

The Role of Stock-Flow Reasoning in Understanding the Social Security Trust Fund

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Abstract

The financial future of Social Security's trust funds is an important policy topic with significant implications for members of the public who pay taxes and expect to receive retirement benefits. The funds were created to hold and invest surplus tax revenue not used to pay out benefits, but Social Security has started to use this money to fulfill benefits obligations. The funds are projected to become depleted in 2035, at which point benefits will need to be reduced. In this research, we draw from the literature on stock-flow reasoning to explore how communication about the trust funds impacts understanding of the situation. In Experiments 1 and 2, we randomly assign participants to see information about the trust funds over time presented as a *stock* (i.e., balance) or in terms of *flows* (i.e., tax revenue and benefits payments), finding that those who see the flows presentation are significantly less likely to expect benefits to go away completely after depletion. In Experiments 3a and 3b, we show that prompting participants to reflect on the continuity of the inflows (via payroll taxes) significantly reduces this common misunderstanding about the outflows even further, suggesting that drawing attention to specific aspects of dynamic systems may help alleviate difficulties in understanding them. Applying the theoretical lens of stock-flow reasoning, this research highlights a key aspect of communications about the future of Social Security that may contribute to – or be used to remedy – the widespread misconception that benefits will cease when the funds are depleted.

Keywords: judgments, stocks and flows, retirement, public policy, communication

For American workers who anticipate receiving Social Security retirement (i.e., Old-Age and Survivors Insurance, or OASI) benefits in retirement, the solvency of the Social Security system is a relevant and pressing concern. In the absence of Congressional action, the solvency of the system generally focuses on the status of the Social Security trust funds. The trust funds represent the accumulated surplus resulting from the difference between (a) payroll tax income paid into the system by current workers, and (b) benefits paid out to current beneficiaries. Separate projections exist for the OASI (retirement benefits) trust fund versus the smaller DI (disability insurance) trust fund, but the combined OASDI funds are the focus of most reports. Current projections are that both the OASI trust fund and the combined trust funds will be depleted by 2035 (Social Security and Medicare Boards of Trustees, 2022). If and when it is depleted, Social Security is expected to be able to pay 75 to 80% of scheduled benefits.

Media coverage of Social Security projections intensifies each year when the Board of Trustees releases its Annual Report documenting updates to the expected depletion date for the trust funds. Communicating the implications of these projections is critical but can lead to misleading inferences. Coverage that asks, “Will Social Security Run Out of Money?” (Paul, 2022) or highlights a “worst-case scenario” (Werschkul, 2021), and politicians who declare that Social Security will go “bankrupt” (Kiely, 2022), can make the actual impact on retirement benefits appear more severe than trust fund insolvency would actually imply. Because media headlines often emphasize the balance running to zero, non-experts may be likely to arrive at the erroneous conclusion that Social Security benefits will dry up too – indeed, survey evidence suggests that many prospective retirees are pessimistic about the state of future benefits payouts (Turner & Rajnes, 2021).

In this project, we argue that the faulty reasoning about the relationship between the trust funds balance and the depletion of benefits may result from a “stock-flow” reasoning error. After providing a brief overview of the Social Security trust funds and how the workings of the funds can be understood as a dynamic system of stocks and flows, we review prior research on workers’ understanding of the funds and highlight how stock-flow reasoning errors and inconsistencies may be able to help explain how people think about the funds. To test our predictions, we present two experiments that vary the

presentation format of information about the trust funds and examine how these different communications impact understanding. We focus specifically on how stock vs. flow information influences perceptions of what will happen to benefits as a result of depletion. We find that compared to respondents presented with flow information (about the funds' income and costs), respondents presented with stock information (about the balance of the funds) are more likely to erroneously believe that when the trust fund balance is depleted, benefits will cease altogether. In our final two experiments, we test an intervention that directly prompts participants to reflect on whether the trust funds will continue to receive inflows (i.e., income collected through payroll taxes). These studies find that explicitly drawing attention to the continuation of these inflows can further reduce misconceptions about fund depletion, providing indirect evidence of the process by which the misconception arose in the first place.

The Social Security Trust Funds

When President Franklin D. Roosevelt established the Social Security program in 1935, extra funds (i.e., the difference between worker payroll contributions and paid benefits) were held in an "Old Age Reserve Account," which was replaced by the modern OASI trust fund in 1940. The trust fund is overseen by the Board of Trustees, who release an annual report on the health of the fund with a (typically) 75-year projection of taxes and benefits. Even in the early years of the fund, the Trustees were concerned about whether the trust fund would be sufficient as the number of eligible workers increased and as life expectancy improved (see Hines & Taylor, 2005, and Pattison, 2015, for histories). One key measure from the report, and often the focus of media headlines, is the year in which the trust fund will be depleted. This date has moved earlier as life expectancy has increased. The 2022 Report estimates this date will occur in 2035. This estimated date is the metric that generates the most sensational headlines about the trust fund.

Stock-Flow Reasoning Problems

The Social Security trust funds are a textbook example of a dynamic system, with inflows (i.e., payroll taxes paid into the system) and outflows (i.e., benefits paid out to beneficiaries) combining over time to determine the level of accumulation (i.e., how much money is held in the trust funds). In the

language of system dynamics, the cumulative amount of a resource, like the balance of money in a checking account or the amount of water in a reservoir, is a “stock.” The changes in the amount of a resource over some defined period, like deposits to and withdrawals from a checking account – or water flowing into and out of a reservoir – are the “flows.” Given an initial value of the stock, there is a one-to-one correspondence between the stock and the net flow: the stock is the integral of the net flow, and the net flow is the derivative of the stock. As a result, given either a time series of the stock or a time series of the flows (with a starting or ending value of the stock), the information content is calculably the same. But calculus is difficult. As a result, even though the calculable information is identical, people do not respond to the two representations in the same way.

Drawing from research on system dynamics, we argue that a key difficulty in understanding the Social Security trust funds may arise from what researchers have termed a stock-flow reasoning error. In particular, stock-flow accumulation processes lead to two related types of problems. First, formal mathematical transformations between stocks and flows are difficult and prone to errors even for highly-educated people (e.g., Booth Sweeney & Sterman, 2000; Brunstein et al., 2010; Cronin et al., 2009; Sterman & Booth Sweeney, 2007). This has sometimes been called the *stock-flow failure*. Because stock-flow transformations are so difficult (i.e., integrating a series of flow values or differentiating a series of stock values), people are prone to rely on a faulty *correlation heuristic*: they wrongly expect the stock trend will tend to match the flow trend. For example, a constant flow into a reservoir followed by a constant flow out of a reservoir leads to a linear increase in the level followed by a linear decrease in the level. Instead, use of the correlation heuristic may lead people to infer that the level of the reservoir suddenly drops when the direction of flow shifts from in to out. Except in rare cases (e.g., no net flows at all, or exponential growth), the two will typically not show the same pattern. Using such a heuristic can lead to both quantitative and qualitative mistakes, resulting in a number of serious errors like violating the conservation of mass in physical systems.

Second, the presentation of stocks versus flows can lead to qualitatively different evaluations and forecasts – creating *stock-flow inconsistencies*. Whereas the research cited above indicates that people

often cannot successfully translate from one format (e.g., stock) to the other (flow), research on stock-flow inconsistencies addresses how evaluations about the past and forecasts about the future depend on the presentation format even when no translation is necessary. In other circumstances, people may act *as if* they were able to successfully carry out complex calculations, even if the likelihood of successfully conducting such calculations is unlikely. These findings regarding stock-flow inconsistencies suggest reasoning about stock-flow problems is not a case of successful as-if reasoning but instead reflects sensitivity to the ways in which the same data are presented.

Such stock-flow inconsistencies hold for personal finances (Goldstein et al., 2016), evaluations of national employment (Spiller et al., 2020), and risk evaluations upon seeing COVID test data (Reinholtz et al., 2021). As a concrete example, consider employment in the United States in 2009 (as tested in Spiller et al., 2020). During this time, the number of employed people was decreasing from one month to the next, but at a slowing rate. When one considers the number of employed people, the flow is increasing (from a large negative number to a small negative number). But when one considers the stock, the stock is decreasing (due to the negative flow). As a result, when shown the flow and asked about the economy, a majority of respondents indicated that the economy was getting better. When shown the stock and asked about the economy, a majority of respondents indicated that the economy was getting worse. Presenting the same data in different ways led to qualitatively different evaluations. There were corresponding effects on forecasts of what respondents anticipated would happen next.

The literature on stock-flow reasoning failures and inconsistencies shows them to be remarkably robust and replicable. They apply across a wide variety of domains, including: atmospheric accumulation of carbon dioxide (Sterman & Booth Sweeney, 2007; Sterman, 2008); water accumulating in a bathtub (Booth Sweeney & Sterman, 2000; Cronin et al., 2009); weight (Brunstein et al., 2010); people in a store (Cronin et al., 2009; Brunstein et al., 2010); distance between cars (Cronin et al., 2009); product inventory in warehouses (Booth Sweeney & Sterman 2000; Spiller et al., 2020); national employment (Spiller et al., 2020); COVID cases (Reinholtz et al., 2021; Villanova 2022; Harman et al., 2021; Padilla et al., 2022); blood glucose levels and other medical measurements (Brunstein et al., 2010); and perhaps most

relevantly for the current investigation, corporate and personal cash flows (Booth Sweeney & Sterman 2000; Newell et al., 2016; Spiller et al., 2020). Such stock-flow failures and inconsistencies can be taken as a “stylized fact,” even among highly educated participants (e.g., medical students and MIT graduate students; Booth Sweeney & Sterman 2000; Brunstein et al., 2010; Cronin et al., 2009; Sterman & Booth Sweeney 2007). Moreover, they hold across multiple presentation formats, including scatterplots, line charts, barcharts, tables, and verbal descriptions (Cronin et al., 2009; Newell et al., 2016; Spiller et al., 2020).

Worker Perceptions of Social Security Trust Fund Status

In a review of several largescale surveys that measure workers’ expectations about their future retirement benefits, Turner and Rajnes (2021) find evidence of considerable pessimism among workers regarding their retirement benefits. These authors suggest that current communications that focus on insolvency may be partly to blame and point to the need for targeted informational interventions to help make perceptions more accurate. A small number of prior projects have examined how to better communicate the workings of the trust fund to future beneficiaries.

Under an assumption that worker perceptions about system solvency distract from efforts to reform it, Holahan and Schug (2000) designed a training tool that explains the system to students of economics. Their teaching materials introduce flow charts to track how money flows between payroll taxes from workers, Treasury, and retired beneficiaries. Their approach highlights the impact of the trust fund on the larger system of the economy, and the uses of both private and public investments to build a robust economy. However, they do not report any results of empirical testing to show how successful their approach is at communicating the workings of the trust fund to student audiences, so it is unclear whether the tool can be used to reduce incorrect inferences about the trust fund among a broader population.

Directly relevant to the current project is a recent effort by Quinby and Wettstein (2021) which considers the impacts of a poor understanding of the trust fund by looking at how variations in newspaper headlines can affect investing and benefit claiming intentions. The authors test the effects of headlines for

an otherwise identical article about the projected insolvency of the trust fund and its impact on benefits. Compared to a headline emphasizing a “long-term financing shortfall,” respondents who saw headlines highlighting that revenue will still cover three-fourths of benefits were more likely to report accurate expectations regarding future monthly benefit size. We take this approach a step farther by incorporating existing behavioral science research on understanding of stock-flow models to design better communications about trust fund projections.

Understanding Social Security Trust Funds is a Stock-Flow Reasoning Problem

Stock-flow reasoning problems have meaningful implications for public understanding of the Social Security Trust Funds. Accumulation and decumulation in the trust funds is a textbook stock-flow reasoning problem. Given the direct applicability of the domain and the generalizability of the findings above, it would be highly surprising if people *did* fully understand the implications of accumulation for proper interpretation of what happens when the trust fund is depleted. Yet to our knowledge, the robust finding on such problems with understanding accumulation has not been brought to bear on this critical topic.

The time course of the trust fund is illustrated both as a stock and as flows in current SSA communications.¹ Some depictions focus on the balance of money in the trust fund (i.e., the stock, which may present a dire picture to consumers in that it shows depletion by 2035) and some show the changes in inflows and outflows over time (i.e., the flows, which may present a more optimistic view by demonstrating that there will still be taxes paid into the system that can be used to pay for benefits obligations). Reasoning errors like the correlation heuristic and effects on evaluations described above may lead people to wrongly infer that zero balance of the trust funds implies zero benefits paid out to retirees.

Reinforcing this problem – and providing suggestive evidence that journalists may be confusing stocks and flows – is media characterization that does not unambiguously distinguish the balance of the

¹ E.g., <https://www.ssa.gov/oact/TRSUM/index.html>

trust funds from the flows of the trust funds. For example, on December 1, 2020 *CNBC* ran a headline “How Social Security invests its money – and why it may run out of cash really soon”; on August 31, 2021 the *New York Times* tweeted: “Social Security will be depleted in 2033, a year earlier than previously projected...”; and on June 2, 2022 *CNBC* ran a headline “Social Security fund will be able to pay benefits one year longer than expected, Treasury says.” Without distinguishing the stock (the trust funds balance) from the flows (taxes collected and benefits paid out), these headlines may suggest to readers that the Social Security system itself (rather than just the trust funds) may be depleted and suggest the headline writer did not find the distinction sufficiently important to draw attention to.

