ability, and financial literacy form different beliefs. Perhaps not having already discounted the possible benefit cuts at baseline, they reduce their benefit expectations more strongly under the benefit reduction scenario. Likewise, a poorer understanding of the policy-tradeoffs means that their expected benefits are insensitive to raising the payroll tax and wage ceiling.

Of course, this interpretation is complicated by the fact that these groups have different expected income streams and hence different levels of expected benefits at baseline. In order to address this issue, we revisited the above analysis in a multivariate regression framework where we can assess the sensitivity of these results to the addition of relevant control variables.

This analysis is presented in Panel A of Table 5. Column 1 shows the results of three separate regressions of the change expected after the benefit cut (E(SSB|B–E(SSB)) against one of the three individual variables of interest (cognitive score, financial literacy score, and years of education). Consistent with the prior findings, the coefficients for each of these is positive showing that the more cognitively able, financially literate, and educated express a lower reduction in benefit expectation after a benefit cut. The coefficients are 5.2, 21.1, and 36.1, respectively, with the coefficient for financial literacy being significant at the 10% level and the one for years of education at the 5% level. The second column shows the result of the same regression but adding the three variables

Table 5. Heterogeneous effects of the qualitative and quantitative policy change scenarios. Regression models

(A) Effect of individual characteristics on the impact of qualitative policy change scenarios

Variables	Benefit cut			Social Security payroll tax raise			Income tax raise (placebo)			Wage ceiling increase		
IRT-based cognitive score	5.234	−1.793	−2.002	5.641	4.143	4.142	2.094	−2.662	−2.556	7.485	3.043	2.913
	(4.527)	(2.565)	(2.571)	(2.184)***	(2.487)*	(2.494)*	(3.736)	(4.621)	(4.635)	(2.164)***	(1.689)*	(1.692)*
Financial literacy score	21.117	18.442	15.841	8.992	−2.614	−2.853	16.777	18.500	19.053	20.217	10.950	9.367
	(12.618)*	(7.282)**	(7.396)**	(6.087)	(7.070)	(7.186)	(10.416)	(13.108)	(13.324)	(6.005)***	(4.770)**	(4.848)*
Years of education	36.186	41.984	38.970	24.310	26.609	26.257	15.788	10.497	11.336	32.801	35.070	33.229
										(8.067)***		
	(16.886)**	(8.860)***	(8.982)***	(8.155)***	(8.611)***	(8.737)***	(13.982)	(15.960)	(16.197)		(5.827)***	(5.907)***
Baseline level of E(SSB)		−0.338	−0.338		−0.094	−0.094		−0.039	−0.039		−0.182	−0.182
		(0.003)***	(0.003)***		(0.004)***	(0.004)***		(0.006)***	(0.006)***		(0.003)***	(0.003)***
Total household income			0.000			0.000			−0.000			0.000
			(0.000)*			(0.000)			(0.000)			(0.000)*
Total household wealth			0.000			0.000			0.000			0.000
			(0.000)			(0.000)			(0.000)			(0.000)
Constant		−235.776	−188.208		−378.179	−374.187		−182.914	−196.597		−432.191	−403.616
		(135.299)*	(137.343)		(131.473)***	(133.541)***		(243.590)	(247.486)		(88.929)***	(90.264)***
Separate regressions	YES	NO	NO	YES	NO	NO	YES	NO	NO	YES	NO	NO
Observations		2,834	2,829		2,807	2,802		2,837	2,832		2,812	2,807
R-squared		0.793	0.793		0.164	0.164		0.017	0.017		0.610	0.610

(B) Effect of individual characteristics on the impact of the magnitude of policy changes

	Benefit cut	Social Security tax raise	Wage ceiling increase
Cognitive score			
Large policy change	−116.480	−146.323	43.776
	(469.276)	(226.127)	(232.092)
IRT-based cognitive score	4.608	4.313	1.662
	(6.351)	(3.088)	(2.958)
Cognitive score × large policy change	1.387	2.509	−0.218
	(9.070)	(4.373)	(4.145)
Constant	−358.839	−176.864	−8.603
Observations	2,839	2,812	677
R^2	0.001	0.002	0.002
Financial literacy score			
Large policy change	−297.109	−76.219	20.743
	(249.752)	(120.417)	(153.196)
Financial literacy score	8.384	5.413	4.206
	(17.711)	(8.645)	(8.997)
Financial literacy score × large policy change	26.417	6.200	1.330
	(25.280)	(12.190)	(13.277)
Constant	−201.639	−7.294	33.982

(*Continued*)

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Table 5. (*Continued.*)

(B) Effect of individual characteristics on the impact of the magnitude of policy changes	Benefit cut	Social Security tax raise	Wage ceiling increase
Observations	2,832	2,805	676
R^2	0.002	0.001	0.003
Years of education			
Large policy change	−200.103	−415.504	264.177
	(499.168)	(241.066)*	(229.347)
Years of education	31.100	9.900	11.914
	(23.904)	(11.825)	(10.023)
Years of education × large policy change	10.628	27.448	−14.305
	(33.840)	(16.346)*	(14.219)
Constant	−576.410	−101.293	−108.752
Observations	2,843	2,816	679
R^2	0.002	0.004	0.004

Standard errors in parentheses.
***p<0.01, **p<0.05, *p<0.1.

simultaneously and controlling for the baseline levels of expected benefits. As can be seen, the coefficients do not change much, and they become more strongly significant in the case of financial literacy and years of education. Finally, additional controls for household income and total household wealth do not change the main coefficients' magnitude or significance, as shown in the third column.