Indeed, such headlines can affect beliefs about future benefits (Quinby & Wettstein, 2021). This perhaps contributes to widespread uncertainty and misunderstanding of the long-term prospects of Social Security retirement benefits: 42% of survey respondents to a Pew Research poll doubt they will receive retirement benefits at all, with younger generations showing more pessimism than those closer to retirement (Parker, Morin, & Horowitz, 2019). Another study found that about three-quarters of respondents were either “not too confident” or “not at all confident” that Social Security would be able to pay them the benefits amount they were supposed to receive and that people saw about a 1 in 6 chance that they would not receive anything (Luttmer & Samwick, 2018; see Turner & Rajnes, 2021 for a review of survey evidence).

Research on stock-flow reasoning problems both suggests why people may hold such misconceptions and provides some potential tools to reduce the extent of mistaken inferences regarding the Social Security trust fund. We argue that alternative presentations of the trust funds that deemphasize the trust funds balance and instead focus on the projection of paid amounts may help to lead to more accurate judgments and inferences based on communications. As a further theoretical contribution, we propose a novel intervention that targets a more conceptual understanding of how flows are related to stocks. This intervention helps to overcome the faulty application of the correlation heuristic by simply prompting people to reason through how the different concepts of the system relate to each other. Notably, the literature on such stock-flow problems has found that reasoning errors arising from stock vs.

flow presentations are stubbornly persistent, even in the face of simpler presentations, clearer graphs, more familiar contexts, feedback about incorrect initial answers, and incentives to answer correctly (Cronin et al., 2009; Brunstein et al., 2010; Newell et al., 2016). Our intervention takes a different approach: rather than targeting the understanding or applications of the mathematical relationships between stocks and flows, we simply direct participants' attention to one aspect of the system (the inflows) and, without providing additional information, ask them to think about what would happen to the outflows when the stock is depleted.

In understanding why this intervention might work in improving reasoning about the Social Security system, we build on work that suggests changing the accessibility of information can affect the extent to which that information is used to make choices or draw conclusions (e.g., Feldman & Lynch, 1988; Johnson et al., 2007; Weber et al., 2007). Within the context of Social Security funding, workers' paychecks reliably include automatic deductions for the payroll taxes that fund the Social Security system, so most people are likely aware of their own contributions to the system's inflows. However, even if people understand the connection between these deductions and the benefits paid to retirees, they may not have actively considered whether they will continue paying these taxes in the future. Thus, the belief that benefits payouts will cease after depletion may result from participants failing to consider their expectations about future taxes. If people understand that inflows (taxes) connect to outflows (benefits), making the continuity of those taxes more salient may affect their perceptions of what will happen to benefits after the trust funds run out of money.

To test these ideas, we experimentally vary the presentation format and observe how key metrics differ depending on the presentation format and the salience of various aspects of the Social Security system. We expect that presenting relative inflows and outflows may lead to better-calibrated benefit expectations, which are important for beneficiaries, whereas presenting stocks may lead to better-calibrated forecasts of when the trust fund will reach zero, an important milestone for policymakers. We also test an intervention that prompts participants to think about whether the trust funds will continue to receive income. We hypothesize that such reflection will reduce misunderstanding about what happens to

benefits by increasing the salience of the fact that inflows will not stop when the funds are depleted. This intervention further supports the proposed role of stock-flow reasoning errors.

Experiments

We conducted four experiments to test these research questions. Experiment 1 was designed to test our main hypotheses using graphs that we designed to cleanly manipulate whether participants saw the OASDI trust funds' balance or income and costs over time. Experiment 2 tested closer replicas of SSA visuals about the trust funds that used different metrics and examined whether a third type of graph that showed payable benefits would further improve understanding. Finally, Experiments 3a and 3b tested whether drawing participants' attention to the fact that payroll taxes would still be collected after depletion would reduce misperceptions about benefits going away after depletion, providing both a potential intervention as well as evidence regarding process.

We received approval for this research from [University] Institutional Review Board. For each experiment, we recruited participants from Amazon's Mechanical Turk (AMT) and used CloudResearch to set additional eligibility requirements for each study. We restricted our samples to adults located in the United States with 100+ approved HITs, an approval rating of 95% or above, and who had not completed any prior studies run for this specific project. All study designs and analyses were preregistered on AsPredicted.org prior to data collection,² and any additional data exclusions are described where applicable.³ We report results for all preregistered key measures in the sections below. Full model results are reported in Appendix 3. We used R version 4.0.0 for analyses. All raw data, analysis code, and

² Experiment 1: https://aspredicted.org/RRY_76Y; Experiment 2: https://aspredicted.org/MBF_SVL; Experiment 3a: https://aspredicted.org/5X4_6GF; Experiment 3b: https://aspredicted.org/7J9_L6M

³ For each experiment, we include participants who completed the study once in our analyses. Due to the mechanics of Qualtrics, it was possible for subjects to enter the study multiple times (i.e., after failing an initial screener, participants could try again). As a result, our raw data files include a small number of instances of the same workers entering multiple times. In Experiments 1, 2, and 3a, none of these participants completed the full study more than once so they are all included in analyses. In Experiment 3b, one participant completed the study twice; only the first response from this participant is retained for analyses.

research materials are available in our Research Box,⁴ and main manipulations and measures are reproduced in Appendix 4.

Experiment 1

In Experiment 1 we sought to test the effect of stock vs. flow stimuli based on data and presentations of those data used in the 2022 Trustees Reports and related communications. We focused on measures of objective understanding as our key dependent variables.

Materials and Procedure

Based on a power analysis using data from a pilot study,⁵ we aimed to recruit 1,000 participants from AMT to take this survey. 1,044 unique participants started the survey, and after preregistered exclusions, our sample for analysis consisted of 1,001 participants who completed the study ($M_{age} = 41.96$, $SD_{age} = 13.16$ ⁶; 48% female). First, participants read the following brief description about the OASDI trust funds:

The Social Security Administration uses accounts called “trust funds” to store income that’s collected through Social Security taxes and then eventually uses that money to pay out benefits. The OASI Trust Fund pays retirement and survivors benefits and the DI Trust Fund pays disability benefits, but the two are often referred to together as the OASDI Trust Funds. At the end of the year in 2021, the OASDI trust funds held \$2.85 trillion in total.

Social Security uses the OASDI trust funds to make benefits payments and pay administrative expenses. The trust funds receive income through two sources: tax revenue collected from workers and interest that comes from the investment of the money in US Government securities. In 2021, Social Security’s total income from both of these sources was \$56 billion lower than its total costs (benefits payments plus administrative expenses). This was the first time in many years that total income was lower than total costs. Social Security predicts that in future years, total income will continue to be lower than total costs. Because of this continued projected deficit, the trust funds balance is projected to reach \$0 at some time in 2035.

On the same page as the above description, participants were randomly assigned to see an accompanying graph that showed either the balance (*stock* condition, $n = 508$) or total income and

⁴ See this link for Research Box: https://researchbox.org/1172&PEER_REVIEW_passcode=GQYVKB

⁵ A brief summary of results from this pilot study ($N = 403$) are available in Appendix 1. This pilot study and the four experiments reported in the main text represent all data we collected regarding the relation between stock-flow reasoning and the Social Security trust funds.

⁶ In all studies, we asked participants for their year of birth (as Social Security rules regarding retirement are based on this). Age calculations are made as if participants were born on July 1.

expenditures (*flows* condition, $n = 493$) of the trust funds for the period 1994 through 2034. Historical data were shown on both graphs with solid lines, while projected data were represented with a dotted line. Both graphs reported the respective metrics in trillions of dollars.⁷ These graphs are shown in Figure 1 below.

Next, we asked participants four key objective understanding questions: (1) when total costs did/will begin to exceed income (with a dropdown where participants could select any year from 1994 to 2050 or Never); (2) when the trust funds did/will become depleted (with a dropdown where participants could select any year from 1994 to 2050 or Never); (3) what will happen to benefits if trust funds are depleted (a multiple choice question with options for no benefits, smaller benefits, the same amount of benefits, or larger benefits); and (4) after depletion, what the monthly retirement benefits amount would be for someone currently expecting \$1,000/month (an open text box; asked only of participants who selected either the smaller benefits or larger benefits option for the prior question). The order of the first two questions (when costs began to exceed income and when the trust funds would become depleted) was randomized across participants. We include this as a factor in statistical analyses reported below. Importantly, whereas both key dates were explicitly mentioned in the text of the description, what would happen to benefits was not discussed, meaning that answering these latter questions required participants to make inferences that went beyond the data that was explicitly provided. After this section, participants wrote a media headline about the trust funds⁸, responded to questions about their own eligibility for benefits, and provided demographic information. The final page of the survey provided links to further resources about the trust funds and benefits calculations. Key measures used for all studies are shown in Table 1 and are reproduced in full in Appendix 4 (the full survey materials are available in our Research Box).

⁷ The description was based on the 2022 Trustees Report, and the data were taken from the 2022 Supplemental Single-Year Tables (specifically, Table VI.G8 available at <https://www.ssa.gov/oact/TR/2022/lr6g8.html>).

⁸ We included this measure in Experiments 1, 2, and 3a to explore whether the different presentations led to systematically different “headlines” about the trust funds (i.e., calling out different aspects of the situation). A team of 3 research assistants coded these responses. There were no clearly interpretable patterns across conditions, so we do not discuss further. These data are available from the researchers upon request.

Figure 1. Experiment 1 graph stimuli (with introductory text)

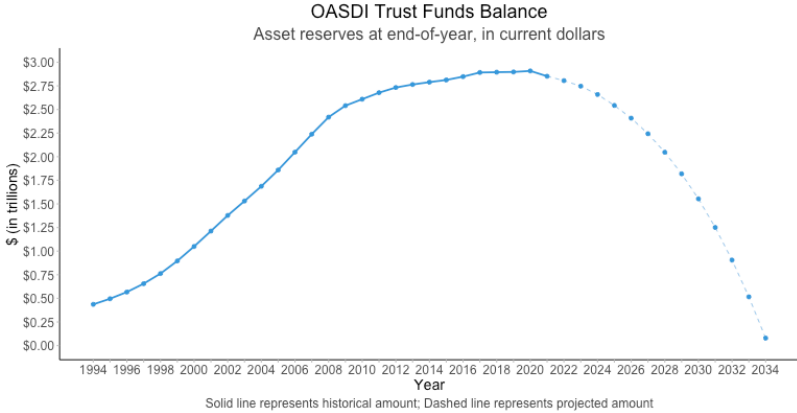
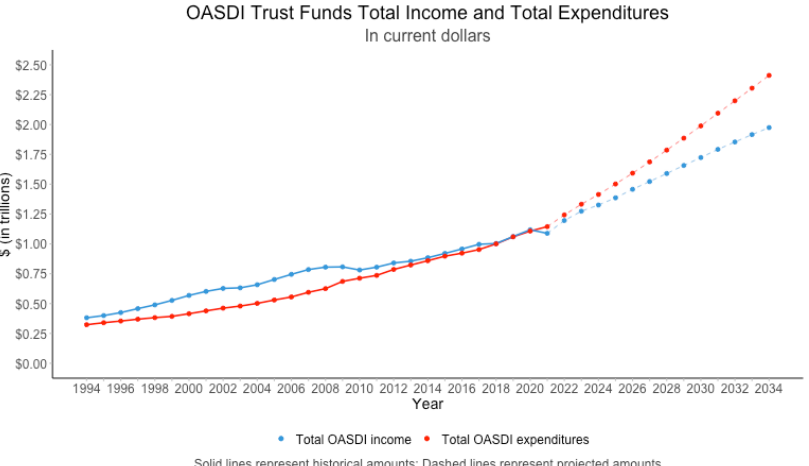
<i>Stock</i> condition graph and description	<i>Flows</i> condition graph
<p>The chart below provides some more information on the situation of the OASDI trust funds. The chart depicts the historical and projected OASDI trust fund balance for the period 1994 through 2034, in trillions of dollars (scaled to the current dollar). The solid line shows the historical trust fund balance, and the dotted line shows the projected balance.</p>  <p style="text-align: center;">OASDI Trust Funds Balance Asset reserves at end-of-year, in current dollars</p> <p style="text-align: center;">Solid line represents historical amount; Dashed line represents projected amount</p>	<p>The chart below provides some more information on the situation of the OASDI trust funds. The chart depicts the historical and projected OASDI total income (from payroll taxes and interest) and expenditures for the period 1994 through 2034, in trillions of dollars (scaled to the current dollar). The solid lines show the historical trust funds income and expenditures, and the dotted lines show the projected income and expenditures.</p>  <p style="text-align: center;">OASDI Trust Funds Total Income and Total Expenditures In current dollars</p> <p style="text-align: center;">Solid lines represent historical amounts; Dashed lines represent projected amounts</p>

Table 1. Key measures for all experiments

Question description	Question text and answer options	Correct Answer for Analyses ¹
Depletion date	According to your understanding, in what year did or will the Social Security OASDI trust funds become depleted? In other words, in what year did or will the trust funds run out of money? <i>Experiments 1, 3a, 3b:</i> [Dropdown] 1994... 2050; Never <i>Experiment 2²:</i> [Dropdown] 2000... 2050; Never	2035 (+/- 1 year)
Costs exceed income date	<i>Experiments 1, 3a, 3b:</i> According to your understanding, in what year did or will the Social Security OASDI trust funds' total costs begin to exceed total income? [Dropdown] 1994... 2050; Never <i>Experiment 2:</i> According to your understanding, in what year did or will the Social Security OASDI trust funds' total costs begin to exceed non-interest income? [Dropdown] 2000... 2050; Never	Experiments 1, 3a, 3b: 2021 (+/- 1 year) Experiment 2: 2010 (+/- 1 year)
What happens to benefits	Assuming the government does not take any action to increase the amount of income that Social Security collects based on tax revenues – in your view, what is most likely to happen to Social Security benefits if the trust funds are depleted? If you aren't sure, please select the option that reflects your best guess. [Multiple choice (select one)]	Social Security benefits will still get paid out and will be a smaller amount
	<ul style="list-style-type: none"> • Social Security will no longer be able to pay out benefits • Social Security benefits will still get paid out and will be a smaller amount • Social Security benefits will still get paid out and will be the same amount • Social Security benefits will still get paid out and will be a larger amount 	

Benefits amount ³	You just indicated that Social Security benefits will most likely still get paid out and will be a different amount if the trust funds are depleted.	Analyzed as a mean
	Again, assuming the government does not take any action to increase the amount of income that Social Security collects based on tax revenues – for someone whose benefits are currently projected to be \$1,000 per month, what monthly amount might they expect after depletion of the trust funds?	(SSA projections suggest the correct answer is around \$750-800).
	\$[text box].00 per month	

Notes. ¹ Based on preregistration. ² Questions used in Experiment 2 were slightly different due to differences in the range of years covered in the graph stimuli (see Figure 2) and the type of income discussed in the description and graphs. ³ This question was only asked of participants who responded “Social Security benefits will still get paid out and will be a smaller amount” or “Social Security benefits will still get paid out and will be a larger amount” to the prior what happens to benefits question. Per our preregistrations, answers to this question were imputed for participants who chose the other two answer options for the prior question.

Analyses

As specified in our preregistration, we coded answers to the first three objective understanding questions according to accuracy (see Table 2 for the breakdown of correct vs. incorrect answers to each question by condition for Experiments 1 and 2).⁹ To analyze differences in accuracy by condition, we conducted three separate logistic regressions using contrast-coded predictors (-1, 1) for condition, order of the first two questions, and their interaction. There was no significant difference across conditions in accuracy in answers to the question about when costs began to exceed income ($b = 0.00$, $z = -0.01$, $p > .99$), though a larger proportion of participants in the stock condition (80%) correctly identified when the funds were projected to become depleted, compared to the flow condition (72%; $b = 0.21$, $z = 2.87$, $p = .004$). Those in the stock condition were more likely to incorrectly answer that benefits would completely go away as a result of depletion (64%), compared to the flow condition (56%; $b = 0.17$, $z = 2.62$, $p = .009$).

⁹ For all studies, missing answers due to a participant failing to answer a question are marked as missing but are included in the base for calculating the proportion of correct answers. These participants are excluded from regression analyses.

Following our preregistration, we analyzed the fourth question (about the benefits amount someone expecting \$1,000/month would get after depletion) as a continuous variable. Since this question was only asked of those who indicated in the prior question that benefits would be smaller or larger, we treat those who indicated that benefits would go away completely as giving an answer of \$0 to this question and those who indicated that benefits would stay the same as giving an answer of \$1,000.¹⁰ The average amount given by those who answered this question was \$641.40 ($SD = \237.79), but looking at the whole sample (i.e., using our imputed values), the mean is \$276.07 ($SD = \375.45). Using the same predictors as specified above, we conducted a regression to analyze differences across condition. As expected, the average benefits amount is significantly lower for those in the stock condition ($M_{stock} = \$239$, $SD_{stock} = \$356$) compared to those in the flow condition ($M_{flows} = \$314$, $SD_{flows} = \$391$; $b = -37.00$, $t(996) = -3.13$, $p = .002$). To put these numbers into context, based on the projections in the 2022 Trustees Report, for every \$1,000 in scheduled benefits, trust funds income post-depletion would be sufficient to pay \$750 to \$800, suggesting both groups underestimate the amount on average.

We randomized the order of the first two questions that participants answered such that some participants saw the question about when depletion would happen first while others saw the question about when costs began to exceed income first. While this factor was included to counterbalance stimuli and was not of theoretical interest, results indicated that question order did have a significant impact on accuracy for the question about when costs began to exceed income ($b = 0.22$, $z = 2.92$, $p < .001$). Specifically, those who saw this question first were less likely to answer it correctly (51%) than those who saw the question about the depletion date first (61%). We did not have a specific theoretical expectation for this result but return to it in the General Discussion.

Discussion

Using comparable stock and flows graphs based on Social Security data, the results from this study show that different ways of showing trust funds information over time can significantly impact

¹⁰ Per our preregistrations, responses greater than \$2000 were excluded here and in future studies as more than likely indicating misunderstanding or inattentive responses.

important facets of understanding. Specifically, we found that people shown a stock graph that displayed the trust fund balance over time (making particularly salient the decline to zero around 2035) were more accurate in their understanding of when depletion would happen. This is in line with the existing literature on stock-flow reasoning – and notable given that this date was explicitly provided in the text description for both conditions. However, while the stock condition boosted accuracy on this question, those who saw the stock graph were *less* accurate in translating this information into an understanding of what impact trust fund depletion would have on benefits.

Table 2. Summary table of results for all preregistered dependent variables for Experiments 1 and 2

Measure ¹	Experiment 1 (N = 1,001)		Experiment 2 (N = 1,503)		
	Stock	Flows	Stock	Plain Flows	Enhanced Flows
Date questions (% correct) ²					
Depletion date	80%	72%	74%	71%	73%
Costs exceed income date	56%	56%	47%	46%	43%
What happens to benefits question (% choosing each option)					
Benefits go away completely ³	64%	56%	61%	54%	54%
Paid, smaller amount ⁴	31%	36%	30%	37%	38%
Paid, the same amount	4%	7%	8%	7%	7%
Paid, larger amount	1%	1%	0%	1%	1%
Benefits amount question ⁵ (mean (SD))	\$239 (356)	\$314 (391)	\$264 (373)	\$318 (390)	\$321 (396)

Notes. ¹Missing answers due to a participant failing to answer a question are marked as missing but are included in the base for calculating the proportion of correct answers. These participants are excluded from regression analyses. ²Following our preregistration, answers are coded as correct if the participant entered a date within +/- 1 year of the correct answer. ³Whether or not participants choose this incorrect answer option is a key dependent variable across all studies. ⁴This is the correct answer. ⁵Following our preregistration, responses above \$2,000 are excluded from calculations. The correct value is estimated to be approximately \$750-800.

Experiment 2

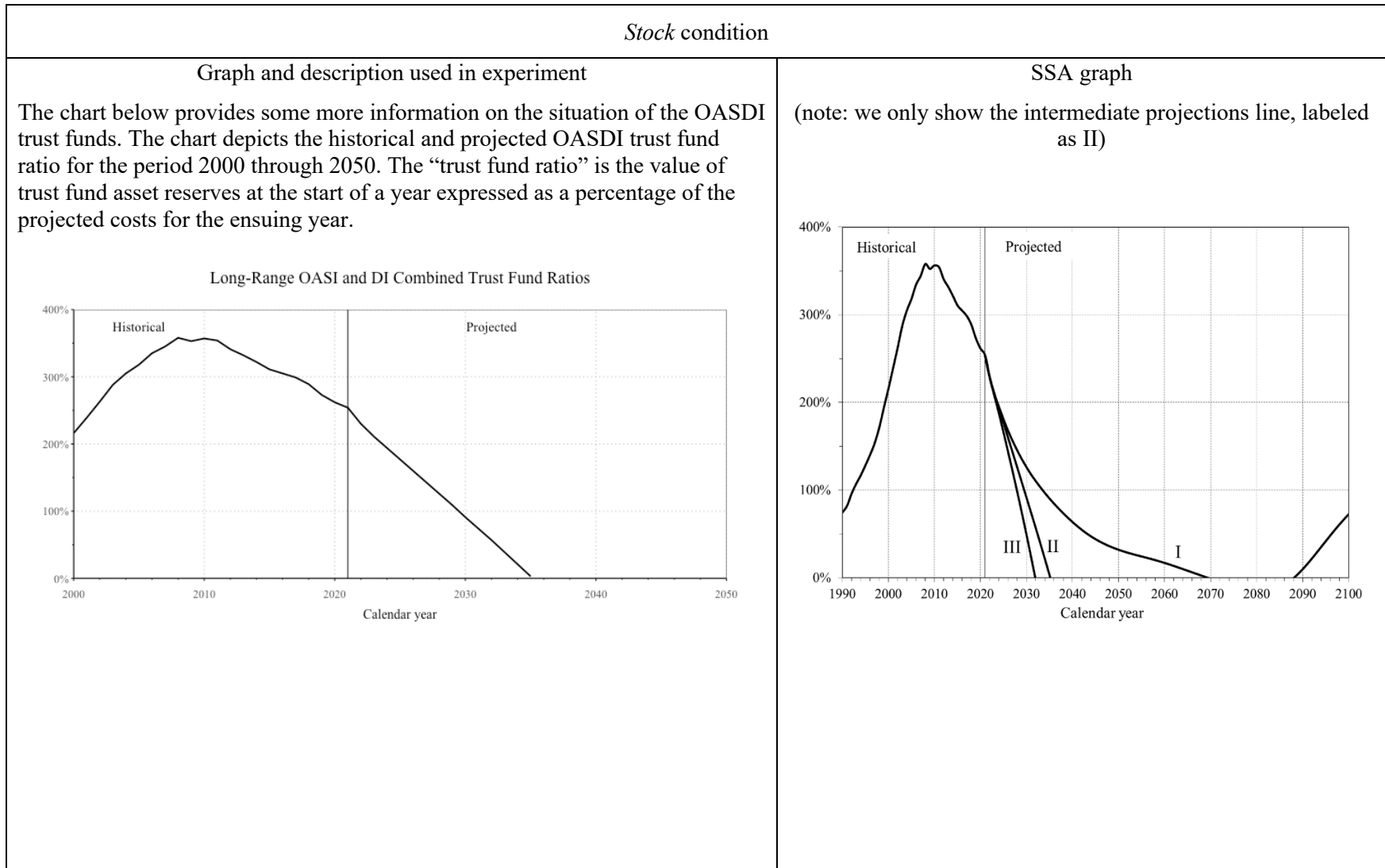
Experiment 2 was designed for two main purposes. First, we sought to investigate whether our main findings would replicate with materials more closely based on those typically included in Trustees

Reports, shifting from our stimuli in Experiment 1 that were generated to ensure formal equivalence across conditions. Second, we added a third “enhanced flows” condition, also based on existing SSA communications, that showed the same information on income and costs along with information on “payable benefits.” We included this condition to explore whether this additional information on payable benefits would further enhance understanding by making it clear when and how benefits would be impacted.

Materials and Procedure

A total of 1,578 unique workers from AMT started the survey, and our sample for analysis included 1,503 participants who completed the study ($M_{age} = 40.90$, $SD_{age} = 12.91$; 52% female). The structure of the survey was very similar to that of Experiment 1: participants saw a description and graph related to the trust funds, answered several objective understanding questions, and ended by answering questions about eligibility and demographics. The key changes in this study came in the data displays and content of the description. Participants were randomly assigned to see one of three graphs displaying information about the combined OASDI trust funds for the period 2000-2050: a *stock* graph that showed the trust fund ratios (balance as a percentage of projected costs for the ensuing year; $n = 500$), a *plain flows* graph that showed non-interest income and cost (scheduled benefits) as percentages of taxable payroll ($n = 502$), and an *enhanced flows* graph that built on the plain flows graph by including a line for expenditures (payable benefits; $n = 501$). We designed these graphs to mimic graphs from the Trustees Report as closely as possible, though we did constrain the x-axis to show the same date range across conditions to be consistent (see Figure 2 for our graphs and the SSA graphs we based them on). Since these stimuli were closely based on the graphs included in Trustees Reports, which use data on non-interest income (rather than total income, as we used in Experiment 1), we updated the description to include key dates and other information for this metric (specifically, the date for when costs began to exceed non-interest income is 2010; see Research Box for full materials).