The fourth to sixth columns present the corresponding analysis when the outcome is the expected change in benefits upon a Social Security payroll tax increase cut (E(SSB|T−E(SSB)). Column 4 shows positive coefficients for the three variables when separately regressed on the dependent variable which are significant for cognitive score and years of education. For each additional point in the cognitive score, an increase in the payroll tax rate results $5.6 more positive change in expected benefits and an additional year of education results in $24 additional increase in expected benefit. The two subsequent columns show that there are no major effects of introducing the three variables in the same equation and controlling for baseline levels of expected benefits, nor for adding income and wealth controls. The last three columns show the corresponding analysis for wage ceiling increases, and similarly demonstrate a higher positive change in benefits among those with higher levels of education, cognitive, and financial literacy scores. It is reassuring that there are no significant effects for these variables in the placebo (income tax raise) scenarios (columns seventh through ninth).

While respondents on average were mostly unresponsive to the magnitude of the policy changes, we can also ask whether those with high levels of education, financial literacy, and cognitive ability are also different in this regard. To answer this question, we use similar regressions to those in panel A of Table 5, but include an interaction of the dependent variable of interest with an indicator for having been presented with the more severe policy change (i.e., the steeper benefit cut, or the larger tax and wage ceiling increase). To the extent that these traits are associated with greater responsiveness to the magnitude of the effect, we would expect the interaction to be positive and large relative to the coefficient corresponding to the non-interacted characteristic.

We find this to be the case only to some extent. The results of this analysis are shown in panel B of Table 5. For example, while a point in cognitive scores leads to a $4.6 lower cut in expectations under the 10pp benefit cutoff, this is increased only by $1.4 when the benefit cut is 25pp. Likewise, while a point in the cognitive score leads to $4 dollars higher expected benefits under the more moderate tax raise, this effect increases only by $2.5 when the tax raise is higher. The corresponding coefficients for the wage ceiling increase are 1.6 and −0.2. More generally, the interaction coefficients are statistically insignificant and while these effects may be in the right direction for at least two of the cases, they are not large enough to fully account for the size of the policy change. Hence, we can at most conclude that there is some indicative evidence that those with higher cognitive ability, financial literacy, or education are more responsive to the magnitude of policy change.

7. The expected impacts of policy changes on labor force participation, savings, and retirement

Ultimately, we are interested not only on the effect of policies on benefit expectations, but how they affect behavior. One approach to answer this question is to directly ask respondents how they would expect to react given a policy change. Delavande and Rohwedder (2017) followed this approach for the case of a benefit cut: they asked respondents of the Health and Retirement Study of 2007 how their savings, retirement age, and claiming age would be affected if benefits are cut by 30%.

For each of the policy scenarios, we asked respondents whether they thought their labor force participation, savings rate, and retirement change would decrease, stay the same, or increase. Many respondents stated that they would not expect to see any changes. As shown in Table 6, a reduction in benefit rates would result in higher savings according to 71% of respondents (versus 27% of no change and 1% of lower savings). Fifty-two percent also said they would retire later (versus 42% of no change and 6% of earlier) and 48% that they could claim benefits later. These results are

Table 6. Expected behavioral effects of the policy change scenarios

	More/later (%)	Less/early (%)	No change (%)
Benefits			
Retire	52	6	42
Save	71	1	27
Claim Social Security benefits	48	12	40
Taxes			
Retire	25	15	60
Save	42	6	51
Claim Social Security benefits	17	24	60
Ceiling			
Retire	16	9	75
Save	28	5	67
Claim Social Security benefits	10	14	76

similar in magnitudes to those of Delavande and Rohwedder.[3] For most respondents, the other policy options would not result in expected behavior changes: more than 50% said they would not change their saving, retirement, or claiming decisions in the event of either a tax raise or a wage ceiling increase.

8. Conclusions

For the most part, the responses of expectations to hypothetical policy changes are qualitatively in line with what one would expect from theory based on the assumption that consumers form rational, forward-looking expectations. The same can be said about expected behavior. However, the magnitude of the expected responses is quantitatively puzzling. For instance, reactions to benefit cuts or tax hikes of a given magnitude are indistinguishable from reactions to benefit cuts or tax hikes that are twice as large.

The data used in this study could be used to further investigate these and other empirical puzzles. Future research could construct and provide a break-down of people into 'types', where some people react differently to different types of policy changes. As shown here, people with more education, cognitive ability, and financial literacy are more likely to update their expectations as predicted by rational expectations under the policy trade-offs. Models of 'rational-expectations' and 'behavioral' types could be built to provide more accurate forecasts of the behavioral impacts of policy changes. Some of the parameters for such models could be estimated taking into account the coefficients that we present in this study.

Supplementary material. The supplementary material for this article can be found at https://doi.org/10.1017/S1474747219000234.

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[3]However, we note that the questions are not strictly comparable between our survey and theirs. Their response options were 'definitely work longer', 'maybe work longer', or 'not work longer' rather than our 'retire later', 'no change', or 'retire earlier' options. They found that 60% would definitely save more, and 34.1% would 'definitely work longer'.

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