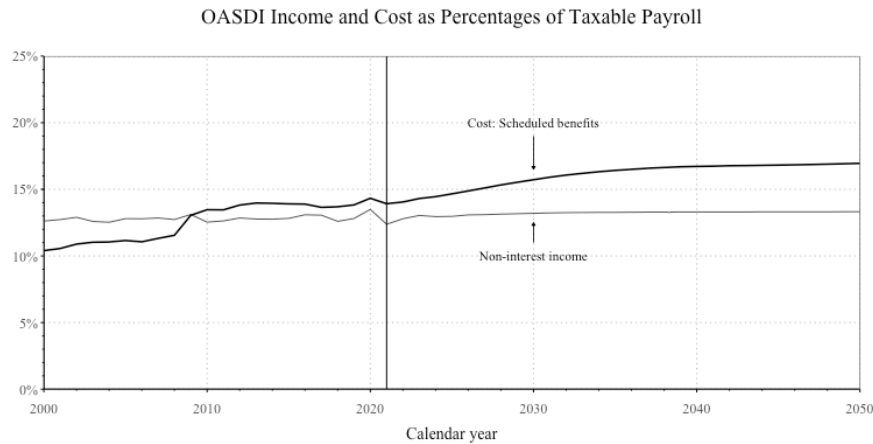
Figure 2. Stimuli for Experiment 2, with comparison to SSA graphs



Plain flows condition

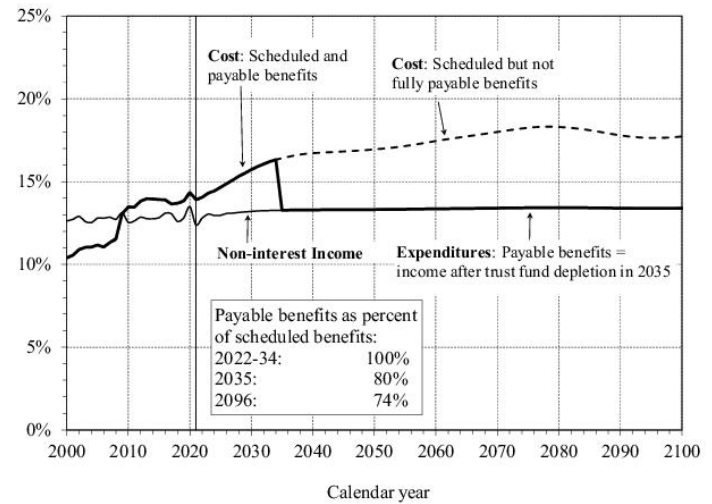
Graph and description used in experiment

The chart below provides some more information on the situation of the OASDI trust funds. The chart depicts the historical and projected year-by-year relationship between OASDI income (excluding interest) and cost (including scheduled benefits) for the period 2000 through 2050. The figure shows all values as percentages of taxable payroll.



SSA version

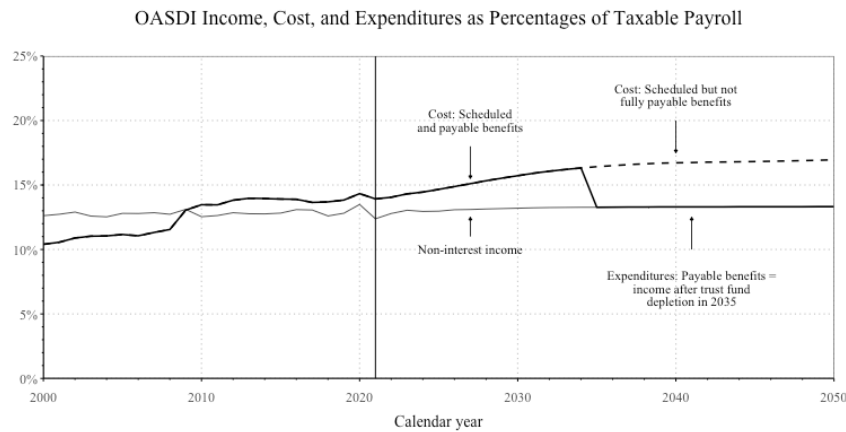
(note: version used in experiment does not include line for payable benefits)



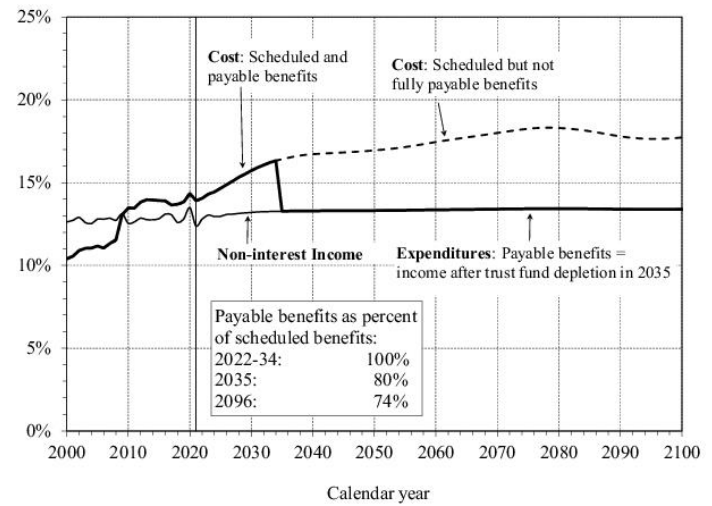
Enhanced flows condition

Graph and description used in experiment

The chart below provides some more information on the situation of the OASDI trust funds. The chart depicts the historical and projected year-by-year relationship between OASDI income (excluding interest), cost (including scheduled benefits), and expenditures (including payable benefits) for the period 2000 through 2050. The figure shows all values as percentages of taxable payroll.



SSA version



Note. Source for SSA graphs: https://www.ssa.gov/oact/TR/2022/II_D_project.html#105057

Analyses

As in Experiment 1, we preregistered that we would recode the objective understanding questions for accuracy and focus on proportions of incorrect answers about benefits going away. Based on the three conditions in our design, we used the plain flows condition as the reference group and created two dummy coded predictors to capture the effect of condition (stock vs. plain flows: 1 if stock condition, 0 otherwise; enhanced vs. plain flows: 1 if enhanced flows condition, 0 otherwise). As in Experiment 1, we randomized the order of the two questions about when costs began to exceed income and when depletion would happen and included a contrast-coded predictor (-1, 1) for order and all interactions in all analyses. Again, there were no significant differences across conditions for accuracy on the question about when costs began to exceed (non-interest) income (stock vs. plain flows: $b = 0.00, z = 0.00, p > .99$; enhanced vs. plain flows: $b = -0.16, z = -1.21, p = .22$).¹¹ In contrast with Experiment 1, though, there were also no significant differences for the question about when depletion would happen (stock vs. plain flows: $b = 0.15, z = 1.08, p = .28$; enhanced vs. plain flows: $b = 0.12, z = 0.87, p = .38$); the direction of the difference between the stock and two flows conditions is consistent with what we find in other studies.

We replicated the main results about understanding what would happen to benefits: participants in the stock condition were more likely to choose the wrong answer about benefits going away completely than those in the plain flows condition ($b = 0.29, z = 2.22, p = .027$). Contrary to our expectations, however, the enhanced flows condition did not provide a further reduction in inaccuracy on this question, as the difference between the plain flows and enhanced flows condition was negligible and not significant ($b = -0.01, z = -0.04, p = .96$).

We also analyzed the question about the amount of the expected benefits after depletion using the same method as Experiment 1. Among those who answered this question, the average amount entered was \$626 ($SD = \240); looking at the whole sample the average was \$300 ($SD = \387). Replicating

¹¹ There was, however, a significant interaction between the dummy code for stock vs. plain flows and question order. The interaction term is difficult to interpret in this context, and we do not have a specific theoretical explanation for it.

Experiment 1, those in the stock condition ($M_{stock} = \$264$, $SD_{stock} = \$373$) thought benefits would be significantly lower than those in the plain flows condition ($M_{plain\ flows} = \$318$, $SD_{plain\ flows} = \$390$; $b = -52.66$, $t(1495) = -2.15$, $p = .032$). However, the difference between the plain flows and enhanced flows condition was not significant ($M_{enhanced\ flows} = \$321$, $SD_{enhanced\ flows} = \$396$; $b = 3.79$, $t(1495) = 0.15$, $p = .88$), providing further support for the conclusion that the mere inclusion of the “payable benefits” line did not necessarily improve understanding.

Discussion

In contrast to the prior study, neither question about dates showed any significant differences, which may not be surprising given that the description shown to all participants mentioned these specific dates (although this was also the case in Experiment 1). More importantly, though, this study provides further evidence of the “stickiness” of the misconception that when the trust funds become depleted, benefits will fully disappear. Building on the previous study, we expected and found that the flows condition mitigates this misunderstanding relative to the stock condition – though more than half of participants across all conditions still thought this would be the case. Contrary to our expectations, the results from this study also suggest that including an explicit line corresponding to “payable benefits” in the enhanced flow condition does not provide any additional benefit for understanding.

Experiments 3a and 3b

While the flows manipulations used thus far significantly decreased the extent to which participants thought benefits would go away completely, levels of misunderstanding remained consistently high – over half of participants in the flows conditions in Experiments 1 and 2 still chose the incorrect option. Experiments 3a and 3b were designed to test a stronger manipulation that encourages participants to reason through what would happen to the inflows and outflows when the trust funds become depleted. This manipulation was inspired by Benjamin Franklin’s famous utterance that “nothing is certain except death and taxes” (Sparks, 1856, p. 410). Specifically, the intervention asks participants to consider whether Social Security will continue collecting taxes (in line with Benjamin Franklin, a large

majority say “yes”) and if so, what that money will be used for.¹² Experiment 3a provided an initial test of this novel intervention, and Experiment 3b served as a higher-power replication of both the intervention effect from Experiment 3a and the stock-flow effect from Experiments 1 and 2. As the procedure and analyses are almost identical for the two studies, we describe them together below.

Materials and Procedure

Our ending samples included 1,001 participants (out of 1,044 who started the study) from AMT for Experiment 3a ($M_{age} = 41.17$, $SD_{age} = 12.59$; 52% female) and 2,001 participants (out of 2,126 who started the study) from AMT for Experiment 3b ($M_{age} = 41.00$, $SD_{age} = 12.78$; 55% female). The beginning of the survey was identical to previous studies, where participants read a description of the trust funds accompanied by a stock or flow diagram (the same description and graphs as in Experiment 1; 3a: $n_{Stock} = 499$ and $n_{Flows} = 502$; 3b: $n_{Stock} = 1,005$ and $n_{Flows} = 996$) and then answered two questions (in random order) about when costs began to exceed income and when depletion was projected to happen. The key addition in these studies was the addition of two self-reflection questions: first, a yes/no question that asked if participants thought Social Security would continue to collect payroll taxes after depletion, and second, an open-ended question that asked participants about what they thought Social Security would do with the money if payroll taxes continued to be collected. These questions did not provide participants with any new information. Instead, they merely asked them to consider for themselves the consequences of whatever they already knew. Crucially, participants were randomly assigned to answer these questions as an intervention that came either before or after the questions about what would happen to benefits as a result of depletion. We refer to participants who saw the intervention before the questions about benefits as being in the treatment condition (3a: $n = 491$; 3b: $n = 998$) and those who saw the intervention after as being in the control condition (3a: $n = 510$; 3b: $n = 1,003$). Thus, these studies

¹² See Appendix 2 for a brief summary of an analysis looking at what participants write in at this question.

utilized a 2 (presentation: *stock* vs. *flow*) by 2 (intervention: *treatment* vs. *control*) design. The remainder of the surveys were the same as Experiments 1 and 2.¹³

Analyses

Just over half of participants in both studies (3a: 56%; 3b: 54%) correctly identified the date when total costs began to exceed total income, and about three-fourths (3a: 77%; 3b: 73%) of participants gave a correct answer when asked about when the trust funds would be depleted. Across all conditions, almost all participants correctly answered that Social Security would continue collecting taxes after depletion (3a: 90%; 3b: 89%). Despite this, accuracy about what would happen to benefits after depletion was still very low, with only 38% of Experiment 3a participants and 39% of Experiment 3b participants choosing the correct answer that benefits would still be paid out in smaller amounts.

We used regression analyses with contrast-coded predictors (-1, 1) to test the impact of presentation condition and intervention condition. As in previous studies, we also randomized the order of the first two objective knowledge questions about key dates, so all models include a contrast-coded predictor for order (-1, 1) that controls for this factor (we discuss findings related to this at the end of this section). Our models also include all two- and three-way interactions between factors. However, since none of these interactions are significant, we do not report on them below (see Appendix 3 for full model results). Following our preregistrations, we focus on stock-flow presentation effects only for the two date questions and both presentation and intervention effects for the questions about what happens to benefits.

As in previous studies, we did not see a significant main effect of presentation on accuracy in identifying when costs began to exceed income (3a: $b = 0.04$, $z = 0.61$, $p = .54$; 3b: $b = 0.01$, $z = 0.15$, $p = .88$). We did, however, replicate Experiment 1's finding that significantly more participants in the stock condition (3a: 79%; 3b: 78%) correctly identified the projected depletion date, compared to the flow condition (3a: 74%, $b = 0.17$, $z = 2.21$, $p = .027$; 3b: 69%, $b = 0.24$, $z = 4.66$, $p < .001$). The effect of intervention condition was non-significant for both of these dependent variables (3a income vs. costs: $b =$

¹³ The only exception is that Experiment 3b did not include the question that asked participants to write a headline about the future of Social Security.

0.06, $z = 0.90$, $p = .37$; 3b income vs. costs: $b = -0.01$, $z = -0.28$, $p = .78$; 3a depletion: $b = 0.03$, $z = 0.35$, $p = .73$; 3b depletion: $b = -0.02$, $z = 0.43$, $p = .67$), as expected given that everyone responded to these questions before the intervention.

Table 3. Summary table of results for all preregistered dependent variables for Experiments 3a and 3b

Measure ¹	Experiment 3a ($N = 1,001$)				Experiment 3b ($N = 2,002$)			
	Treatment		Control		Treatment		Control	
	Stock	Flows	Stock	Flows	Stock	Flows	Stock	Flows
Date questions (% correct) ²								
Depletion date	79%	73%	80%	74%	78%	69%	78%	68%
Costs exceed income date	54%	56%	59%	55%	52%	56%	56%	51%
What happens to benefits question (% choosing each option)								
Benefits go away completely ³	44%	43%	68%	65%	42%	36%	66%	58%
Paid, smaller amount ⁴	45%	48%	29%	31%	46%	51%	26%	33%
Paid, the same amount	10%	8%	2%	3%	10%	11%	7%	8%
Paid, larger amount	1%	1%	1%	0%	3%	2%	2%	2%
Benefits amount question ⁵ (mean (SD))	\$361 (387)	\$349 (383)	\$214 (346)	\$242 (351)	\$391 (405)	\$417 (401)	\$235 (374)	\$296 (393)

Note. ¹ Missing answers due to a participant failing to answer a question are marked as missing but are included in the base for calculating the proportion of correct answers. These participants are excluded from regression analyses. ² Following our preregistration, answers are coded as correct if the participant entered a date within +/- 1 year of the correct answer. ³ Whether or not participants choose this incorrect answer option is a key dependent variable across all studies. ⁴ This is the correct answer. ⁵ Following our preregistration, responses above \$2,000 are excluded from calculations. The correct value is estimated to be approximately \$750-800. ⁶ While we do not observe a significant main effect of stock vs. flows in this experiment, we do see directional evidence of a stock-flow difference on the key DV about what happens to benefits within the control condition.

Table 3 shows the breakdown of answers to the multiple-choice question about what happens to benefits for each experimental condition across both studies. Analyses focused on the incorrect answer (i.e., that benefits will go away completely) reveal that the main effect of presentation condition was not

significant in Experiment 3a ($b = 0.04, z = 0.59, p = .56$). However, this effect was significant in Experiment 3b, replicating earlier findings that those in the stock condition were more likely to choose the answer option that benefits would go away completely (54% vs. 47%; $b = 0.14, z = 3.10, p = .002$).¹⁴

The main effect of the intervention condition on answers to the question about what happens to benefits is significant and quite large in both studies. Participants in the treatment condition who were asked to reflect on what would happen to the inflow of payroll taxes before this question were significantly less likely to choose the incorrect answer option (3a: 43%; 3b: 39%) compared to those in the control condition who saw the intervention questions later (3a: 66%, $b = 0.48, z = 7.29, p < .001$; 3b: 62%, $b = 0.46, z = 10.02, p < .001$). A secondary, non-preregistered analysis focused on the correct answer revealed that participants in the treatment condition who answered the intervention questions first were more likely than those in the control condition to indicate that benefits would still be paid out at a smaller amount (3a: 47% vs. 30%, $b = -0.36, z = -5.40, p < .001$; 3b: 48% vs. 29%, $b = -0.41, z = -8.70, p < .001$).

Turning to the benefits amount question, the overall patterns of results are similar to previous studies. Among those who answered the question, the average amount written in was \$592 ($SD = \260) in Experiment 3a and \$606 ($SD = \291) in Experiment 3b; using imputed values based on our preregistered approach, the overall average was \$291 ($SD = \372) in Experiment 3a and \$335 ($SD = \400) in Experiment 3b. The main effect of stock-flow presentation was not significant in Experiment 3a ($b = -4.01, t(992) = -0.34, p = .73$) but was significant in Experiment 3b such that participants in the flow condition expected significantly higher monthly benefits ($M_{Flow} = \$359, SD_{Flow} = \402) than those in the stock condition ($M_{Stock} = \$311, SD_{Stock} = \$397; b = -21.26, t(1992) = -2.41, p = .016$). In both studies the

¹⁴ The simple effect of stock vs. flow in the control condition for Experiment 3a ($n = 510$) is directionally consistent with the stock-flow effect observed in other studies, with 68% in the stock condition choosing the wrong answer (vs. 65% in the flows condition). The simple effect in the treatment condition ($n = 491$) is directionally smaller, with 44% in the stock condition choosing the wrong answer (vs. 43% in the flow condition). The simple effects within the control and treatment conditions for Experiment 3b are in the expected direction, and similar in magnitude to prior studies: in the control condition ($n = 1,003$), 66% chose the wrong answer in the stock condition (vs. 58% in the flows condition); in the treatment condition ($n = 998$), 42% chose the wrong answer in the stock condition (vs. 36% in the flows condition).

effect of the intervention condition was significant such that participants in the treatment condition who saw the intervention questions first estimated significantly higher benefits amounts after trust fund depletion (3a: $M_{Treatment} = \$355$, $SD_{Treatment} = \$385$; 3b: $M_{Treatment} = \$404$, $SD_{Treatment} = \$403$), compared to those in the control condition who saw the intervention questions later (3a: $M_{Control} = \$229$, $SD_{Control} = \$349$, $b = -64.04$, $t(992) = -5.49$, $p < .001$; 3b: $M_{Control} = \$265$, $SD_{Control} = \$385$; $b = -68.98$, $t(1992) = -7.83$, $p < .001$). While still below the levels of what Social Security projections suggest could still be paid out (about \$750-800), the mean amounts in the treatment condition are closer to realistic projections than in the flows conditions from prior studies.

Finally, as in Experiments 1 and 2, we randomized the order in which we asked the first two objective knowledge questions about when costs began to exceed income and when depletion is projected to occur. Results in this study suggest a strong order effect on accuracy for both of these questions. Replicating our finding in Experiment 1, those who saw the question about the date when costs exceeded income first were less likely to answer correctly (3a: 47%; 3b: 50%) than those who saw that question second (3a: 64%, $b = 0.35$, $z = 5.41$, $p < .001$; 3b: 58%, $b = 0.16$, $z = 3.61$, $p < .001$). In Experiment 3a only, we also find a significant effect of order on accuracy for the depletion date question such that participants who answered this question first were more likely to answer correctly (80%) than those who answered the question about income and costs first (73%; $b = 0.18$, $z = 2.38$, $p = .017$). This was not replicated in Experiment 3b ($b = 0.04$, $z = 0.81$, $p = .42$). However, there was a significant order effect in Experiment 3b on the question about what happens to benefits such that participants who saw the depletion date question second were less likely to choose the correct answer option about partial benefits being possible after depletion (41% vs. 36%; $b = -0.09$, $z = -1.98$, $p = .048$). We report the full results of all models in Appendix 3 and return to potential interpretations in the General Discussion.

Discussion

In this pair of studies, we tested an intervention that drew participants' attention directly to the state of the inflows into the trust funds, asking them to consider whether Social Security would continue to collect payroll taxes after depletion and how that tax revenue would be used. Notably, a very large

majority – 90% of the sample in Experiment 3a and 89% in Experiment 3b – believed that Social Security would continue to receive these inflows, suggesting this specific aspect of Social Security policy is well understood. Importantly, however, those asked to reflect on this *before* answering a question about what would happen to benefits as a result of depletion were both less likely to think benefits would go away completely and more likely to choose the correct answer that partial benefits would still be paid out. Thus, this intervention, designed specifically to prompt participants to reflect on the fact that the trust funds would continue to receive inflows (i.e., income from payroll taxes), was successful in combatting the widely held misperception that Social Security benefits (i.e., outflows) will dry up when the trust funds do.

General Discussion

The Social Security trust funds hold and invest the surplus from payments that have been made into the system after benefits have been paid out. Because current projections suggest that the trust funds will be depleted by 2035, it is critical that researchers and policymakers alike determine how best to communicate information about the situation to constituents and beneficiaries. Yet, media headlines often emphasize how the trust funds will run dry, dwindling down to a balance of \$0, leading many everyday consumers to erroneously arrive at the conclusion that benefit payouts will dry up too. In this paper, we argue that one reason for these problematic interpretations is due to stock-flow reasoning errors: converting between stocks (the trust funds balance) and flows (the taxes paid in and benefits paid out over time) can be a difficult task to undertake.

In four pre-registered experiments, we tested whether differences in inferences regarding the Social Security trust funds arose based on reasoning about stocks versus flows. Namely, results from Experiments 1, 3a, and 3b suggest that presenting the information as a stock leads to higher accuracy regarding *when* depletion of the trust funds will occur; while this effect is not significant in Experiment 2, the direction of the difference is consistent. This is notable given the fact that all participants, regardless of condition, read a description that included the correct date of 2035. But as shown in our stimuli (see

Figure 1 and Figure 2), the stock graph made it very clear to participants that the balance would be running down to zero around 2035.

Our main results, however, center on inferences about *what* will happen to benefits after depletion. Experiment 1 found that relative to those in the flows condition, more respondents in the stock condition thought that benefits will go away completely. In Experiment 2, we used different stimuli that more closely resembled information presented in the Trustees reports, again finding that framing information in terms of flows reduced the proportion of respondents who think benefits will go away completely after depletion. We also tested an enhanced presentation format, in which we explicitly showed participants a line that represented payable benefits, with the purpose of highlighting when depletion occurs as well as what happens to benefits after that point. Responses to our central outcome variables were no different in this condition than they were in the standard flows condition, indicating just how difficult it may be to fully de-bias consumer perceptions of the SSA trust funds even with more explicit information. Together, these results hold practical importance as they suggest that framing trust funds information in terms of flows may help overcome misconceptions but that an enhanced presentation of flows (as SSA currently uses in its communications) does not seem to add further value.

Such framing, however, is not a panacea: more than half of those in the flows conditions across Experiments 1 and 2 still incorrectly answer questions about benefits payouts. To this end, Experiments 3a and 3b test an intervention aimed at further reducing the misconception that benefits stop completely when the trust funds become depleted and provide supportive process evidence about why this misunderstanding is so prevalent. This intervention was simple: we asked two targeted questions that asked participants to explicitly consider whether the funds' inflows (income from payroll taxes) would continue post-depletion, and if so, what that revenue would be used for. Despite its simplicity, the intervention of asking these questions before (vs. after) the questions about what happens to benefits resulted in a large reduction in the number of people who thought benefits would go away completely. While there may be ways to improve understanding even further, the results of this study point to this kind of targeted reflection being a promising technique for harnessing citizen beliefs about the continuity

of taxes to reinforce expectations for the continuity of benefits. It is also informative about the psychological attention process by indicating that participants are capable of the necessary stock-flow reasoning here – but that they may merely be unlikely to engage in it spontaneously unless otherwise prompted (e.g., by the intervention questions). This may provide a promising avenue for improving qualitative stock-flow reasoning problems more generally, which have previously proven stubbornly resistant to accuracy interventions (e.g., Cronin et al., 2009).

Unexpectedly, in Experiments 1, 3a, and 3b (though not Experiment 2), we also found that participants were more likely to correctly report the year in which costs began to exceed revenues when they did so after reporting when the trust fund would be depleted. Revealingly, among participants who did not enter the correct date for when costs started exceeding income, a majority entered the depletion date instead. This suggests that when encountering the question regarding flows after the question regarding stocks, respondents were more likely to distinguish between the two representations. In contrast, when encountering the question regarding flows first, they may not distinguish the two metrics and instead answer with respect to the stock.

This project was not without its limitations. First, although we targeted a representative sample, our studies were conducted solely on Amazon’s Mechanical Turk, leaving open questions of generalizability. Findings using online convenience samples like Amazon Mechanical Turk are strongly correlated with findings using (typically much more expensive) probability samples (Coppock, Leeper, & Mullinix, 2018; Mullinix et al., 2015; Peyton, Huber, & Coppock, 2021; Snowberg & Yariv, 2021), especially when using screeners such as the CloudResearch approved pool we used (Litman, Robinson, & Abberbock, 2017; Peer et al., 2021). Second, our studies did not include incentive-compatible outcomes or consequential choices and so it is possible that incentives could have enhanced accuracy (although unless they also would have reduced the difference between conditions, they would not pose a threat to our estimate of the effect of stock vs. flow presentation or the effect of our intervention; prior research suggests enhanced motivation is not sufficient; e.g., Cronin et al., 2009). Finally, even though we attempted to generate stimuli that closely resembled material used by Social Security, our materials were

written to be more accessible and understandable than the status quo. It is possible that differences between conditions would be muted were we to use actual SSA materials.

Despite these limitations, the results are promising and offer opportunities for future research. Specifically, more work is needed to better understand how to improve de-biasing attempts further. We reason that it may be difficult to alter perceptions about the trust funds precisely because the stock framing of the trust funds is so strongly ingrained. Indeed, media headlines themselves may reinforce a focus on stocks rather than flows (cf. Jerit & Barabas, 2006). Further, because stock-flow reasoning is so difficult, future interventions may need to be more involved and/or occur over multiple time points rather than the single-shot interventions we employed in these studies (e.g., the “enhanced flow” intervention in Experiment 2 or the reflection intervention in Experiments 3a and 3b). Finally, future work may benefit from studying not just perceptions of benefit payouts, but also preferences related to retirement benefit timing and SSA policies regarding taxes and benefits.

Policy decisions about the Social Security trust funds affect members of the public on many levels. Many workers incorporate expected OASI benefits into their retirement planning, meaning changes to taxes and benefits calculations or amounts may have wide-ranging consequences for prospective retirees. It is important that the public fully understands the situation in order to make informed decisions – both for their own retirement planning and in forming policy preferences. This work contributes to a deeper understanding of how communication about this complex policy topic can influence public understanding and discourse.

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Appendix 1

Key Results from Pilot Study

The purpose of the pilot study was to test our stimuli, refine our key dependent variables for assessing understanding, and explore additional measures that might be related to stock-flow reasoning about the trust funds. This pilot study was also preregistered on AsPredicted.¹⁵

We recruited 410 unique participants from Amazon's Mechanical Turk (AMT) to take part in this study, of whom 403 passed the screener and completed the full study ($M_{age} = 38.73$, $SD_{age} = 11.07$; 38% female). The content of measures and manipulations can be found in our Research Box.¹⁶

In the first section of the survey, we asked participants about their pre-existing knowledge about the future of Social Security's finances and gathered both open-ended answers about this and information on where participants learned this information. After this, participants read a brief description about the OASDI trust funds and were randomly assigned to see an accompanying graph that showed either the balance (*stock* condition, $n = 204$) or income and expenditures (*flows* condition, $n = 199$) of the trust funds for the period 1993 through 2033¹⁷. Next, participants answered a number of objective understanding questions about the trust funds, including questions about key dates (when total income began to exceed total costs and when the funds are projected to be depleted) and key features of the situation (whether current total income is enough to pay for yearly obligations and what will happen to benefits after depletion). While answering these questions, participants had the option to click a button that would allow them to see the description and graph (though participants were not informed this would be possible when they first saw the information). After this section, we asked a number of questions to assess related policy attitudes, expectations for the economy, subjective reactions, and subjective understanding of the information. The final sections of the survey asked about participants' own eligibility for retirement benefits and collected other demographic information. The results reported here focus on the objective understanding questions, as these are the questions most central to our research objectives and that are used (in modified forms) in the main studies.

Results by condition, including significance tests, are reported in Table A1 below. Note that the results are directionally consistent with the two main results we find across our main experiments – that the stock presentation leads to greater accuracy on the depletion date question and a higher rate of choosing the incorrect answer for the what happens to benefits question.

¹⁵ See https://aspredicted.org/MW1_B7K. Note: our preregistration contained a small error. Specifically, there was one yes/no question that preceded the question about when depletion would happen. This yes/no question asked if the trust funds would become depleted (correct answer: yes), and only those who answered this question correctly were asked the next question about when depletion would happen. Almost all participants (98%) correctly answered the yes/no question about whether depletion would happen.

¹⁶ Research Box available here: https://researchbox.org/1172&PEER_REVIEW_passcode=GQYVKB

¹⁷ The description was based on the 2021 Trustees Report, and the data were taken from the 2021 Supplemental Single-Year Tables (specifically, Table VI.G8 available at <https://www.ssa.gov/oact/TR/2021/lr6g8.html>). Of note, the 2022 Trustees Report was released while this survey was in-field. The data and projections from the 2022 Trustees Report are used for all other studies.

Table A1. Pilot study results summary

Answer ¹	Experimental Condition		Significance Test
	Stock	Flows	
Current income enough to cover benefits? (% correct)	74%	81%	$b = -0.21, z = -1.75, p = .08$
Will the funds become depleted? (% correct)	99%	97%	$b = 0.57, z = 1.39, p = .16$
Date questions (% correct) ²			
Depletion date	94%	88%	$b = 0.28, z = 1.35, p = .18$
Costs exceed income date	61%	69%	$b = -0.15, z = -1.40, p = .16$
What happens to benefits question (% choosing each option)			
Benefits go away completely ³	67%	58%	$b = 0.18, z = 1.73, p = .08$
Paid, smaller amount ⁴	28%	28%	
Paid, the same amount	4%	11%	
Paid, larger amount	1%	3%	
Benefits amount question (mean (SD)) ⁵	\$203.73 (326.15)	\$286.17 (389.51)	$b = -41.22, t(392) = -2.28, p = .023$

Note. ¹ Missing answers due to a participant failing to answer a question are marked as missing but are included in the base for calculating the proportion of correct answers. These participants are excluded from regression analyses. ² Following to our preregistration, answers are coded as correct if the participant entered a date within +/- 1 year of the correct answer. ³ Whether or not participants choose this incorrect answer option is a key dependent variable across all studies. ⁴ This is the correct answer. ⁵ In our preregistration we specified that we would also mark answers within +/- \$50 of \$780 as correct (in addition to analyzing as a mean). In keeping with our main studies, we report the mean and standard deviation of the amounts here.

Appendix 2

Coding Results from Studies 3a and 3b

A team of 3 research assistants coded a sample of 300 responses ($n = 100$ from Study 3a, and $n = 200$ from Study 3b) to the second question in our intervention. This question asked participants to write in how they thought Social Security would use any payroll taxes collected after the depletion date. The research assistants coded the open-ended text to assess whether the participant indicated the money would go towards paying out benefits (yes/no). We briefly discuss the results of this below, reporting frequencies based on how a majority of the research assistants categorized each response.

Among participants in the treatment group (who responded to these intervention questions *before* the multiple choice question about what happens to benefits), about half (52%) wrote that they thought the money would be used to pay benefits. Of those in the treatment condition, a larger proportion of participants who mentioned benefits in their open-ended response reported that at least some benefits would continue at the multiple choice question (75%; compared to 47% of participants whose open-ended responses did not mention benefits). In the control condition (where participants responded to the intervention question *after* the multiple choice question), 42% wrote in an answer about paying out benefits. Of those in the control group, 48% of participants who mentioned benefits in their response also indicated that some benefits would be paid at the multiple choice question, while only 27% of those who did not mention benefits reported that some benefits would be paid. The finding that those who saw the intervention question first and who wrote in benefits were most likely to indicate that benefits would still be paid (at the multiple choice question) roughly aligns with our proposed mechanism.¹⁸

¹⁸ These data are available from the researchers upon request.

Appendix 3

Full Model Results

Experiment 1

	<i>Dependent variable:</i>			
	Costs vs. income date (correct) (1)	Depletion date (correct) (2)	What happens to benefits (incorrect) (3)	Benefits amounts (in dollars) (4)
Flows vs. Stock	-0.0004 (0.064) p = 0.996	0.214** (0.075) p = 0.005	0.170** (0.065) p = 0.009	-36.996** (11.836) p = 0.002
Order	0.217*** (0.064) p = 0.001	0.027 (0.075) p = 0.716	-0.020 (0.065) p = 0.755	5.174 (11.836) p = 0.663
Flows vs. Stock * Order	-0.036 (0.064) p = 0.577	-0.064 (0.075) p = 0.391	0.058 (0.065) p = 0.370	-5.968 (11.836) p = 0.615
Constant	0.235*** (0.064) p = 0.0003	1.155*** (0.075) p = 0.000	0.414*** (0.065) p = 0.000	276.395*** (11.836) p = 0.000
Model type	Logistic	Logistic	Logistic	OLS
DV Coding	1 = 2021 +/- 1 year; 0 = all other answers	1 = 2035 +/- 1 year; 0 = all other answers	1 = benefits go away completely; 0 = all other answers	Written or imputed dollar amount
Observations	1,001	1,000	1,001	1,000

Note:

* $p < .05$; ** $p < .01$; *** $p < 0.001$

Experiment 2

	<i>Dependent variable:</i>			
	Costs vs. income date (correct) (1)	Depletion date (correct) (2)	What happens to benefits (incorrect) (3)	Benefits amounts (in dollars) (4)
Plain Flows vs. Stock	0.0004 (0.128) p = 0.998	0.152 (0.142) p = 0.283	0.285* (0.129) p = 0.027	-52.657* (24.495) p = 0.032
Plain Flows vs. Enhanced Flows	-0.155 (0.128) p = 0.225	0.124 (0.142) p = 0.384	-0.006 (0.127) p = 0.965	3.787 (24.470) p = 0.878
Order	-0.044 (0.090) p = 0.627	-0.032 (0.099) p = 0.748	-0.164 (0.090) p = 0.070	20.072 (17.317) p = 0.247
Plain Flows vs. Stock * Order	0.370** (0.128) p = 0.004	0.095 (0.142) p = 0.504	0.164 (0.129) p = 0.202	-11.416 (24.495) p = 0.642
Plain Flows vs. Enhanced Flows * Order	0.207 (0.128) p = 0.106	0.252 (0.142) p = 0.076	0.257* (0.127) p = 0.044	-23.652 (24.470) p = 0.334
Constant	-0.137 (0.090) p = 0.127	0.893*** (0.099) p = 0.000	0.179* (0.090) p = 0.048	316.720*** (17.317) p = 0.000
Model type	Logistic	Logistic	Logistic	OLS
DV Coding	1 = 2021 +/- 1 year; 0 = all other answers	1 = 2035 +/- 1 year; 0 = all other answers	1 = benefits go away completely; 0 = all other answers	Written or imputed dollar amount
Observations	1,499	1,502	1,503	1,501

*Note:** $p < .05$; ** $p < .01$; *** $p < 0.001$

Experiment 3a

	<i>Dependent variable:</i>				
	Costs vs. income date (correct)	Depletion date (correct)	What happens to benefits (incorrect)	What happens to benefits (correct)	Benefits amounts (in dollars)
	(1)	(2)	(3)	(4)	(5)
Flows vs. Stock	0.040 (0.065) p = 0.540	0.168* (0.076) p = 0.028	0.039 (0.066) p = 0.557	-0.054 (0.067) p = 0.416	-4.005 (11.659) p = 0.732
Treatment vs. Control	0.056 (0.065) p = 0.394	0.026 (0.076) p = 0.729	0.479*** (0.066) p = 0.000	-0.360*** (0.067) p = 0.00000	-64.044*** (11.659) p = 0.00000
Order	0.359*** (0.065) p = 0.00000	0.181* (0.076) p = 0.018	0.020 (0.066) p = 0.766	-0.014 (0.067) p = 0.836	0.366 (11.659) p = 0.975
Flows vs. Stock * Treatment vs. Control	0.070 (0.065) p = 0.286	-0.010 (0.076) p = 0.892	0.016 (0.066) p = 0.811	0.001 (0.067) p = 0.993	-9.498 (11.659) p = 0.416
Flows vs. Stock * Order	0.084 (0.065) p = 0.199	-0.011 (0.076) p = 0.886	0.034 (0.066) p = 0.609	-0.078 (0.067) p = 0.241	-4.218 (11.659) p = 0.718
Treatment vs. Control * Order	0.060 (0.065) p = 0.355	0.077 (0.076) p = 0.310	-0.073 (0.066) p = 0.266	0.102 (0.067) p = 0.128	9.865 (11.659) p = 0.398
Flows vs. Stock * Treatment vs. Control * Order	-0.086 (0.065) p = 0.190	0.039 (0.076) p = 0.608	0.014 (0.066) p = 0.828	0.014 (0.067) p = 0.839	-3.264 (11.659) p = 0.780
Constant	0.252*** (0.065) p = 0.0002	1.201*** (0.076) p = 0.000	0.203** (0.066) p = 0.003	-0.497*** (0.067) p = 0.000	291.506*** (11.659) p = 0.000
Model type	Logistic	Logistic	Logistic	Logistic	OLS
DV Coding	1 = 2021 +/- 1 year; 0 = all other answers	1 = 2035 +/- 1 year; 0 = all other answers	1 = benefits go away completely; 0 = all other answers	1 = smaller benefits; 0 = all other answers	Written or imputed dollar amount
Observations	997	999	1,000	1,000	1,000

*Note:** $p < .05$; ** $p < .01$; *** $p < 0.001$

Experiment 3b

	<i>Dependent variable:</i>				
	Costs vs. income date (correct)	Depletion date (correct)	What happens to benefits (incorrect)	What happens to benefits (correct)	Benefits amounts (in dollars)
	(1)	(2)	(3)	(4)	(5)
Flows vs. Stock	0.006 (0.045) p = 0.895	0.241*** (0.051) p = 0.00001	0.144** (0.046) p = 0.002	-0.141** (0.047) p = 0.003	-21.630* (8.807) p = 0.015
Treatment vs. Control	-0.014 (0.045) p = 0.765	-0.020 (0.051) p = 0.701	0.463*** (0.046) p = 0.000	-0.413*** (0.047) p = 0.000	-69.348*** (8.807) p = 0.000
Order	0.164*** (0.045) p = 0.0003	0.039 (0.051) p = 0.448	0.003 (0.046) p = 0.951	-0.094* (0.047) p = 0.048	12.700 (8.807) p = 0.150
Flows vs. Stock * Treatment vs. Control	0.081 (0.045) p = 0.075	0.018 (0.051) p = 0.727	0.026 (0.046) p = 0.578	-0.030 (0.047) p = 0.521	-8.503 (8.807) p = 0.335
Flows vs. Stock * Order	0.053 (0.045) p = 0.243	-0.025 (0.051) p = 0.628	0.006 (0.046) p = 0.894	0.022 (0.047) p = 0.643	-5.736 (8.807) p = 0.515
Treatment vs. Control * Order	-0.018 (0.045) p = 0.686	-0.065 (0.051) p = 0.208	-0.003 (0.046) p = 0.946	0.015 (0.047) p = 0.754	-7.400 (8.807) p = 0.401
Flows vs. Stock * Treatment vs. Control * Order	-0.106* (0.045) p = 0.019	-0.078 (0.051) p = 0.130	-0.045 (0.046) p = 0.325	0.034 (0.047) p = 0.471	7.815 (8.807) p = 0.375
Constant	0.149*** (0.045) p = 0.001	1.023*** (0.051) p = 0.000	0.021 (0.046) p = 0.652	-0.482*** (0.047) p = 0.000	334.784*** (8.807) p = 0.000
Model type	Logistic	Logistic	Logistic	Logistic	OLS
DV Coding	1 = 2021 +/- 1 year; 0 = all other answers	1 = 2035 +/- 1 year; 0 = all other answers	1 = benefits go away completely; 0 = all other answers	1 = smaller benefits; 0 = all other answers	Written or imputed dollar amount
Observations	1,998	1,999	2,000	2,000	1,999

*Note:** $p < .05$; ** $p < .01$; *** $p < 0.001$

Appendix 4

This appendix includes the key experimental manipulations and measures for all studies. Full materials are available in Research Box at https://researchbox.org/1172&PEER_REVIEW_passcode=GQYVKB

Experiment 1 Materials

Trust funds descriptions [seen by everyone]

Introduction

On the next page, we'll be showing you some information about the Social Security Old-Age and Survivors Insurance (OASI) and Disability Insurance (DI) trust funds (also known as the OASDI trust funds), based on the 2022 Trustees Report from the Social Security Administration (SSA). Even if you have seen information about this topic before, please make sure to read carefully as the next part of the survey will involve answering some questions about what you read.

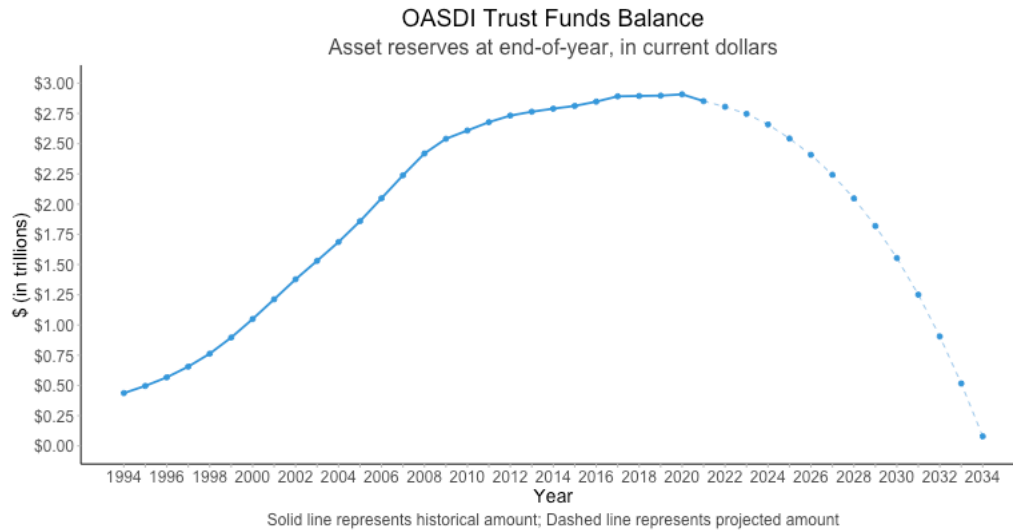
Description

The Social Security Administration uses accounts called “trust funds” to store income that’s collected through Social Security taxes and then eventually uses that money to pay out benefits. The OASI Trust Fund pays retirement and survivors benefits and the DI Trust Fund pays disability benefits, but the two are often referred to together as the OASDI Trust Funds. At the end of the year in 2021, the OASDI trust funds held \$2.85 trillion in total.

Social Security uses the OASDI trust funds to make benefits payments and pay administrative expenses. The trust funds receive income through two sources: tax revenue collected from workers and interest that comes from the investment of the money in US Government securities. In 2021, Social Security's total income from both of these sources was \$56 billion lower than its total costs (benefits payments plus administrative expenses). This was the first time in many years that total income was lower than total costs. Social Security predicts that in future years, total income will continue to be lower than total costs. Because of this continued projected deficit, the trust funds balance is projected to reach \$0 at some time in 2035.

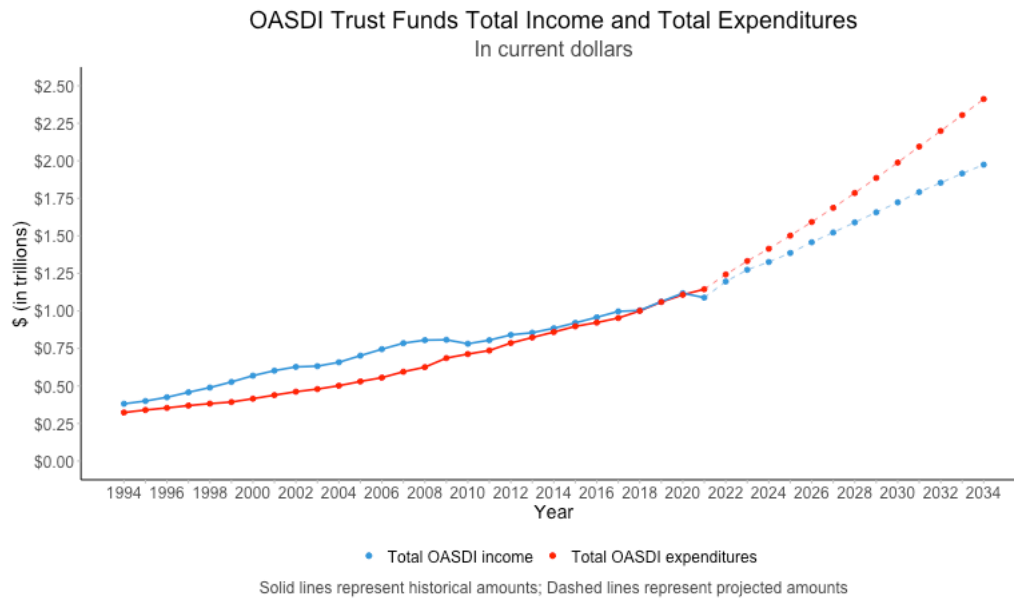
Stock condition

The chart below provides some more information on the situation of the OASDI trust funds. The chart depicts the historical and projected OASDI trust fund balance for the period 1994 through 2034, in trillions of dollars (scaled to the current dollar). The solid line shows the historical trust fund balance, and the dotted line shows the projected balance.



Flows condition

The chart below provides some more information on the situation of the OASDI trust funds. The chart depicts the historical and projected OASDI total income (from payroll taxes and interest) and expenditures for the period 1994 through 2034, in trillions of dollars (scaled to the current dollar). The solid lines show the historical trust funds income and expenditures, and the dotted lines show the projected income and expenditures.



Key outcome measures
[order of Q1 and Q2 randomized]

Question Introduction

Now we'd like to ask you a few questions about your understanding of and reactions to the information you just saw.

For the questions in this section, please answer them with the assumption that no changes are made to the Social Security system regarding taxes or how benefits are calculated.

Q1. Date: costs exceed income

According to your understanding, in what year did or will the Social Security OASDI trust funds' total costs begin to exceed total income?

If you don't think total costs have ever or will ever exceed total income, you can select the "Never" option at the bottom of the dropdown.

▼ 1994 (1994) ... 2050 (2050); Never (-99)

Q2. Date: depletion

According to your understanding, in what year did or will the Social Security OASDI trust funds become depleted? In other words, in what year did or will the trust funds run out of money?

If you don't think the trust funds have ever or will ever be depleted, you can select the "Never" option at the bottom of the dropdown.

▼ 1994 (1994) ... 2050 (2050); Never (-99)

Q3. What happens to benefits (multiple-choice)

Assuming the government does not take any action to increase the amount of income that Social Security collects based on tax revenues – in your view, what is most likely to happen to Social Security benefits if the trust funds are depleted?

If you aren't sure, please select the option that reflects your best guess.

- Social Security will no longer be able to pay out benefits (1)
- Social Security benefits will still get paid out and will be a smaller amount (2)
- Social Security benefits will still get paid out and will be the same amount (3)
- Social Security benefits will still get paid out and will be a larger amount (4)

Q4. Benefits amount [only asked of those who chose Social Security benefits will still get paid out and will be a smaller/larger amount above]

You just indicated that Social Security benefits will most likely still get paid out and will be a different amount if the trust funds are depleted.

Again, assuming the government does not take any action to increase the amount of income that Social Security collects based on tax revenues – for someone whose benefits are currently projected to be \$1,000 per month, what monthly amount might they expect after depletion of the trust funds?

\$(text box).00 per month

Experiment 2 Materials

Trust funds descriptions [seen by everyone]

Introduction

On the next page, we'll be showing you some information about the Social Security Old-Age and Survivors Insurance (OASI) and Disability Insurance (DI) trust funds (also known as the OASDI trust funds), based on the 2022 Trustees Report from the Social Security Administration (SSA). Even if you have seen information about this topic before, please make sure to read carefully as the next part of the survey will involve answering some questions about what you read.

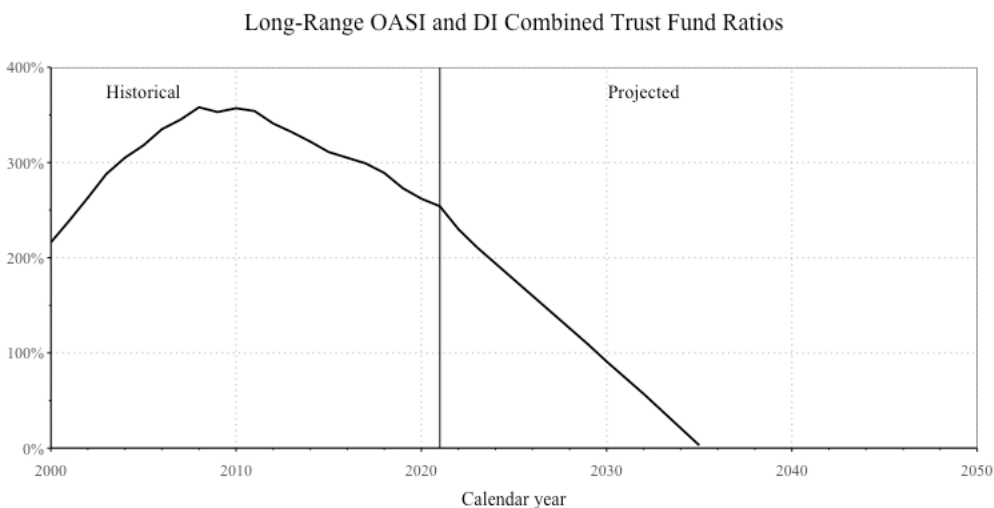
Description

The Social Security Administration uses accounts called "trust funds" to store income that's collected through Social Security taxes and then eventually uses that money to pay out benefits. The OASI Trust Fund pays retirement and survivors benefits and the DI Trust Fund pays disability benefits, but the two are often referred to together as the OASDI Trust Funds. At the end of the year in 2021, the OASDI trust funds held \$2.85 trillion in total.

Social Security uses the OASDI trust funds to make benefits payments and pay administrative expenses. The trust funds receive income through two sources: tax revenue collected from workers and interest that comes from the investment of the money in US Government securities. In 2010, Social Security's non-interest income (i.e., income from taxes) was \$49 billion lower than its total costs (benefits payments plus administrative expenses). This was the first time in many years that non-interest income was lower than total costs. Non-interest income has continued to be lower than total costs since then, and Social Security predicts that this will be the case in future years. Because of this continued projected deficit, the trust funds balance is projected to reach \$0 at some time in 2035.

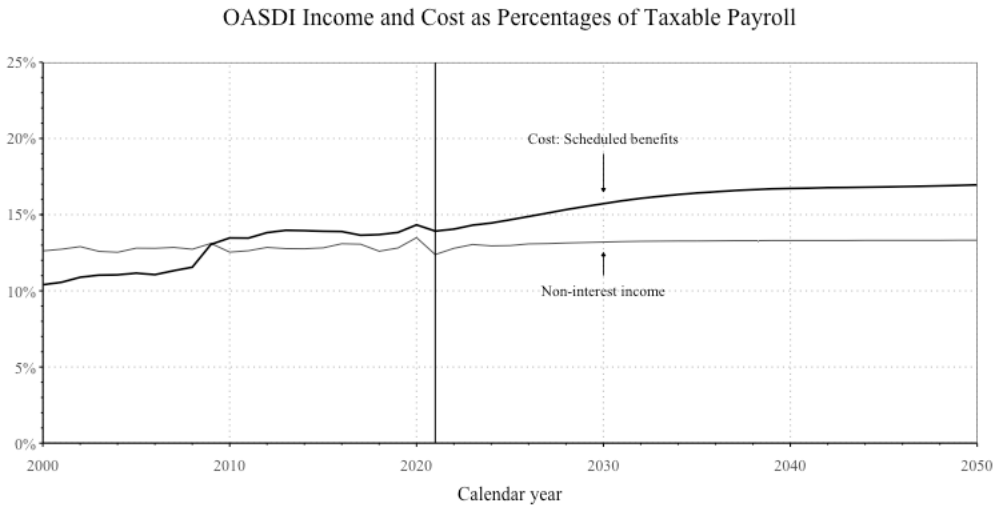
Stock condition

The chart below provides some more information on the situation of the OASDI trust funds. The chart depicts the historical and projected OASDI trust fund ratio for the period 2000 through 2050. The "trust fund ratio" is the value of trust fund asset reserves at the start of a year expressed as a percentage of the projected costs for the ensuing year.



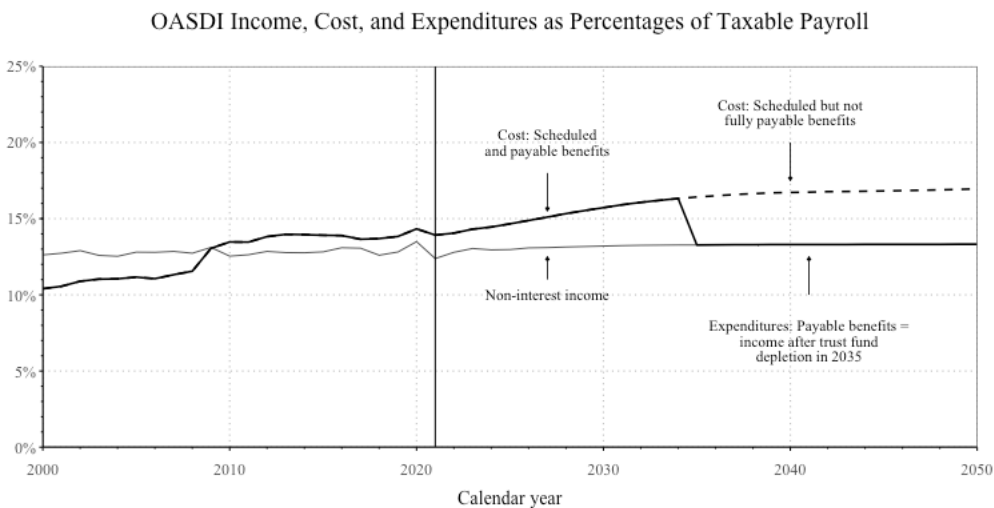
Plain flows condition

The chart below provides some more information on the situation of the OASDI trust funds. The chart depicts the historical and projected year-by-year relationship between OASDI income (excluding interest) and cost (including scheduled benefits) for the period 2000 through 2020. The figure shows all values as percentages of taxable payroll.



Enhanced flows condition

The chart below provides some more information on the situation of the OASDI trust funds. The chart depicts the historical and projected year-by-year relationship between OASDI income (excluding interest), cost (including scheduled benefits), and expenditures (including payable benefits) for the period 2000 through 2020. The figure shows all values as percentages of taxable payroll.



Key outcome measures
[order of Q1 and Q2 randomized]

Question Introduction

Now we'd like to ask you a few questions about your understanding of and reactions to the information you just saw.

For the questions in this section, please answer them with the assumption that no changes are made to the Social Security system regarding taxes or how benefits are calculated.

Q1. Date: costs exceed income

According to your understanding, in what year did or will the Social Security OASDI trust funds' total costs begin to exceed non-interest income?

If you don't think total costs have ever or will ever exceed non-interest income, you can select the "Never" option at the bottom of the dropdown.

▼ 2000 (2000) ... 2050 (2050); Never (-99)

Q2. Date: depletion

According to your understanding, in what year did or will the Social Security OASDI trust funds become depleted? In other words, in what year did or will the trust funds run out of money?

If you don't think the trust funds have ever or will ever be depleted, you can select the "Never" option at the bottom of the dropdown.

▼ 2000 (2000) ... 2050 (2050); Never (-99)

Q3. What happens to benefits (multiple-choice)

Assuming the government does not take any action to increase the amount of income that Social Security collects based on tax revenues – in your view, what is most likely to happen to Social Security benefits if the trust funds are depleted?

If you aren't sure, please select the option that reflects your best guess.

- Social Security will no longer be able to pay out benefits (1)
- Social Security benefits will still get paid out and will be a smaller amount (2)
- Social Security benefits will still get paid out and will be the same amount (3)
- Social Security benefits will still get paid out and will be a larger amount (4)

Q4. Benefits amount [only asked of those who chose Social Security benefits will still get paid out and will be a smaller/larger amount above]

You just indicated that Social Security benefits will most likely still get paid out and will be a different amount if the trust funds are depleted.

Again, assuming the government does not take any action to increase the amount of income that Social Security collects based on tax revenues – for someone whose benefits are currently projected to be \$1,000 per month, what monthly amount might they expect after depletion of the trust funds?

\$(text box).00 per month

Experiments 3a & 3b Materials

Trust funds descriptions [seen by everyone]

Introduction

On the next page, we'll be showing you some information about the Social Security Old-Age and Survivors Insurance (OASI) and Disability Insurance (DI) trust funds (also known as the OASDI trust funds), based on the 2022 Trustees Report from the Social Security Administration (SSA). Even if you have seen information about this topic before, please make sure to read carefully as the next part of the survey will involve answering some questions about what you read.

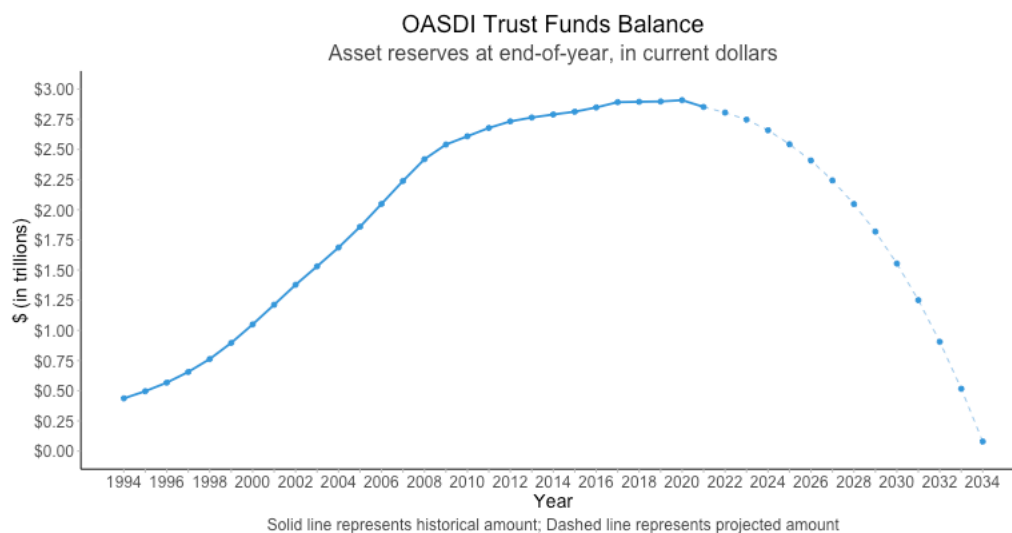
Description

The Social Security Administration uses accounts called “trust funds” to store income that’s collected through Social Security taxes and then eventually uses that money to pay out benefits. The OASI Trust Fund pays retirement and survivors benefits and the DI Trust Fund pays disability benefits, but the two are often referred to together as the OASDI Trust Funds. At the end of the year in 2021, the OASDI trust funds held \$2.85 trillion in total.

Social Security uses the OASDI trust funds to make benefits payments and pay administrative expenses. The trust funds receive income through two sources: tax revenue collected from workers and interest that comes from the investment of the money in US Government securities. In 2021, Social Security's total income from both of these sources was \$56 billion lower than its total costs (benefits payments plus administrative expenses). This was the first time in many years that total income was lower than total costs. Social Security predicts that in future years, total income will continue to be lower than total costs. Because of this continued projected deficit, the trust funds balance is projected to reach \$0 at some time in 2035.

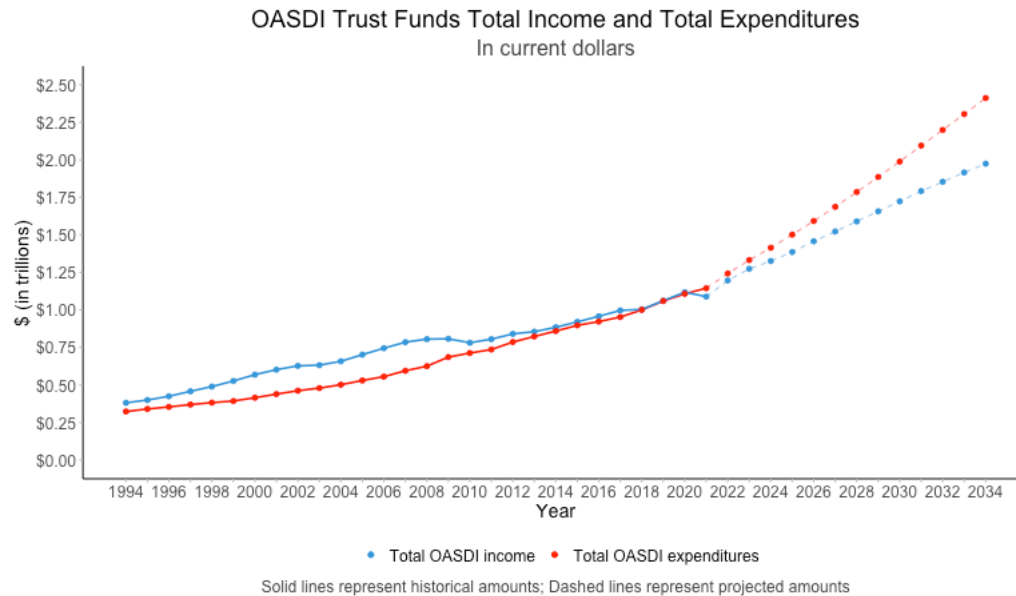
Stock condition

The chart below provides some more information on the situation of the OASDI trust funds. The chart depicts the historical and projected OASDI trust fund balance for the period 1994 through 2034, in trillions of dollars (scaled to the current dollar). The solid line shows the historical trust fund balance, and the dotted line shows the projected balance.



Flows condition

The chart below provides some more information on the situation of the OASDI trust funds. The chart depicts the historical and projected OASDI total income (from taxes and interest) and expenditures for the period 1994 through 2034, in trillions of dollars (scaled to the current dollar). The solid lines show the historical trust funds income and expenditures, and the dotted lines show the projected income and expenditures.



Key outcome measures [order of Q1 and Q2 randomized]

Question Introduction

Now we'd like to ask you a few questions about your understanding of and reactions to the information you just saw.

For the questions in this section, please answer them with the assumption that no changes are made to the Social Security system regarding taxes or how benefits are calculated.

Q1. Date: costs exceed income

According to your understanding, in what year did or will the Social Security OASDI trust funds' total costs begin to exceed total income?

If you don't think total costs have ever or will ever exceed total income, you can select the "Never" option at the bottom of the dropdown.

▼ 1994 (1994) ... 2050 (2050); Never (-99)

Q2. Date: depletion

According to your understanding, in what year did or will the Social Security OASDI trust funds become depleted? In other words, in what year did or will the trust funds run out of money?

If you don't think the trust funds have ever or will ever be depleted, you can select the "Never" option at the bottom of the dropdown.

▼ 1994 (1994) ... 2050 (2050); Never (-99)

Q3. What happens to benefits (multiple-choice)

Assuming the government does not take any action to increase the amount of income that Social Security collects based on tax revenues – in your view, what is most likely to happen to Social Security benefits if the trust funds are depleted?

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\$(text box).00 per month

Intervention Questions

[participants randomly assigned to answer these questions either before or after questions Q3 and Q4 above]

Q1. Income/Inflows Reflection

Most of the money that goes into the OASDI trust funds comes from a dedicated payroll tax. Employees and employers each pay 6.2% of wages up to the taxable maximum of \$147,000 (in 2022).

Assuming that Congress doesn't change the Social Security system of taxation, do you expect Social Security to continue to collect payroll taxes from workers and employees if the trust funds are depleted?

- Yes, Social Security will continue to collect payroll taxes (1)
- No, Social Security will not continue to collect payroll taxes (2)

Q2. Outflows Reflection

If the trust funds are depleted and if Social Security continues to collect payroll taxes, how do you expect those payroll taxes to be used?

[text box]